Study & Evaluation Scheme

of

In Collaboration with

Bachelor of Technology

(Computer Science & Engineering)
Specialization in Application Development using
Cloud and Analytics Platforms
[Applicable w.e.f. Academic Session – 2020-21 till revised]

[As per CBCS guidelines given by UGC]

TEERTHANKER MAHAVEER UNIVERSITY
N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001
Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U.P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P.)

Study & Evaluation Scheme	
SUMMARY	
Institute Name	*College of Computing Sciences and Information Technology, Teerthanker Mahaveer University, Delhi Road, Moradabad*
Programme	*B. Tech (Computer Science & Engineering) Specialization in Application Development using Cloud and Analytics Platforms*
Duration	*Four Years full time(Eight Semesters)*
Medium	*English*
Minimum Required Attendance	*75%*
Credits	
Maximum Credits	*196*
Minimum Credits Required for Degree	*180*

Assessment:					
Evaluation			**Internal**	**External**	**Total**
Theory			40	60	100
Practical/ Dissertations/ Project Reports/ Viva-Voce			50	50	100
Class Test-1	**Class Test-2**	**Class Test-3**	**Assignment(s)**	**Attendance& Participation**	**Total**
Best two out of three					
10	10	10	10	10	40
Duration of Examination			**External**	**Internal**	
			3 Hours	1.5 Hours	

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external).A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have at least 45% marks in aggregate to clear the semester.

 # Provision for delivery of 25% content through online mode.

 # Policy regarding promoting the students from semester to semester & year to year. No specific condition to earn the credit for promoting the students from one semester to next semester.

 # Maximum Duration: Maximum no of years required to complete the program: N+2 (N=No of years for program for B.TECH (CSE) N=4)

	Question Paper Structure
1	*The question paper shall consist of six questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question no. 2 to 6 (from Unit-I to V) shall have explanatory answers (approximately 350 to 400 words) along with having an internal choice within each unit.*
2	*Question No. 1 shall contain 8 parts from all units of the syllabus with at least one question from each unit and students shall have to answer any five, each part will carry 2 marks.*
3	*The remaining five questions shall have internal choice within each unit; each question will carry 10 marks.*
	Evaluation of practical course
1	**Practical Courses Internal Evaluation (50 marks)**
2	**Practical Courses External Evaluation (50 marks)** The external evaluation would also be done by the External Examiner based on the experiment performed during the examination.

Practical Courses Internal Evaluation:

EXPERIMENT (30 MARKS)	ATTENDANCE (10 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)

Practical Courses External Evaluation:

EXPERIMENT (30 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	TOTAL EXTERNAL (50 MARKS)

	IMPORTANT NOTES:
1	*The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to of attainment of Programme Specific Outcomes (PSOs). A question paper must assess the following aspects of learning: Remember Understand, Apply, Analyze, and Evaluate & Create (reference to Bloom's Taxonomy).*
2	*Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy) for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.*
3	*There shall be continuous evaluation of the student and there will be a provision of fortnight progress report.*
4	*Progression: There is no restriction to earn minimum credits for progression from semester to semester and year to year.*

Program Structure- B.Tech- Computer Science & Engineering In association with IBM with specializations in Application Development using Cloud and Analytics Platforms

A. Introduction:

Teerthanker Mahaveer University offers B.Tech.- Computer Science & Engineering In association with IBM with specializations in Application Development using Cloud and Analytics Platforms. IBM, which is a well known multi-national conglomerate having a turnover of more than US$ 100 billion and worldwide business in computer hardware/software, IT services and consulting shall deliver specialized modules in the above mentioned and other domain areas in consultation with IT industry to enhance employable skills of Engineering/ Management Graduates, which consist of Learning Management System, Student Project, Expert lectures from Corporate, visits to software development and testing centers. TMU students enrolled in this programmes shall be extensively exposed to professional environment and industrial experience under the mentorship of academic and IT Industry experts. Those students who excel in the specified domain skills shall definitely be preferred by the reputed IT employers through campus drive. IBM shall also issue certificates for various modules after their successful completion in addition to B.Tech (CSE) degree.

Course handouts for students will be provided in every course. A course handout is a thorough teaching plan of a faculty taking up a course. It is a blueprint which will guide the students about the pedagogical tools being used at different stages of the syllabus coverage and more specifically the topic-wise complete plan of discourse, that is, how the faculty members treat each and every topic from the syllabus and what they want the student to do, as an extra effort, for creating an effective learning. It may be a classroom exercise, an assignment- home or field, or anything else which is relevant and which can enhance their learning about that particular concept or topic. Due to limited availability of time, most relevant topics will have this kind of method in course handout.

Credit Category Distribution:

Minimum 196 credits required, out of maximum 180 credits offered in the programme, for the award of B.Tech degree. However, in each category other than core, the criteria to pass are given below:

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B.Tech : Four-Year (8-Semester) CBCS Programme			
Basic Structure: Distribution of Courses			
S.No.	**Type of Course**	**Credit Hours**	**Total Credits**
1	Professional Core Courses (PCC)	22Courses of 3 Credit Hrs. each (Total Credit Hrs. 22X3) 1 Courses of 4 Credit Hrs. each (Total Credit Hrs. 1X4)	70
2	Professional Elective Courses (PEC)	5 Courses of 3 Credit Hrs. each (Total Credit Hrs. 5X3) 1 Courses of 1 Credit Hrs. each (Total Credit Hrs. 1x1)	16
3	Basic Science Courses (BSC)	4 Courses of 4 Credit Hrs. each (Total Credit Hrs. 4X4) 1 Courses of 3 Credit Hrs. each (Total Credit Hrs. 1X3)	19
4	Engineering Science Courses (ESC)	2 Courses of 4 Credit Hrs. each (Total Credit Hrs. 2X4)	08
5	Open Elective Courses (OEC)	2 Courses of 3 Credit Hrs. each (Total Credit Hrs. 2X3)	06
6	Humanities And Social Science Courses (HSMC)	5 Courses of 3 Credit Hrs. each (Total Credit Hrs. 5X3) 2 Courses of 2 Credit Hrs. each (Total Credit Hrs. 2X2) 1 Courses of 4 Credit Hrs. each (Total Credit Hrs. 1X4)	23
7	Project / Industrial Training/Seminar (PROJ)	1 Courses of 6 Credit Hrs. each (Total Credit Hrs. 1X6) 3 Courses of 2 Credit Hrs. each (Total Credit Hrs. 3X2) 2 Courses of 4 Credit Hrs. each (Total Credit Hrs. 2X4)	20
8	Mandatory Courses (MC)	1 Courses of 3 Credit Hrs. each (Total Credit Hrs. 1X3)	3
9	Laboratory Courses (LC)	17 Courses of 1 Credit Hrs. each (Total Credit Hrs. 17X1) 7 Courses of 2 Credit Hrs. each (Total Credit Hrs. 7X2)	31
10	Value Added Audit Course (VAC)	6 Courses of 0 Credit Hrs. each (Total Credit Hrs. 6X0)	0
Total Credits			**196**

Contact hours include work related to Lecture, Tutorial and Practical (LTP), where our institution will have flexibility to decide course wise requirements.

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the B.Tech (Computer Science & Engineering) program:

Professional Core Course (PCC): Professional core courses of B.TECH (CSE) program will provide a holistic approach to computer education, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish computer knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase.

The core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the society at large.

A wide range of core courses provides groundwork in the basic computer disciplines: programming languages, Database, Web Programming, Mobile Applications, Big data, Data Mining, Machine Learning etc.

The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various computer fields.

HSMC – (Humanities and Social Sciences including Management courses): As per the AICTE guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the *Humanities and Social Sciences including Management courses* are actually Ability Enhancement Compulsory Course (AECC) which is designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture. We offer five HSMC courses of 3 credits, one HSMC courses of 4 credits and two courses of 2 credits in different semesters of engineering course.

Basic Science Course (BSC): Basic Science Course of B.TECH (CSE) program will provide a basic foundation to build the knowledge in the field of engineering and science. The BSC consists of courses like mathematics, physics and chemistry.

Engineering Science Course (ESC): Engineering Science Course of B.TECH (CSE) program will provide a basic foundation of the various field of engineering like Electrical, Electronics, Mechanical and Civil. These ESC courses has been placed in Semester-I & II and total 14 credits has been assigned with 2 Courses of 4 Credit,2 Courses of 1 Credit and 2 courses of 2 credit. .

Open Elective Course (OEC): Open Elective is an interdisciplinary additional subject that is compulsory in the seven and eight semester of a program. The score of Generic Elective is counted in your overall aggregate marks under Choice Based Credit System (CBCS). Each Generic Elective paper will be of 3 Credits and students will have the choice of taking 2 OEC: 1 each in Semester VII & VIII. Each student has to take Open Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Generic Electives.

Mandatory Course (MC): This is a compulsory course that does not have any choice and will be of 3 credits. Each student of B.TECH (CSE) program has to compulsorily pass the Environment Studies course and acquire 3 credits.

Value Added Course (VAC): A Value Added Course is a non-credit audit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to

nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester III, IV, V & VI semesters and two courses of Soft Skills in V &VI Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum 45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.

Professional Elective Course (PEC): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain. It will be covered from Vth semester onward of the program relevant to chosen disciplines of core courses of the program. Each student has to choose six Program Elective Course (PEC); 1 PEC in Semester-V of 3 credit, 1 PEC in Semester-VI of 3 credit, 2 PEC in Semester-VII of 3 credit and 1 credit each, 2 PEC in Semester VIII of 3 credit.

Laboratory Course (LC): The Lab Course (LC) is the laboratory course which student has to take as per the core courses. In computer science and engineering these lab course has the emphasis on technicalities related to enhancing the knowledge in programming languages / Database / web programming. Total 23 LC has to be chosen across the eight semester of with 13 courses of 1 credit and 5 courses of 2 credits.

Project / Industrial Training/ Seminar-Field Project (PROJ): The project and Industrial training has to be taken as per the guideline issued from time to time. It helps to provide the industrial exposure to the students. They are being able to learn, enhance their skills and utilize the learnt concept to be able to understand the facts practically. Total 20 credit are being assigned to it with 2 courses of 4 credit each in Vth Semester, 1 course of 6 credit in VII semester, 3 course of 2 credit in VIIth semester.

C. Programme Outcomes (PO's)

The learning and abilities or skills that a student would have developed by the end of four-year **B. Tech (Computer Science & Engineering) Specialization in Application Development using Cloud and Analytics Platforms:**

PO – 1	**Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO – 2	**Problem analysis:** identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusion using first principles of mathematics, natural science, and engineering science.
PO – 3	**Design/Development of solution:** Design solution for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental consideration.
PO – 4	**Conduct investigations of complex problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusion.

PO – 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering and IT tool including predication and modeling to complex engineering activities with an understanding of the limitation.
PO – 6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to access societal, health, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO – 7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO – 8	**Ethics:** Apply ethical principal and commit to professional ethics and responsibility and norms of engineering practices.
PO – 9	**Individual and team work**: function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO – 10	**Communication**: communicate effectively on complex engineering activities with the engineering communicate and with society at large such as being able to comprehend and right effective report and design documentation , make effective presentation , and give and receive clear instructions
PO – 11	**Project management and finance:** Demonstrate knowledge and understanding the engineering and management principles and apply these to one's own work as a member and leader in team, to manage projects in multidisciplinary environments
PO – 12	**Lifelong Learning**: recognize the need for, and have a presentation and ability to engage in independent and lifelong learning in the broadest context of technological change

D. Programme Specific Outcomes (PSOs)

The learning and abilities or skills that a student would have developed by the end of four-year **B. Tech (Computer Science & Engineering) Specialization in Application Development using Cloud and Analytics Platforms:**

PSO – 1	Understanding, analyzing and developing computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO – 2	Understanding the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success, real world problems and meet the challenges of the future.
PSO – 3	Applying and utilize modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, lifelong learning and a zest for higher studies and also to act as a good citizen by inculcating in them moral values & ethics.

PSO – 4	Developing intelligent systems and implement solutions to cater the business specific requirements.

E. Pedagogy & Unique practices adopted: "Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will **emphasize on experiential learning.**

*1. Case Based Learning***:** Case based learning enhances student skills at delineating the critical decision dilemmas faced by organizations, helps in applying concepts, principles and analytical skills to solve the delineated problems and develops effective templates for business problem solving. Case method of teaching is used as a critical learning tool for effective learning and we encourage it to the fullest.

2. Role Play & Simulation: Role-play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play& simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.

3. Video Based Learning (VBL) & Learning through Movies (LTM): These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become an indispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL & LTM, wherever possible.

*4. Field / Live Projects***:** The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.

5. Industrial Visits: Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

6. MOOCs: Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs.

University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through only NPTEL/Swayam could be given 2 credits for each MOOC course.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

a) This is recommended for every student to take at least one MOOC Course throughout the programme.

b) There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.

c) The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 credits defined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.

d) Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.

e) After completion of MOOC course, Student will submit the photo copy of Completion certificate of MOOC Course to the Examination cell as proof.

f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.

College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree

7. Special Guest Lectures (SGL): Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry, we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and provide greater insights.

8. Student Development Programs (SDP): Harnessing and developing the right talent for the right industry an overall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

9. Industry Focused programes: Establishing collaborations with various industry partners to deliver the programme on sharing basis. The specific courses/contents are to be delivered by industry experts to provide practice based insight to the students.

10. Special Assistance Programme for Slow & Fast Learners: The College gets a diverse group of students every year. They differ in terms of their intelligence , efforts and interest. We make efforts to identify them as Slow and fast learners within first three months of their joining. Slow learners are given extra time and sessions to bridge the learning gap under the guidance of faculty coordinator and Fast learners are provided challenging assignments/Projects/Readings and learning opportunity

11. Orientation Program: The Orientation Programme is designed keeping in mind the guidelines of UGC & the Council. This Programme is for 03 Weeks duration. The Programme designed by the College is Approved by the office of the Vice Chancellor. The purpose is to make the fresh students comfortable and provide awareness about the college and the university. The Topics covered are multi -faceted encompassing: Academic rules & regulation, Examination rules & regulation, Learning resources, participation in Extra -curricular & extra Mural Activities, Discipline, Conduct, Motivational talks, Industry talks, & Bridge Courses/content etc

12. Mentoring Scheme: Every Student shall be provided with a faculty Mentor to help him /her in their personal & Academic Issues. The mentor maintains a register of al all his/her mentees with complete personal & parents 'details. It is essential to have at least to meet once in a month. The mentor enters the discussions held, advice given and efforts & improvements made by the mentee. This register of the mentor must be counter signed by the HOD once a month and by the Principal once in a semester

13. Career & Personal Counseling: Helps Gain Confidence and Insight. Career Counseling helps a counselee understand the hurdles in his/her career path. This knowledge helps to develop the confidence to overcome these hurdles. It is the duty of a good counselor to provide such insight and confidence to the counselee.

14. Competitive Exam Preparation: It is true that competitive exams are not that easy to face it, but it is also not something impossible. With proper guidance and hard work of faculties, student's can easily crack any competitive exam such as GATE, Bank Services, Civil Services or any other govt. administrative platform.

15. Extra-curricular Activities: organizing & participation in extracurricular activities will be mandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

16. Participation in Workshops, Seminars & writing & Presenting Papers: A seminar may have several purposes or just one purpose. For instance, a seminar may be for the purpose of education, such as a lecture, where the participants engage in the discussion of an academic subject for the aim of gaining a better insight into the subject. Other forms of educational seminars might be held to impart some skills or knowledge to the participants.

17. Formation of Student Clubs, Membership & Organizing & Participating events: Computer Science clubs channelize the energies of students and make use of their skills and talents, which satisfy their instincts and urges and helps in their overall personality development. Through activities of a computer science club, learning of computer science and its applications become joyful. The computer science club caters to freedom for expression, where as the classroom atmosphere leads to conformity and repression. Students organize thought and translate into action.

18. Capability Enhancement & Development Schemes: The development of soft skills has become important in today's fast growing world. The students at the college are taught to communicate and interact at a professional level. The qualities of confidence and critical thinking are developed making the students better at soft skills. Soft skill development courses inculcate ethical attitude towards others and also help in the nurturing of better interpersonal skills. Much of the communication related activities are developed and taught to students who are willing and interested to enhance their skills.

19. **Library Visit & Utilization of E-Learning Resources:** Student can visit the library from morning 10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.

    a) Institute Library & Information is subscribing online e-books and e-journals databases (DELNET and EBSCO host E-databases) as per the requirement of the institute and fulfilling AICTE norms. IP based access is given to all computers connected on campus LAN to access e-journals.

    b) For the effective utilization of resources, Information Literacy training programs are conducted to the staff and students.

    c) Wi-Fi enabled campus

    d) Regular addition of latest books and journals

    e) Well maintained e-library to access e-resources

B.Tech. (CSE) Specialization in Application Development Using Cloud and Analytics Platforms

B.Tech - Semester I

S.N.	Category Code	Course Code	Course Name	L	T	P	Credit	Internal	External	Total
1.	BSC-I	EAS116	Engineering Mathematics – I	3	1	0	4	40	60	100
2.	BSC-II	EAS112	Engineering Physics	3	1	0	4	40	60	100
		EAS113	Engineering Chemistry							
3.	PCC-I	IBD111	Software Foundation and Programming (with 'C')	3	0	0	3	40	60	100
4.	ESC-I	EEE117	Basics Electrical Engineering	3	1	0	4	40	60	100
		EEC111	Basics Electronics Engineering							
5.	MC-I	TMU101	Environmental Studies	2	1	0	3	40	60	100
6.	HSMC-I	TMUGE101	English communication – I	2	0	2	3	50	50	100
7.	LC-I	EAS162	Engineering Physics (Lab)	0	0	2	1	50	50	100
		EAS163	Engineering Chemistry (Lab)							
8.	LC-II	IBD151	Software Foundation and Programming 1 (with 'C') Lab	0	0	2	1	50	50	100
9.	LC-III	EEE161	Basic Electrical Engineering (Lab)	0	0	2	1	50	50	100
		EEC161	Basics Electronics Engineering (Lab)							
10.	LC-IV	EME 161	Engineering Drawing (Lab)	0	0	4	2	50	50	100
		EME 162	Workshop Practice (Lab)							
			Total	**16**	**4**	**12**	**26**	**450**	**550**	**1000**

B.Tech - SEMESTER II

S.N.	Category Code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	BSC-III	EAS211	Engineering Mathematics-II	3	1	0	4	40	60	100
2.	BSC-IV	EAS 212	Engineering Physics	3	1	0	4	40	60	100
		EAS213	Engineering Chemistry							
3.	ESC-II	EEC 211 EEE 217	Basic Electronic Engineering	3	1	0	4	40	60	100
			Basics Electrical Engineering							
4.	PCC-II	IBD211	Programming with Python	3	0	0	3	40	60	100
5.	HSMC-II	TMUGE201	English communication– II	2	0	2	3	40	60	100
6.	LC-V	EAS 262	Engineering Physics Lab	0	0	2	1	50	50	100
		EAS 263	Engineering Chemistry Lab							
7.	LC-VI	EEC 261	Basic Electronics Engineering Lab	0	0	2	1	50	50	100
		EEE 261	Basic Electrical Engineering Lab							
8.	LC-VII	IBD252	Programming with Python Lab	0	0	2	1	50	50	100
9.	LC-VIII	EME 262	Workshop Practice Lab	0	0	4	2	50	50	100
		EME 261	Engineering Drawing Lab							
Total				14	3	12	23	400	500	900

SEMESTER III

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1.	PCC-III	ECS305	Data Structure using C++	3	0	0	3	40	60	100
2.	PCC-IV	IBD311	OOPS with Java	3	0	0	3	40	60	100
3.	PCC-V	EEC 302	Digital electronics & Computer Organization	3	0	0	3	40	60	100
4.	BSC-V	EAS 301	Mathematics III	3	0	0	3	40	60	100
5.	HSMC-III	EAS 303	Human Values & Professional Ethics	2	0	0	2	40	60	100
6.	HSMC-IV	TMUGE301	English Communication -III	2	0	2	3	40	60	100
7.	LC-IX	ECS 355	Data Structure using C++ Lab	0	0	4	2	50	50	100
8.	LC-X	IBD351	OOPS with Java Lab	0	0	4	2	50	50	100
9.	LC-XI	EEC 351	Digital Logic & Circuit Lab	0	0	2	1	50	50	100
			Total	16	0	12	22	390	510	900

For **Lateral Entry student with polytechnic/ B.Sc background will have to pass below additional courses either in IIIrd or IVth semester with minimum 40% marks if they have not taken these courses in their polytechnic/B.Sc degree.**

1	LC-IV	EME161/261	Engineering Drawing (Lab)	-	-	4	-	50	50	100
2	LC-VIII	EME162/262	Workshop Practice (Lab)	-	-	4	-	50	50	100
3	HSMC-1	TMU101	Environmental Studies	2	1	3	-	40	60	100

Value Added Course:

It is an audit course. The performance of the student in this course will not be counted in the overall result however the student has to pass it compulsorily with 45% marks.

Value Added Course*

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-I	TMUGA-301	Foundation Course in Quantitative Aptitude – I	2	1	0	0	40	60	100

*Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

S.N	Category Code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	L
1.	PCC-VI	ECS 401	Theory of Computation	3	0	0	3	40	60	100
2.	PCC-VII	ECS 405	Computer Based Numerical & Statistical Techniques	3	0	0	3	40	60	100
3.	PCC-VIII	IBD411	Basics of Information Management	3	0	0	3	40	60	100
4.	PCC-IX	IBD413	Agile Development Methodologies	3	0	0	3	40	60	100
5.	PCC-X	ECS 406	Operating System	3	0	0	3	40	60	100
6.	HSMC-V	EHM 403	Management Concepts & Organizational Behavior	2	0	0	2	40	60	100
7.	HSMC-VI	TMUGE401	English Communication -IV	2	0	2	3	50	50	100
8.	LC-XII	ECS 453	Computer Based Numerical & Statistical Techniques (Lab)	0	0	2	1	50	50	100
9.	LC-XIII	IBD451	Information Management Basics (Lab)	0	0	2	1	50	50	100
10.	LC-XIV	IBD453	Agile Development Methodologies Lab	0	0	2	1	50	50	100
11.	LC-XV	ECS 455	OS Lab with software Engineering (LAB)	0	0	2	1	50	50	100
			Total	19	0	10	24	490	610	1100

Value Added Course*

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-II	TMUGA -401	Analytical Reasoning	2	1	0	0	40	60	100

*Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

NOTE: After the examination of 4th Semester. Student has to take industrial training of minimum 40days before the starting of 5th Semester. The evaluation will be performed with below mentioned code in 5th semester.

PROJ-1	ECS591	Industrial Training

S.N	Category Code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	L
1.	PCC-XI	ECS511	Computer Architecture	3	0	0	3	40	60	100
2.	PCC-XII	ECS 510	Computer Networks	3	0	0	3	40	60	100
3.	PCC-XIII	ECS503	Analysis and Design of Algorithm	3	1	0	4	40	60	100
4.	PCC-XIV	*IBD514	Cloud Application Development	3	0	0	3	40	60	100
5.	PCC-XV	IBD 515	Hadoop Fundamentals	3	0	0	3	40	60	100
6.	PEC-I		Professional Elective Course-I	3	0	0	3	40	60	100
7.	LC-XVI	ECS552	Analysis and Design of Algorithm (Lab)	0	0	2	1	50	50	100
8	LC-XVII	IBD 553	Cloud Application Development (Lab)	0	0	4	2	50	50	100
9	LC-XVIII	IBD 554	Hadoop Fundamentals (Lab)	0	0	2	1	50	50	100
10.	PROJ-I	ECS591	Industrial Training	0	0	0	2	50	50	100
11	PROJ-II	ECS555	MOOC Course	0	0	0	2	50	50	100
			Total	18	1	8	27	490	610	1100

*MOOC Evaluation will be same as per MOOC guidelines.

Value Added Course***

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total L
1	VAC-III	TMUGA - 501	Modern Algebra and Data Management	2	1	0	0	40	60	100
2	VAC-IV	TMUGS-501	Managing Self	2	1	0	0	50	50	100

***Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

SEMESTER VI

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	L
1	PCC-XVI	ECS 611	Data Warehousing and Data Mining with R- programming	3	0	0	3	40	60	100
2.	PCC-XVII	ECS 612	Mobile Communication	3	0	0	3	40	60	100
3.	PCC-XVIII	*IBD613	Big Data Engineering	3	0	0	3	40	60	100
4.	HSMC-VII	FOE023	Entrepreneurship	3	1	0	4	40	60	100
5.	PEC-II		Professional Elective Course-II	3	0	0	3	40	60	100
6.	LC-XIX	IBD653	Big Data Engineering (Lab)	0	0	4	2	50	50	100
7.	PROJ-III	ECS 692	Seminar (Field Project)	-	-	-	2	50	50	100
8	LC-XX	ECS654	Data Warehousing and Data Mining with R- programming (Lab)	0	0	2	1	50	50	100
			Total	15	1	6	21	350	450	800

Value Added Course*

S.N	Category code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	VAC-V	TMUGA - 601	Advance Algebra and Geometry	2	1	0	0	40	60	100
2	VAC-VI	TMUGS-601	Managing Work and Others	2	1	0	0	50	50	100

*Value Added Courses (VAC) is an audit course. The result of this course will not be added to overall result of the programme. However, it will be compulsory to pass the course with minimum 45% including both faculty continuous & end semester examination.

NOTE: After the examination of 6th Semester. Student has to take industrial training of 40days minimum before the starting of 7th Semester. The evaluation will be performed with below mentioned code in 7th semester.

PROJ-4	ECS791	Industrial Training - II

SEMESTER VII

S.N.	Category Code	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		*Internal*	*External*	L
1.	PCC-XIX	IBD 715	Spring Framework	3	0	0	3	40	60	100
2.	PCC-XX	ECS 703	Cryptography & Network Security	3	0	0	3	40	60	100
3.	PCC-XXI	IBD713	Advanced RDBMS	3	0	0	3	40	60	100
4.	PCC-XXII	*IBD716	Artificial Intelligence	3	0	0	3	40	60	100
5.	PEC-III	Professional Elective Course-III		3	0	0	3	40	60	100
6.	PEC-IV	Professional Elective Course-IV (Lab)		0	0	2	1	50	50	100
7.	LC-XXI	IBD755	Spring Framework (Lab)	0	0	2	1	50	50	100
8.	LC-XXII	IBD753	Advanced RDBMS (Lab)	0	0	2	1	50	50	100
9.	LC-XXIII	IBD756	Artificial Intelligence (Lab)	0	0	4	2	50	50	100
10.	PROJ-IV	ECS 791	Industrial Training-II	0	0	0	4	50	50	100
11.	PROJ-V	ECS 799	Project Work Phase –I	0	0	8	4	50	50	100
12	OEC-I		Open Elective- I	3	0	0	3	40	60	100
			Total	**18**	**0**	**18**	**31**	**540**	**660**	**1200**

SEMESTER VIII

S. No	Course Category	Course Code	Course Name	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	HSMC-VIII	EHM801	Project Management for Engineers	3	0	0	3	40	60	100
2	PCC-XXIII	ECS812	Big Data Analytics	3	0	0	3	40	60	100
3	PEC-V	Professional Elective Course-V		3	0	0	3	40	60	100
4	PEC-VI	Professional Elective Course-VI		3	0	0	3	40	60	100
5	LC-XXIV	ECS855	Big Data Analytics (Lab)	0	0	2	1	50	50	100
6	PROJ-VI	ECS899	Project Work Phase- 2	0	0	12	6	50	50	100
7	OEC-II		OPEN ELECTIVE -II	3	0	0	3	40	60	100
	Total			15	0	14	22	300	400	700

Scheme of Professional Elective Course (PEC)

	Professional Elective Courses (PEC) I (Semester-V)- Select any one course from Group No 1 given below:		
1	**[Group No 1]** **Professional Elective Courses (PEC)-I**	**Course code**	**Course**
		ECS506	ERP System
		EHM504	Managerial Economics & Engineering
		ECS512	E-commerce
		ECS513	Software Project Management
		ECS514	Software Testing
	Professional Elective Courses (PEC)-II (Semester-VI) - Select any one course from Group No 2 given below:		
2	**[Group No 2]** **Professional Elective Courses (PEC)-II**	**Course code**	**Course**
		ECS606	Real Time Operating System
		ECS607	Soft Computing
		EEC606	Microprocessor & Applications
		ECS603	Computer Graphics
		ECS610	Cyber Law & Information Security
		ECS613	Compiler Design and Construction
		ECS614	Multimedia & Animation
	Professional Elective Courses (PEC)-III (Semester-VII) - Select any one course from Group No 3 given below:		
3	**[Group No 3]** **Professional Elective Courses (PEC)-III**	**Course code**	**Course**
		ECS713	Data compression
		ECS716	Digital Image Processing
		ECS5717	Android Programming
	Professional Elective Courses (PEC)-IV (Lab) (Semester-VII) - Select any one course from Group No 4 same as one selected from Group No 3 mentioned above		
4	**[Group No 4]** **Professional Elective Courses (PEC)-IV (Lab)**	**Course code**	**Course**
		ECS754	Data compression(LAB)
		ECS756	Digital Image Processing Using SCI-Lab (Lab)
		ECS757	Android Programming (Lab)

Professional Elective Courses (PEC)-V (Semester-VIII) - Select any one course from Group No 5 given below:			
5	**[Group No 5]** **Professional Elective Courses (PEC)-V**	**Course code**	**Course**
		ECS809	Pattern Recognition
		ECS810	Neural Network
		ECS811	Natural Language Processing
		ECS814	Block Chain Technology

Professional Elective Courses (PEC)-VI (Semester-VIII) - Select any one course from Group No 6 given below:			
6	**[Group No 6]** **Professional Elective Courses (PEC)-VI**	**Course code**	**Course**
		ECS805	Distributed System
		ECS812	Concept of IoT(Internet of Things)
		ECS813	Machine Learning

Course Code: EAS116	Basic Science Course-I B.Tech- Semester-I **Engineering Mathematics-I**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	*Understanding* the concepts of eigen values and eigenvectors, Optimization & derivatives of functions of several variables, partial and total differentiation, implicit functions.	
CO2.	*Understanding* the concepts of curl and divergence of vector field.	
CO3.	*Understanding* of Green's theorem, Gauss Theorem, and Stokes theorem.	
CO4.	*Applying* the concept of Leibnitz's theorem for successive derivatives.	
CO5.	*Analyzing* the intangibility of a differential equation to find the optimal solution of first order first degree equations.	
CO6.	*Evaluating* the double integration and triple integration using Cartesian, polar co-ordinates and the concept of Jacobian of transformation.	
Course Content:		
Unit-1:	**Determinants**- Rules of computation; Linear Equations and Cramer's rule. **Matrices:** Elementary row and column transformation; Rank of matrix; Linear dependence; Consistency of linear system of equations; Characteristic equation; Cayley-Hamilton Theorem (without proof); Eigen values and Eigen vectors; Complex and Unitary matrices.	**8 Hours**
Unit-2:	**Differential Equation--**First order first degree Differential equation: variable separable, Homogeneous method, Linear differential equation method, Exact Differential equation.	**8 Hours**
Unit-3:	**Differential Calculus:** Leibnitz theorem; Partial differentiation; Euler's theorem; Change of variables; Expansion of function of several variables, Jacobians, Error function.	**8 Hours**
Unit-4:	**Multiple Integrals:** Double integral, Triple integral, Beta and Gamma functions; Dirichlet theorem for three variables, Liouville's Extension of Dirichlet theorem.	**8 Hours**
Unit-5:	**Vector Differentiation:** Vector function, Differentiation of vectors, Formulae of Differentiation, Scalar and Vector point function, Geometrical Meaning of Gradient, Normal and Directional Derivative, Divergence of a vector function, Curl of a vector **Vector Integration:** Green's theorem, Stokes' theorem; Gauss' divergence theorem.	**8 Hours**
Text Books:	1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.	
Reference Books:	1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern. 2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers. 3. Narayan Shanti, *A Text book of Matrices*, S. Chand ***Latest editions of all the suggested books are recommended.**	

| Additional electronic reference material: | 1. https://www.youtube.com/watch?v=EGnI8WyYb3o

2. https://www.youtube.com/watch?v=ksS_yOK1vtk&list=PLbRMhDVUMngfIr ZCNOyPZwHUU1pP66vQW | |

	Basic Science Course- II	
Course Code: EAS112	**B.Tech- Semester-I** **Engineering Physics**	**L-3** **T-1** **P-0** **C-4**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the basic concepts of interference, diffraction and polarisation.	
CO2.	**Understanding** the concept of bonding in solids and semiconductors.	
CO3.	**Understanding** the special theory of relativity.	
CO4.	**Applying** special theory of relativity to explain the phenomenon of length contraction, time dilation, mass-energy equivalence etc.	
CO5.	**Applying** the concepts of polarized light by the Brewster's and Malus Law	
Course Content:		
Unit-1:	**Interference of Light:** Introduction, Principle of Superposition, and Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.	**8 Hours**
Unit-2:	**Diffraction**: Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. **Single slit diffraction**: Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. **Resolving Power**: Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.	**8 Hours**
Unit-3:	**Polarization:** Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.	**8 Hours**
Unit-4:	**Elements of Material Science:** Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi-Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. **Hall Effect:** Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.	**8 Hours**
Unit-5:	**Special Theory of Relativity:** Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.	**8 Hours**
Text Books:	1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.	
Reference Books:	1. F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw-Hill. 2. Concept of Modern Physics, Beiser, Tata McGraw-Hill. 3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore. ***Latest editions of all the suggested books are recommended.**	

Additional electronic reference material:	1. https://www.youtube.com/watch?v=toGH5BdgRZ4&list=PLD9DDFBDC338226CA 2. https://www.youtube.com/watch?v=CuqsU7B1MtU

Course Code: EAS162	Laboratory Course- I B.Tech- Semester-I **Engineering Physics (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** of the operation of various models of optical devices.	
CO2.	**Understanding** types of Semiconductors using Hall experiments.	
CO3.	**Applying** the concept of interference, polarization & dispersion in optical devices through Newton's ring, Laser, polarimeter & spectrometer.	
CO4.	**Applying** the concept of resonance to determine the AC frequency using sonometer & Melde's apparatus.	
CO5.	**Applying** the concept of resolving & dispersive power by a prism.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list:**	
1	To determine the wavelength of monochromatic light by Newton's ring.	
2	To determine the wavelength of monochromatic light by Michelson-Morley experiment.	
3	To determine the wavelength of monochromatic light by Fresnel's Bi-prism.To determine the Planck's constant using LEDs of different colours.	
4	To determine the Planck's constant using LEDs of different colours.	
5	To determine the specific rotation of cane sugar solution using Polarimeter	
6	To verify Stefan's Law by electrical method	
7	To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up	
8	To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.	
9	To compare Illuminating Powers by a Photometer.	
10	To determine the frequency of A.C. mains by means of a Sonometer.	
11	To determine refractive index of a prism material by spectrometer	
12	To determine the Flashing & Quenching of Neon bulb.	
13	Determination of Cauchy's constant by using spectrometer.	
14	To study the PN junction characteristics	
15	To determine the resolving power and dispersive power by a prism	
16	To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode	
17	Study the characteristics of LDR	

18	To study the characteristics of a photo-cell.	
Books:	1. B.Sc.Practical Physics, Gupta and Kumar, PragatiPrakashan. 2. B.Sc. Practical Physics, C.L. Arora, S. Chand & Company Pvt. Ltd. ***Latest editions of all the suggested books are recommended.**	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EAS113	Basic Science Course- II B.Tech- Semester-I **Engineering Chemistry**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concept of softening & purification of water.	
CO2.	**Understanding** calorific value& combustion, analysis of coal, Physical & Chemical properties of hydrocarbons & quality improvements.	
CO3.	**Understanding** the concept of lubrication, Properties of Refractory & Manufacturing of cements.	
CO4.	**Applying** the concepts of the mechanism of polymerization reactions, Natural and synthetic rubber& vulcanization.	
CO5.	**Applying** the concepts of spectroscopic & chromatographic techniques.	
Course Content:		
Unit-1:	**Water and Its Industrial Applications:** Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgonetc	**8 Hours**
Unit-2:	**Fuels and Combustion:** Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of byproduct, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.	**8 Hours**
Unit-3:	**Lubricants:** Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. **Cement and Refractories:** Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, **Refractories.** Introduction, classification and properties of refractories	**8 Hours**
Unit-4:	**Polymers:** Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.	**8 Hours**
Unit-5:	**A. Instrumental Techniques in chemical analysis:** Introduction, Principle,	**8 Hours**

	Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law. **B. Water Analysis Techniques:** Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques.	
Text Books:	1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.	
Reference Books:	1. Morrison & Boyd, Organic Chemistry, Prentice Hall 2. Barrow Gordon M., Physical Chemistry, McGraw-Hill. 3. Manahan Stanley E., Environmental Chemistry, CRC Press	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=RV-OyRTaIOI 2. https://www.youtube.com/watch?v=phhfkikb6Lw	

Course Code: EAS163	Laboratory Course- I B.Tech- Semester-I **Engineering Chemistry (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of Hardness of water.	
CO2.	**Analyzing** & estimating of various parameters of water.	
CO3.	**Analyzing** of Calorific value of Solid fuel by Bomb calorimeter & Liquid Fuels by Junkers Gas Calorimeter.	
CO4.	**Analyzing** of open & closed Flash point of oil by Cleveland & Pensky's Martens apparatus.	
CO5.	**Analyzing** of viscosity of lubricating oil using Redwood Viscometer.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list**	
1	Determination of Total Hardness of a given water sample.	
2	Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate	
3	To determine the pH of the given solution using pH meter and pH-metric titration	
4	Determination of dissolved oxygen content of given water sample	
5	To find chemical oxygen demand of waste water sample by potassium dichromate	
6	Determination of free chlorine in a given water sample	
7	To determine the chloride content in the given water sample by Mohr's method	
8	To prepare the Bakelite resin polymer	
9	To determine the concentration of unknown sample of iron spectrophotometrically	
10	To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer	
11	To determine the flash & fire point of a given lubricating oil	
12	Determination of calorific value of a solid or liquid fuel.	
13	Determination of calorific value of a gaseous fuel	
14	Determination of % of O_2, CO_2, % CO in flue gas sample using Orsat apparatus.	
15	Proximate analysis of coal sample.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: IBD111	**Professional Core Course-I** **BTech- Semester-I** **SOFTWARE FOUNDATION AND PROGRAMMING (with 'C')**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding and describe the concepts related to Software Development using C.	
CO2.	Understanding of software foundation and also develop the capability for self-learning.	
CO3.	Understanding the concept of structured programming language.	
CO4.	Applying the ability to design creative solutions to real life problems faced by the industry.	
CO5.	Analyzing expected to have learnt programming concepts and technical aspects of C programming	
Course Content:		
Unit-1:	Brief History of Computing, Introduction to computing, Introduction to computer, First Computing device, Analog Computers, Digital Computers, Electromechanical digital computers, Modern Computers, Concept of modern computers, Stored Programs, Introduction to program, Stored program architecture, Machine code, Programming language, Low level language, High level language, Forth generation languages, Memory, Input/output, Multitasking, Multiprocessing *One relevant Case Study/ Case let from the unit.*	**6 Hours**
Unit-2:	The Structure of C programs, Literals, variables and types, Expressions, operators, Conditionals, Loops and random numbers, Arrays, Functions, Pointers and Dynamic Memory Allocation, Structures, Applications: searching and sorting, File input and output *One relevant Case Study/ Case let from the unit.*	**28 Hours**
Unit-3:	Open Standards, Open Source and IBM, Introduction to Linux, Introduction to PHP *One relevant Case Study/ Case let from the unit.*	**6 Hours**
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Text Material & resources: IBM Course Material

Essentials of Software Foundation and Programming - Part 1

Detailed Syllabus Contents of Software Foundation and Programming 1 (with 'C')

Unit	Topics

UNIT-1	☐ Introduction to computer ☐ History ☐ First Computing device ☐ Analog Computers ☐ Digital Computers ☐ Electromechanical digital computers ☐ Modern Computers ☐ Concept of modern computers ☐ Stored Programs ☐ Transistors ☐ Integrated circuits ☐ Introduction to program ☐ Stored program architecture ☐ Machine code ☐ Programming language ☐ Low level language ☐ High level language Forth generation languages ☐ Memory ☐ Input/output ☐ Multitasking ☐ Multiprocessing

UNIT-1	☐ The internet revolution ☐ Introduction ☐ The ARPANET ☐ TCP/IP ☐ Birth of internet ☐ Birth of world wide web ☐ Applications of world wide web Computer Programming Languages ☐ Introduction ☐ Early programming languages ☐ Procedure Oriented ☐ C language ☐ Object oriented languages ☐ C++,Java ☐ What is C Language ☐ Why C Language ☐ Future in C Language ☐ Summary ☐ Prerequisite in C Language ☐ Installation of C ☐ What is Data Types in C Language with practical ☐ Integers, long and short in C Language with practical ☐ Integers, signed and unsigned in C Language with practical ☐ Chars, signed and unsigned in C Language with practical ☐ Floats and Doubles in C Language with practical ☐
UNIT-2	☐ Constants in C with practical ☐ Variables in C with practical ☐ Keywords in C with practical ☐ How to get input from user with practical ☐ C library function – printf() ☐ How to display output to user with practical ☐ C library function – scanf() ☐ Comparison operators ☐ Conditional Constructs ☐ If Keyword ☐ Else if ☐ Flow control ☐ Programs related to Conditional statements
UNIT-2	☐ for Loop in C Language with practical ☐ While Loop in C Language with practical ☐ Do-While Loop in C Language with practical ☐ Programs related to looping statements ☐ Break in C Language with practical ☐ Continue in C Language with practical ☐ Goto statement in c language ☐ Explaining the usage of break,continue,goto Statements

	☐ What is a Function in C Language with practical ☐ Passing Values between Functions in C Language with practical ☐ Call by Value in C Language with practical ☐ Call by Reference in C Language with practical
UNIT-2	☐ Void as a parameter, pointer and result ☐ Parameterizing the main function ☐ External function and the extern declaration. ☐ Header files and their role ☐ An Introduction to Pointers ☐ Pointer Notation in C Language ☐ Back to Function Calls in C Language with practical ☐ Recursion in C Language with practical ☐ What are Arrays in C Language ☐ A Simple Program Using Array ☐ How to Initialize Array in C Language with practical ☐ Pointers and Arrays in C Language with practical ☐ One Dimensional Arrays in C Language with practical
UNIT-2	☐ Two Dimensional Arrays in C Language with practical ☐ Initializing a 2-Dimensional Array with practical ☐ Pointers and 2-Dimensional Arrays with practical ☐ Pointer to an Array with practical ☐ Passing 2-D array to a Function with practical ☐ Array of Pointers with practical ☐ Three Dimensional Array with practical ☐ Programs related to looping arrays
UNIT-2	☐ What are Strings in C Language ☐ How to get length of a string in C Language using strlen( ) with practical ☐ How to copy a string in C Language using strcpy( ) with practical ☐ How to concatenate a string in C Language using strcat( ) with practical ☐ How to compare two string in C Language using strcmp( ) with practical
UNIT-2	☐ What is Structures in C Language ☐ Why Use Structures in C Language ☐ Declaring a Structure in C Language with practical ☐ Accessing Structure Elements in C Language with practical ☐ How Structure Elements are Stored with practical ☐ Array of Structures in C Language with practical ☐ Additional Features of Structures with practical ☐ Uses of Structures with practical
UNIT-2	☐ Memory allocation and deallocation: malloc() and free() functions ☐ Difference between malloc(),alloc(),realloc() ☐ Arrays of pointers vs. multidimensional ☐ Programs related to looping statements

UNIT-2	☐ File Input/Output in C Language with practical

UNIT-2	☐ File Operations in C Language with practical ☐ Opening a File in C Language with practical ☐ Reading from a File in C Language with practical ☐ Closing the File in C Language with practical ☐ A File-copy Program in C Language ☐ Writing to a File in C Language with practical ☐ Closing the File in C Language with practical ☐ File Opening Modes
UNIT-2	☐ Operations On Bits in C Language with practical ☐ Bitwise Operators with practical ☐ One's Complement Operator with practical ☐ Right Shift Operator with practical ☐ Left Shift Operator with practical ☐ Bitwise AND Operator with practical ☐ Bitwise OR Operator with practical ☐ Bitwise XOR Operator with practical ☐ Enumerated Data Type with practical ☐ Uses of Enumerated Data Type with practical
UNIT-2	☐ The C Preprocessor in C Language ☐ Features of C Preprocessor ☐ Macro Expansion in C Language ☐ Macros with Arguments with practical ☐ Macros versus Functions with practical ☐ File Inclusion in C Language with practical ☐ #if and #elif Directives with practical ☐ Miscellaneous Directives in C Language
UNIT-2	☐ User defined types-why? ☐ Pointers to functions ☐ Analyzing and creating complex declarations ☐ Scopes of declarations, storage classes ☐ Predefined Preprocessor symbols ☐ Macro operators ☐ Pointers to functions ☐ Recurssion ☐ Importance of Recurssion ☐ Implementation of recursion
UNIT-3	☐ Introduction to linux ☐ Linux commands ☐ Introduction to php ☐ Webpages,websites,web application ☐ Variables in php ☐ Data types in php ☐ Operators in php

UNIT-3	☐ How to write a script ☐ POST vs GET

Course Code: IBD151	Laboratory Courses-II BTech- Semester-I SOFTWARE FOUNDATION & PROGRAMMING 1 (with 'C') LAB	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding Basic structure of C programming, declaration and usage of variable	
CO2.	Understanding the usage of user defined data types.	
CO3.	Applying conditional and iterative statements to write C programs.	
CO4.	Applying the real time problems and their solutions using C.	
CO5.	Applying the C programming in real life.	
Course Content:		
	Programming Concepts based on C and Introductions of IBM Softwares, Introduction of LINUX and Introduction of PHP.	
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: EAS117	Engineering Science Course-I B.Tech-Semester-I Basic Electrical Engineering	L-3 T-1 P-0 C-4
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** the basics of Network, AC Waveform and its characteristics.	
CO2.	**Understanding** the basic concept of Measuring Instruments, Transformers & three phase Power systems.	
CO3.	**Understanding** the basic concepts of Transformer.	
CO4.	**Understanding** the basic concept of power measurement using two wattmeter methods.	
CO5.	**Applying** the concept of Kirchhoff's laws and Network Theorems to analyze complex electrical circuits.	
Course Content:		
Unit-1:	**D.C. Network Theory:** Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems-Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.	**8 Hours**
Unit-2:	**Steady State Analysis of A.C. Circuits:** Sinusoidal and phasor representation of voltage and Current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.	**8 Hours**
Unit-3:	**Basics of Measuring Instruments:** Introduction to voltmeter, ammeter, wattmeter & Energy meter.	**8 Hours**
Unit-4:	**Single phase Transformer:** Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.	**8 Hours**
Unit-5:	**Three Phase A.C. Circuits:** Line and phase voltage/current relations; three phase power, power measurement using two wattmeter methods. Introduction to earthing and electrical safety.	**8 Hours**
Text Books:	**1.** V. Del Toro, Principles of Electrical Engineering, Prentice-Hall International.	
Reference Books:	**1.** Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill. **2.** A Grabel, Basic Electrical Engineering, McGraw Hill. **3.** Cotton H., Advanced Electrical Technology, Wheeler Publishing. ***Latest editions of all the suggested books are recommended.**	
Additional electronic reference material:	• https://nptel.ac.in/courses/108/108/108108076/ • https://sites.google.com/tmu.ac.in/dr-garima-goswami/home	

Course Code: EEE161	**Laboratory Course-III** **B.Tech- Semester-I** **Basic Electrical Engineering (Lab)**	**L-0** **T-0** **P-2** **C-1**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of Kirchoff & Voltage law.	
CO2.	**Understanding** the concepts of Thevenin & Norton theorem.	
CO3.	**Analyzing** the energy by a single-phase energy meter.	
CO4.	**Analyzing** the losses and efficiency of Transformer on different load conditions.	
CO5.	**Analyzing** the electrical circuits using electrical and electronics components on bread board.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list**	
1	To verify the Kirchhoff's current and voltage laws.	
2	To study multimeter.	
3	To verify the Superposition theorem	
4	To verify the Thevenin's theorem.	
5	To verify the Norton's theorem.	
6	To verify the maximum power transfer theorem	
7	To verify current division and voltage division rule.	
8	To measure energy by a single-phase energy meter	
9	To measure the power factor in an RLC by varying the capacitance	
10	To determine resonance frequency, quality factor, bandwidth in series resonance	
11	To measure the power in a 3-phase system by two-wattmeter method	
12	To measure speed for speed control of D.C. Shunt Motor	
13	To determine the efficiency of single-phase transformer by load test.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EEC111	Engineering Sceince Course-I B.Tech- Semester-I **Basic Electronics Engineering**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of electronic components like diode, BJT & FET.	
CO2.	**Understanding** the applications of pn junction diode as clipper, clamper, rectifier & regulator whereas BJT & FET as amplifiers	
CO3.	**Understanding** the functions and applications of operational amplifier-based circuits such as differentiator, integrator, and inverting, non-inverting, summing & differential amplifier.	
CO4.	**Understanding** the concepts of number system, Boolean algebra and logic gates.	
CO5.	**Applying** the knowledge of series, parallel and electromagnetic circuits.	
Course Content:		
Unit-1:	**p-n Junction:** Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator	**8 Hours**
Unit-2:	**Bipolar Junction Transistor (BJT):** Basic construction, transistor action; CB, CE and CC configurations, input/output characteristics, Relation between α, β & γ, Biasing of transistors: Fixed bias, emitter bias, potential divider bias	**8 Hours**
Unit-3:	**Field Effect Transistor (FET):** Basic construction of JFET; Principle of working; concept of pinch-off condition & maximum drain saturation current; input and transfer characteristics; Characteristics equation; fixed and self-biasing of JFET amplifier; Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction, Operation and Characteristics.	**8 Hours**
Unit-4:	**Operational Amplifier (Op-Amp):** Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations, Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.	**8 Hours**
Unit-5:	**Switching Theory:** Number system, conversion of bases (decimal, binary, octal and hexadecimalnumbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table-AND, OR & NOT, Seven segment display & K map.	**8 Hours**
Text Books:	1. Robert Boylestad& Louis Nashelsky, Electronic Circuit and Devices, Pearson India.	

B. Tech (Computer Science & Engineering) Specialization In Application Development using Cloud And Analytics Platforms Syllabus as per CBCS (2019-20)

Reference Books:	1. Sedra and Smith, Microelectronic Circuits, Oxford University Press. 2. Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd. 3. Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International.	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=USrY0JspDEg 2. https://www.youtube.com/watch?v=Hkz27cFW4Xs	

Course Code: EEC161	Laboratory Course-III B.Tech- Semester-I **Basic Electronics Engineering (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the implementation of diode-based circuits.	
CO2.	**Understanding** the implementation of Operational amplifier-based circuits.	
CO3.	**Analyzing** the characteristics of pn junction diode & BJT.	
CO4.	**Analyzing** the different parameters for characterizing different circuits like rectifiers, regulators using diodes and BJTs.	
CO5.	**Analyzing** the truth tables through the different type's adders.	
LIST OF EXPERIMENTS:	**Note: Minimum eight experiments should be performed-**	
1	To study the V-I characteristics of p-n junction diode.	
2	To study the diode as clipper and clamper	
3	To study the half-wave rectifier using silicon diode.	
4	To study the full-wave rectifier using silicon diode.	
5	To study the Zener diode as a shunt regulator.	
6	To study transistor in Common Base configuration & plot its input/output characteristics	
7	To study the operational amplifier in inverting & non-inverting modes using IC 741.	
8	To study the operational amplifier as differentiator & integrator.	
9	To study various logic gates & verify their truth tables.	
10	To study half adder/full adder & verify their truth tables	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: TMU101	Mandatory Course-I B.Tech- Semester-I **Environmental Studies**	L-2 T-1 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** environmental problems arising due to constructional and developmental activities.	
CO2.	**Understanding** the natural resources and suitable methods for conservation of resources for sustainable development.	
CO3.	**Understanding** the importance of ecosystem and biodiversity and its conservation for maintaining ecological balance.	
CO4.	**Understanding** the types and adverse effects of various environmental pollutants and their abatement devices.	
CO5.	**Understanding** Greenhouse effect, various Environmental laws, impact of human population explosion, environment protection movements, different disasters and their management.	
Course Content:		
Unit-1:	Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development. **Ecology and Environment**: Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, FoodChain, FoodWeb, Ecological Pyramid& Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.	**8 Hours**
Unit-2:	**Natural Resources:** Renewable & Non-Renewable resources; Landre sources and landuse change; Land degradation, Soil erosion & desertification. **Deforestation**: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources**: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. **Biodiversity:** Hot SpotsofBiodiversityinIndiaandWorld,Conservation,ImportanceandFactorsResponsibleforLossofBiodiversity,BiogeographicalClassification of India	**8 Hours**
Unit-3:	**Environmental Pollutions:** Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies	**8 Hours**
Unit-4:	**Environmental policies & practices: Climate change & Global** Warming (Green house Effect),Ozone Layer -Its Depletion and Control Measures,	**8 Hours**

	Photo chemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context	
Unit-5:	Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study	**8 Hours**
Field Work:	1. Visit to an area to document environmental assets; river/forest/flora-fauna etc. 2. Visit to a local polluted site: urban/rural/industrial/agricultural. 3. Study of common plants, insects, birds & basic principles of identification. 4. Study of simple ecosystem; pond, river etc.	
Text Books:	1. "Environmental Chemistry", De, A. K., New AgePublishersPvt.Ltd.	
Reference Books:	1. "BiodiversityandConservation",Bryant, P. J., Hypertext Book 2. "Textbook of Environment Studies", Tewari, Khulbe&Tewari,l Publication	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=8tamfocnHb8 2. https://www.youtube.com/watch?v=YlE1DDo25IQ	

Course Code: **TMUGE101**	**Humanities and Social Science Course-I** **B.Tech- Semester-I** **English Communication – I**	**L-2** **T-0** **P-2** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Remembering and understanding** of the basic of English grammar and vocabulary.	
CO2.	**Understanding** of the basic Communication process.	
CO3.	**Applying** correct vocabulary and tenses in sentences construction.	
CO4.	**Analyzing** communication needs and developing communication strategies using both verbal & non-verbal method.	
CO5.	**Drafting** applications in correct format for common issues.	
CO6.	**Developing** self-confidence.	
Course Content:		

Unit-1:	**Introductory Sessions**
	  • Self-Introduction
	  • Building Self Confidence: Identifying strengths and weakness, reasons Failure, strategies to overcome Fear of Failure
	  • Importance of English Language in present scenario
	(Practice: Self-introduction session)
		6 Hours

Unit-2:	**Basics of Grammar**
	  • Parts of Speech
	  • Tense
	  • Subject and Predicate
	  • Vocabulary: Synonym and Antonym
	(Practice: Conversation Practice)
		12 Hours

Unit-3:	**Basics of Communication**
	  • Communication: Process, Types, 7Cs of Communication, Importance & Barrier
	  • Language as a tool of communication
	  • Non-verbal communication: Body Language
	  • Etiquette & Manners
	  • Basic Problem Sounds
	(Practice: Pronunciation drill and building positive body language)
		10 Hours

Unit-4:	**Application writing**
	  • Format & Style of Application Writing
	  • Practice of Application writing on common issues.
		8 Hours

Unit-5:	**Value based text reading:** Short Story (Non- detailed study) • Gift of Magi - O. Henry	**4 Hours**

Text Books:	**1**. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.
Reference Books:	1. Kumar, Sanjay. &PushpLata. "Communication Skills" New Delhi: Oxford University Press. 2. Carnegie Dale. "How to win Friends and Influence People" New York: Simon & Schuster. 3. Harris, Thomas. A. "I am ok, You are ok" New York: Harper and Row. 4. Goleman, Daniel. "Emotional Intelligence' Bantam Book.
Additional electronic reference material:	1. https://www.youtube.com/watch?v=4XEa-8HD3lE 2. https://www.youtube.com/watch?v=sb6ZZ2p3hEM&feature=youtu.be 3. https://www.youtube.com/watch?v=Df3ysUkdB38 4. https://www.youtube.com/watch?v=0LdYaj3jcws 5. https://www.youtube.com/watch?v=64XIkMqPm_8 6. https://www.youtube.com/watch?v=_vS6O8YlMq0
Methodology:	1. Language Lab software. 2. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion. 3. Conversational Practice will be effectively carried out by Face to Face & Via Media (Telephone, Audio-Video Clips) 4. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			**60 Marks**		
20 Marks (Best 2 out of Three CTs) *(From Unit- II, IV & V)*	10 Marks (Oral Assignments) *(From Unit I & III)*	10 Marks (Attendance)	40 Marks (External Written Examination) *(From Unit II, IV & V)*	20 Marks (External Viva)* *(From Unit -1 & III)*	**100**

*Parameters of External Viva

Content	Body Language	Confidence	Question Responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising
   a) One Faculty teaching the class
   b) One examiner nominated by University Examination cell.
Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Course Code: EME161	Laboratory Course-IV B.Tech- Semester-I **Engineering Drawing (Lab)**	L-0 T-0 P-4 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of Engineering Drawing.	
CO2.	**Understanding** about imagine and represent the shape, size & specifications of physical objects.	
CO3.	**Understanding** principle of projection and sectioning.	
CO4.	**Applying** the concepts of drawing the shapes, angles and lines.	
CO5.	**Applying** the computer aided drafting.	
LIST OF EXPERIMENTS:	**All to be performed**	
1	To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.	
2	To draw the types of lines and conventions of different materials.	
3	To draw and study dimensioning and Tolerance	
4	To construction geometrical figures of Pentagon and Hexagon	
5	To draw the projection of points and lines	
6	To draw the Orthographic Projection of given object in First Angle	
7	To draw the Orthographic Projection of given object in Third Angle	
8	To draw the sectional view of a given object	
9	To draw the development of the lateral surface of given object	
10	To draw the isometric projection of the given orthographic projection.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Note: The drawing sheet could be manual or in Auto CAD.

Course Code: EME162	Laboratory Course-IV B.Tech- Semester-I **Workshop Practice (Lab)**	L-0 T-0 P-4 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts to prepare simple wooden joints using wood working tools.	
CO2.	**Understanding** the concepts for processes and operations to produce basic components from raw material.	
CO3.	**Applying** the concepts to Produce Fitting jobs as per specified dimensions.	
CO4.	**Applying** the concepts to prepare simple lap, butt, T-, jointand Corner joints using arc welding equipment.	
CO5.	**Applying** the concepts to perform different operations on centre lathe machine.	
LIST OF EXPERIMENTS:	**Perform any ten experiments selecting at least one from each shop**	
1	**Carpentry Shop**: 1. To prepare half-lap corner joint. 2. To prepare mortise &tenon joint. 3. To prepare a cylindrical pattern on woodworking lathe.	
2	**Fitting Bench Working Shop:** 1. To prepare a V-joint fitting 2. To prepare a U-joint fitting 3. To prepare a internal thread in a plate with the help of tapping process	
3	**Black Smithy Shop:** 1. To prepare a square rod from given circular rod 2. To prepare a square U- shape from given circular rod	
4	**Welding Shop:** 1. To prepare a butt and Lap welded joints using arc welding machine. 2. To prepare a Lap welded joint Gas welding equipment. 3. To prepare a Lap welded joint using spot welding machine	
5	**Sheet-metal Shop:** 1. To make round duct of GI sheet using 'soldering' process. 2. To prepare a tray of GI by fabrication	
6	**Machine Shop:** 1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c. 2. To perform the following operations on Centre Lathe: Turning, Step turning, Taper turning, Facing, Grooving and Knurling	

	3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine.	
7	**Foundry Shop:** 1. To prepare core as per given size. 2. To prepare a mould for given casting.	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EAS211	Basic Science Course-III B.Tech- Semester-II **Engineering Mathematics-II**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of the wave, diffusion and Laplace equations & Fourier series.	
CO2.	**Understanding** the methods of separation of variables	
CO3.	**Understanding** the concepts of Fourier series' representation of single variable function.	
CO4.	**Applying** Laplace transform to determine the complete solutions of linear ODE	
CO5.	**Applying** the method of variations of parameters to find solution of equations with variable coefficients.	
Course Content:		
Unit-1:	**Differential Equations:** Linear Differential Equation, Linear Differential Equation with constant coefficient: Complementary functions and particular integrals, Linear Differential Equation with variable coefficient: Removal method, changing independent variables, Method of variation of parameters, Homogeneous Linear Differential Equation, Simultaneous linear differential equations.	**8 Hours**
Unit-2:	**Series Solutions:** PowerSeries solutions of ODE, Ordinary Point, Singular Points, Frobenius Method. **Special Functions:** Legendre equation and Polynomial, Legendre Function, Rodrigue's formula, Laplace definite integral for first and second kind, Bessel equation and Polynomial, Bessel Function, Orthogonal properties and Recurrence Relation for Legendre and Bessel function.	**8 Hours**
Unit-3:	**Partial differential equations** –Method of separation of variables for solving partial differential equations; Wave equation up to two dimensions; Laplace equation in two-dimensions; Heat conduction equations up to two-dimensions; Equations of transmission Lines.	**8 Hours**
Unit-4:	**Fourier Series:** Periodic functions, Trigonometric series; Fourier series; Dirichlet's conditions, Determination of fourier coefficient by Euler's formulae; Fourier series for discontinuous functions, Even and odd functions, Half range sine and cosine series.	**8 Hours**
Unit-5:	**Laplace Transform:** Laplace transform; Existence theorem; Laplace transform of derivatives and integrals; Inverse Laplace transform; Unit step function; Diratch delta function; Laplace transform of periodic functions; Convolution theorem.	**8 Hours**
Text Books:	**1.** Grewal B.S., Higher Engineering Mathematics, Khanna Publishers.	

Reference Books:	**1.** Kreyszig E., Advanced Engineering Mathematics, Wiley Eastern. **2.** Piskunov N, Differential & Integral Calculus, Moscow Peace Publishers. **3.** Narayan Shanti, A Text book of Matrices, S. Chand **4.** Bali N.P., Engineering Mathematics-II, Laxmi Publications.	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=luJMl37-nso 2. https://www.youtube.com/watch?v=NdouX5-KD6Y	

Course Code: EAS212	Basic Science Course-IV B.Tech- Semester-II **Engineering Physics**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the basic concepts of interference, diffraction and polarisation.	
CO2.	**Understanding** the concept of bonding in solids and semiconductors.	
CO3.	**Understanding** the special theory of relativity.	
CO4.	**Applying** special theory of relativity to explain the phenomenon of length contraction, time dilation, mass-energy equivalence etc.	
CO5.	**Applying** the concepts of polarized light by the Brewster's and Malus Law	
Course Content:		
Unit-1:	**Interference of Light:** Introduction, Principle of Superposition, and Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.	**8 Hours**
Unit-2:	**Diffraction**: Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. **Single slit diffraction**: Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. **Resolving Power**: Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.	**8 Hours**
Unit-3:	**Polarization:** Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.	**8 Hours**
Unit-4:	**Elements of Material Science:** Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi-Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. **Hall Effect:** Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.	**8 Hours**
Unit-5:	**Special Theory of Relativity:** Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.	**8 Hours**
Text Books:	1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.	
Reference Books:	1. F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw-Hill. 2. Concept of Modern Physics, Beiser, Tata McGraw-Hill. 3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore.	

| **Additional electronic reference material:** | 1. https://www.youtube.com/watch?v=toGH5BdgRZ4&list=PLD9DDFBDC338226CA
2. https://www.youtube.com/watch?v=CuqsU7B1MtU | |

Course Code: EAS262	Laboratory Course-V B.Tech- Semester-II **Engineering Physics (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** of the operation of various models of optical devices.	
CO2.	**Understanding** types of Semiconductors using Hall experiments.	
CO3.	**Applying** the concept of interference, polarization & dispersion in optical devices through Newton's ring, Laser, polarimeter & spectrometer.	
CO4.	**Applying** the concept of resonance to determine the AC frequency using sonometer & Melde's apparatus.	
CO5.	**Applying** the concept of resolving & dispersive power by a prism.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list:**	
1	To determine the wavelength of monochromatic light by Newton's ring.	
2	To determine the wavelength of monochromatic light by Michelson-Morley experiment.	
3	To determine the wavelength of monochromatic light by Fresnel's Bi-prism.To determine the Planck's constant using LEDs of different colours.	
4	To determine the Planck's constant using LEDs of different colours.	
5	To determine the specific rotation of cane sugar solution using Polarimeter	
6	To verify Stefan's Law by electrical method	
7	To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up	
8	To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.	
9	To compare Illuminating Powers by a Photometer.	
10	To determine the frequency of A.C. mains by means of a Sonometer.	
11	To determine refractive index of a prism material by spectrometer	
12	To determine the Flashing & Quenching of Neon bulb.	
13	Determination of Cauchy's constant by using spectrometer.	
14	To study the PN junction characteristics	
15	To determine the resolving power and dispersive power by a prism	

16	To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode	
17	Study the characteristics of LDR	
18	To study the characteristics of a photo-cell.	
Books:	1. B.Sc. Practical Physics, Gupta and Kumar, PragatiPrakashan. 2. B.Sc. Practical Physics, C.L. Arora, S. Chand & Company Pvt. Ltd. ***Latest editions of all the suggested books are recommended.**	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EAS213	Basic Science Course-IV	L-3
	B.Tech- Semester-II	T-1
	Engineering Chemistry	P-0
		C-4

Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** the concept of softening & purification of water.	
CO2.	**Understanding** calorific value& combustion, analysis of coal, Physical & Chemical properties of hydrocarbons & quality improvements.	
CO3.	**Understanding** the concept of lubrication, Properties of Refractory & Manufacturing of cements.	
CO4.	**Applying** the concepts of the mechanism of polymerization reactions, Natural and synthetic rubber& vulcanization.	
CO5.	**Applying** the concepts of spectroscopic & chromatographic techniques.	
Course Content:		
Unit-1:	**Water and Its Industrial Applications:** Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgonetc	8 Hours
Unit-2:	**Fuels and Combustion:** Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of byproduct, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.	8 Hours
Unit-3:	**Lubricants:** Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. **Cement and Refractories:** Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, **Refractories.** Introduction, classification and properties of refractories	8 Hours
Unit-4:	**Polymers:** Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.	8 Hours

	A. **Instrumental Techniques in chemical analysis:** Introduction, Principle, Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law.	
Unit-5:	B. **Water Analysis Techniques:** Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques.	**8 Hours**
Text Books:	1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.	
Reference Books:	1. Morrison & Boyd, Organic Chemistry, Prentice Hall 2. Barrow Gordon M., Physical Chemistry, McGraw-Hill. 3. Manahan Stanley E., Environmental Chemistry, CRC Press	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=RV-OyRTaIOI 2. https://www.youtube.com/watch?v=phhfkikb6Lw	

Course Code: EAS263	Laboratory Course-V B.Tech- Semester-II **Engineering Chemistry (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of Hardness of water.	
CO2.	**Analyzing** & estimating of various parameters of water.	
CO3.	**Analyzing** of Calorific value of Solid fuel by Bomb calorimeter & Liquid Fuels by Junkers Gas Calorimeter.	
CO4.	**Analyzing** of open & closed Flash point of oil by Cleveland & Pensky's Martens apparatus.	
CO5.	**Analyzing** of viscosity of lubricating oil using Redwood Viscometer.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list**	
1	Determination of Total Hardness of a given water sample.	
2	Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate	
3	To determine the pH of the given solution using pH meter and pH-metric titration	
4	Determination of dissolved oxygen content of given water sample	
5	To find chemical oxygen demand of waste water sample by potassium dichromate	
6	Determination of free chlorine in a given water sample	
7	To determine the chloride content in the given water sample by Mohr's method	
8	To prepare the Bakelite resin polymer	
9	To determine the concentration of unknown sample of iron spectrophotometrically	
10	To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer	
11	To determine the flash & fire point of a given lubricating oil	
12	Determination of calorific value of a solid or liquid fuel.	
13	Determination of calorific value of a gaseous fuel	
14	Determination of % of O_2, CO_2, % CO in flue gas sample using Orsat apparatus.	
15	Proximate analysis of coal sample.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EEE217	Engineering Science Course-II B.Tech-Semester-I **Basic Electrical Engineering**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the basics of Network, AC Waveform and its characteristics.	
CO2.	**Understanding** the basic concept of Measuring Instruments, Transformers & three phase Power systems.	
CO3.	**Understanding** the basic concepts of Transformer.	
CO4.	**Understanding** the basic concept of power measurement using two wattmeter methods.	
CO5.	**Applying** the concept of Kirchhoff's laws and Network Theorems to analyze complex electrical circuits.	
Course Content:		
Unit-1:	**D.C. Network Theory:** Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems-Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.	**8 Hours**
Unit-2:	**Steady State Analysis of A.C. Circuits:** Sinusoidal and phasor representation of voltage and Current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.	**8 Hours**
Unit-3:	**Basics of Measuring Instruments:** Introduction to voltmeter, ammeter, wattmeter & Energy meter.	**8 Hours**
Unit-4:	**Single phase Transformer:** Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.	**8 Hours**
Unit-5:	**Three Phase A.C. Circuits:** Line and phase voltage/current relations; three phase power, power measurement using two wattmeter methods. Introduction to earthing and electrical safety.	**8 Hours**
Text Books:	**1.** V. Del Toro, Principles of Electrical Engineering, Prentice-Hall International.	
Reference Books:	**1.** Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill. **2.** A Grabel, Basic Electrical Engineering, McGraw Hill. **3.** Cotton H., Advanced Electrical Technology, Wheeler Publishing.	
Additional electronic reference material:	1. https://nptel.ac.in/courses/108/108/108108076/ 2. https://sites.google.com/tmu.ac.in/dr-garima-goswami/home	

Course Code: EEE261	Laboratory Course-VI B.Tech- Semester-II Basic Electrical Engineering (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** the concepts of Kirchoff & Voltage law.	
CO2.	**Understanding** the concepts of Thevenin & Norton theorem.	
CO3.	**Analyzing** the energy by a single-phase energy meter.	
CO4.	**Analyzing** the losses and efficiency of Transformer on different load conditions.	
CO5.	**Analyzing** the electrical circuits using electrical and electronics components on bread board.	
LIST OF EXPERIMENTS:	**Note: Select any ten experiments from the following list**	
1	To verify the Kirchhoff's current and voltage laws.	
2	To study multimeter.	
3	To verify the Superposition theorem	
4	To verify the Thevenin's theorem.	
5	To verify the Norton's theorem.	
6	To verify the maximum power transfer theorem	
7	To verify current division and voltage division rule.	
8	To measure energy by a single-phase energy meter	
9	To measure the power factor in an RLC by varying the capacitance	
10	To determine resonance frequency, quality factor, bandwidth in series resonance	
11	To measure the power in a 3-phase system by two-wattmeter method	
12	To measure speed for speed control of D.C. Shunt Motor	
13	To determine the efficiency of single-phase transformer by load test.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: EEC211	Engineering Science Course-II B.Tech- Semester-II **Basic Electronics Engineering**	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of electronic components like diode, BJT & FET.	
CO2.	**Understanding** the applications of pn junction diode as clipper, clamper, rectifier & regulator whereas BJT & FET as amplifiers	
CO3.	**Understanding** the functions and applications of operational amplifier-based circuits such as differentiator, integrator, and inverting, non-inverting, summing & differential amplifier.	
CO4.	**Understanding** the concepts of number system, Boolean algebra and logic gates.	
CO5.	**Applying** the knowledge of series, parallel and electromagnetic circuits.	
Course Content:		
Unit-1:	**p-n Junction:** Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator	**8 Hours**
Unit-2:	**Bipolar Junction Transistor (BJT):** Basic construction, transistor action; CB, CE and CCconfigurations, input/output characteristics, Relation between α, β & γ, Biasing of transistors: Fixed bias, emitter bias, potential divider bias	**8 Hours**
Unit-3:	**Field Effect Transistor (FET):** Basic construction of JFET; Principle of working; concept of pinch-off condition & maximum drain saturation current; input and transfer characteristics; Characteristics equation; fixed and self-biasing of JFET amplifier; Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction, Operation and Characteristics.	**8 Hours**
Unit-4:	**Operational Amplifier (Op-Amp):** Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations, Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.	**8 Hours**
Unit-5:	**Switching Theory:** Number system, conversion of bases (decimal, binary, octal and hexadecimalnumbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table-AND, OR & NOT, Seven segment display & K map.	**8 Hours**
Text Books:	1. Robert Boylestad& Louis Nashelsky, Electronic Circuit and Devices, Pearson India.	

Reference Books:	**1.** Sedra and Smith, Microelectronic Circuits, Oxford University Press. **2.** Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd. **3.** Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International.	
Additional electronic reference material:	1. https://www.youtube.com/watch?v=USrY0JspDEg 2. https://www.youtube.com/watch?v=Hkz27cFW4Xs	

Course Code: EEC261	Laboratory Course-VI B.Tech- Semester-II Basic Electronics Engineering (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	**Understanding** the implementation of diode-based circuits.	
CO2.	**Understanding** the implementation of Operational amplifier-based circuits.	
CO3.	**Analyzing** the characteristics of pn junction diode & BJT.	
CO4.	**Analyzing** the different parameters for characterizing different circuits like rectifiers, regulators using diodes and BJTs.	
CO5.	**Analyzing** the truth tables through the different type's adders.	
LIST OF EXPERIMENTS:	**Note: Minimum eight experiments should be performed-**	
1	To study the V-I characteristics of p-n junction diode.	
2	To study the diode as clipper and clamper	
3	To study the half-wave rectifier using silicon diode.	
4	To study the full-wave rectifier using silicon diode.	
5	To study the Zener diode as a shunt regulator.	
6	To study transistor in Common Base configuration & plot its input/output characteristics	
7	To study the operational amplifier in inverting & non-inverting modes using IC 741.	
8	To study the operational amplifier as differentiator & integrator.	
9	To study various logic gates & verify their truth tables.	
10	To study half adder/full adder & verify their truth tables	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: IBD211	Professional Core Course-II BTech- Semester-II PROGRAMMING WITH PYTHON	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the detail concept of Python In real life.	
CO2.	Understanding how the Python is Difference and easy from other programming Languages.	
CO3.	Understanding Machine Learning with some modules	
CO4.	Analyzing the relationship between Python and Data Analysis.	
CO5.	Applying how the data is predicted in Python	
Course Content:		
Unit-1:	OVERVIEW OF PYTHON: Introduction Python, Advantages and disadvantages, Downloading and installing, Which version of Python, Running Python Scripts, Using the interpreter interactively.	**8 Hours**
Unit-2:	**INTRODUCTION TO PYTHON:** Using variables, String types: normal, raw and Unicode, String operators and expressions, Math operators and expressions, Writing to the screen, Reading from the keyboard, Indenting is significant, The if and elif statements, While Loops, Using List, Dictionaries, Using the for statement, Opening, reading and writing a text file, Using Pandas, the python data analysis library and data frames, Grouping, aggregating and applying, merging and joining, Dealing with syntax errors, Exceptions, Handling exceptions with try/except.	**12 Hours**
Unit-3:	**DATA HANDLING:** RE Pattern Matching, Parsing Data, Introduction to Regression, Types of Regression. USE CASES: Use Cases, Exploratory data analysis, Correlation Matrix, Visualization using Matplotlib, Implementing linear regression.	**10 Hours**
Unit-4:	**ADVANCE CONCEPTS:** Machine Learning – Algorithm, Algorithms – Random forest, Super vector Machine, Random Forest, Build your own model in python, Comparison between random forest and decision tree.	**10 Hours**
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: TMUGE201	Humanities and Social Science Course-II B.Tech - Semester-II **English Communication – II**	L-2 T-0 P-2 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Remembering & understanding** the basics of English Grammar and Vocabulary	
CO2.	**Understanding** the basics of Listening, Speaking & Writing Skills	
	Understanding principles of letter drafting and various types of formats.	
CO3.	**Applying** correct vocabulary and grammar in sentence construction while writing and delivering presentations	
CO4.	**Analyzing** different types of listening, role of Audience & Locale in presentation	
CO5.	**Drafting** Official Letters, E-Mail & Paragraphs in correct format.	
Course Content:		
Unit-1:	**Functional Grammar** • Prefix, suffix and One words substitution • Modals • Concord	**10 Hours**
Unit-2:	**Listening Skills** • Difference between listening & hearing, Process and Types of Listening • Importance and Barriers to listening	**04Hours**
Unit-3:	**Writing Skills** • Official letter and email writing • Essentials of a paragraph, • Developing a paragraph: Structure and methods Paragraph writing (100-120 words)	**12 Hours**
Unit-4:	**Strategies & Structure of Oral Presentation** • Purpose, Organizing content, Audience & Locale, Audio-visual aids, Body langauge • Voice dynamics: Five P's - Pace, Power, Pronunciation, Pause, and Pitch. •Modes of speech delivery and 5 W's of presentation	**8 Hours**
Unit-5:	**Value based text reading:** Short Essay (Non- detailed study) How should one Read a book? - Virginia Woolf	**6 Hours**
Text Books:	**1.** Singh R.P., An Anthology of English Essay, O.U.P. New Delhi	
Reference	**1.** Nesfield J.C. "*English Grammar Composition & Usage*"	

Books:	Macmillan Publishers	
Additional Electronic Reference Material	**1.**https://www.youtube.com/watch?v=A0uekze2GOU **2.**https://www.youtube.com/watch?v=JIKU_WT0Bls **3.**https://www.youtube.com/watch?v=3Tu1jN65slw **4.**https://youtu.be/sb6ZZ2p3hEM **5.**https://youtu.be/yY6-cgShhac **6.**https://youtu.be/cc4yXwOQsBk **7.**https://youtu.be/yY6-cgShhac **8.**https://youtu.be/84qoeCofXXQ **9.**https://www.youtube.com/watch?v=-9MXmxLisI8&t=28s	
Methodologies:	1. Words and exercises, usage in sentences. 2. Language Lab software. 3. Sentence construction on daily activities and conversations. 4. Format and layout to be taught with the help of samples and preparing letters on different subjects. 5. JAM sessions and Picture presentation. 6. Tongue twisters, Newspaper reading and short movies. 7. Modern Teaching tools (PPT Presentation, Tongue-Twisters& Motivational videos with sub-titles) will be utilized. 8. Text reading: discussion in detail, critical appreciation by reading the text to develop students' reading habits with voice modulation.	

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			**60 Marks**		
20 Marks (Best 2 out of Three CTs) *(From Unit- I, III & V)*	10 Marks (Oral Assignments) *(From Unit- II &IV)*	10 Marks (Attendance)	40 Marks (External Written Examination) *(From Unit-1, III & V)*	20 Marks (External Viva)* *(From Unit- II & IV)*	**100**

*Parameters of External Viva

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note: External Viva will be conducted by 2-member committee comprising
a) One Faculty teaching the class
b) One examiner nominated by University Examination cell.

Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Course Code: IBD252	**Laboratory Course-VII**	L-0
	BTech- Semester-II	T-0
	PROGRAMMING WITH PYTHON LAB	P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the execution of Python In real life	
CO2.	Understanding the different modules to predict data.	
CO3.	Applying different functions to search pattern in the files.	
CO4.	Applying Visualization of data using Matplotlib	
CO5.	Applying the different modules to predict data.	
Course Content:		
	Programming based on python and their Concepts, Basic Java Programming, XML based programming and Eclipse based Programming.	
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: EME261	Laboratory Course-VIII B.Tech- Semester-II **Engineering Drawing (Lab)**	L-0 T-0 P-4 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of Engineering Drawing.	
CO2.	**Understanding** about imagine and represent the shape, size & specifications of physical objects.	
CO3.	**Understanding** principle of projection and sectioning.	
CO4.	**Applying** the concepts of drawing the shapes, angles and lines.	
CO5.	**Applying** the computer aided drafting.	
LIST OF EXPERIMENTS:	**All to be performed**	
1	To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.	
2	To draw the types of lines and conventions of different materials.	
3	To draw and study dimensioning and Tolerance	
4	To construction geometrical figures of Pentagon and Hexagon	
5	To draw the projection of points and lines	
6	To draw the Orthographic Projection of given object in First Angle	
7	To draw the Orthographic Projection of given object in Third Angle	
8	To draw the sectional view of a given object	
9	To draw the development of the lateral surface of given object	
10	To draw the isometric projection of the given orthographic projection.	

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the drawing sheet by the students and a Viva taken by the faculty concerned. The marks shall be given on the drawing sheet & regard maintained by the faculty.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Drawing Sheet (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Note: The drawing sheet could be manual or in Auto CAD.

Course Code: EME262	Laboratory Course-VIII B.Tech- Semester-II **Workshop Practice (Lab)**	**L-0** **T-0** **P-4** **C-2**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts to prepare simple wooden joints using wood working tools.	
CO2.	**Understanding** the concepts for processes and operations to produce basic components from raw material.	
CO3.	**Applying** the concepts to Produce Fitting jobs as per specified dimensions.	
CO4.	**Applying** the concepts to prepare simple lap, butt, T-, joint and Corner joints using arc welding equipment.	
CO5.	**Applying** the concepts to perform different operations on centre lathe machine.	
LIST OF EXPERIMENTS:	**Perform any ten experiments selecting at least one from each shop**	
1	**Carpentry Shop**: 1. To prepare half-lap corner joint. 2. To prepare mortise &tenon joint. 3. To prepare a cylindrical pattern on woodworking lathe.	
2	**Fitting Bench Working Shop:** 1. To prepare a V-joint fitting 2. To prepare a U-joint fitting 3. To prepare a internal thread in a plate with the help of tapping process	
3	**Black Smithy Shop:** 1. To prepare a square rod from given circular rod 2. To prepare a square U- shape from given circular rod	
4	**Welding Shop:** 1. To prepare a butt and Lap welded joints using arc welding machine. 2. To prepare a Lap welded joint Gas welding equipment. 3. To prepare a Lap welded joint using spot welding machine	
5	**Sheet-metal Shop:** 1. To make round duct of GI sheet using 'soldering' process. 2. To prepare a tray of GI by fabrication	
6	**Machine Shop:** 1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c. 2. To perform the following operations on Centre Lathe: Turning, Step turning, Taper turning, Facing, Grooving and Knurling	

	3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine.	
7	**Foundry Shop:** 1. To prepare core as per given size. 2. To prepare a mould for given casting.	

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Course Code: ECS305	Professional Core Course-III BTech- Semester-III	L-3 T-0 P-0 C-3
	Data Structure using C++	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	*Understanding* of different data structures and their usage.	
CO2.	*Applying* the understanding to solve basic operations on data structures.	
CO3.	*Analyzing* various approaches to solve different problems using data structures.	
CO4.	*Analyzing* various methods and the best solution as per running time of basic problems of programming.	
CO5.	*Developing* programming skills to solve problems with various storage structures.	
Course Content:		
Unit-1:	C++ Programming Basics: Variables, data type, features of object oriented programming, Functions, Call by Reference, Call by Address, Call by Value, Function Overloading, Inline Function, Enumerations. Object & Classes: Access Specifiers, Constructors. Default, Copy Constructor, destructor, Object as Function, Arguments, Returning Object from Function. Static Data Members, Static Member Functions, Abstract class, Const Data and Classes. Friend Function	**8 Hours**
Unit-2:	Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time Space trade off. Arrays : Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Sparse Matrices, and Vectors, Arrays in terms of pointers, Static and Dynamic Memory Management. Tower of Hanoi Problem.	**8 Hours**
Unit-3:	Stack: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Applications of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Queues: Array representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, Priority Queue. Linked List: Representation and Implementation: Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List, Header Linked List. Operations on Linked List: Insert, Delete, Searching, Traversing. Array and Queue Implementation using Linked List, Polynomial representation and addition.	**8 Hours**
Unit-4:	Sorting: Insertion Sort, Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort, Practical consideration for Internal Sorting. Searching and Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.	**8 Hours**

Unit-5:	Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Tree. Graphs: Definitions and concepts, representation using Adjacency matrix, Adjacency lists, BFS and DFS, File Structures: Physical Storage Media FileOrganization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices.	8 Hours
Text Books:	1. Lipschutz, S., Data Structure, Tata McGraw Hill.	
Reference Books:	1. Sahani, S.and Horowitz, E., *Fundamentals of Data Structures*, Galgotia 2. Kruse, R., *Data Structures and Program Design in C*, Pearson Education. 3. Cormen, T. H., *Introduction to Algorithms*, Prentice Hall of India. 4. Loudon, K., *Mastering Algorithms With C,*Shroff Publisher & Distributors. 5. Tenenbaum, A.M., *Data Structures using C & C++*, Prentice Hall of India *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	1 https://nptel.ac.in/courses/106/102/106102064/ 2 https://www.youtube.com/watch?v=S47aSEqm_0I 3 https://www.youtube.com/watch?v=5Y8Lfsreeck	

Course Code: IBD311	Professional Core Course-IV BTech- Semester-III	L-3 T-0 P-0 C-3
	OOPS with JAVA	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the fundamentals of OOPS basic terminology used.	
CO2.	Understanding basics of various methods used for computations like Seeing, Applet	
CO3.	Understanding the concept of object oriented model.	
CO4.	Analyzing the efficiency of various machines based upon their functionality and limitations.	
CO5.	Applying the concepts to design various machines.	
Course Content:		
Unit-1:	Introduction to Java and Eclipse, Object-Oriented Programming, Introduction to SDLC, Introduction to UML, Java Basics (The basic building blocks of Java, variables and primitive types, Objects and Messages, String & StringBuffer, Wrapper classes, Building Classes	**8 Hours**
Unit-2:	Debugging, Inheritance and Refactoring, Interfaces, Collections, Serialization and Streams, Exceptions and Exception Handling, Utility Classes, Threads and Synchronization	**12 Hours**
Unit-3:	Java Beans, Web Component Introduction, Java Servlets, Java Servlets API, Java Server Pages, JSP Spécification and Syntax, Page Designer	**10 Hours**
Unit-4:	Debugging Web Applications, Web Archive Deployment Descriptor, Http: Session Management, Cookie API, Management of Application Data, URL Rewriting	**4 Hours**
Unit-5:	JSP Expression Language, JSP Tag Files – Custom Tags, Xdoclets Annotations, Connecting to database, Web Application Security, Java EE Packaging and deployment, Best Practices for Server side Application	**6 Hours**
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: EEC302	Professional Core Course-V BTech- Semester-III Digital Electronics and Computer Organization	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding of the fundamental concepts and techniques used in digital electronics.	
CO2.	Understanding and examine the structure of various number systems and its application in digital design.	
CO3.	Understanding, analyzing and design various combinational and sequential circuits.	
CO4.	Understand the operation of electronic logic elements	
CO5.	Understanding To develop skill to build, and troubleshoot digital circuits.	
CO6.	Analyzing and prevent various hazards and timing problems in a digital design.	
Course Content:		
Unit-1:	**Number System:** Data representation, Data Types and Number Systems, Binary Number System, Octal & Hexa-Decimal Number System; Fixed Point Representation; 1's &2's Complement; Binary Fixed Point Representation; Arithmetic Operation on Binary Numbers; Overflow &Underflow; Floating Point Representation; Codes: ASCII, EBCDIC Codes, Gray Code, Excess-3 & BCD; Error Detection & Correcting Codes; Binary Storage and Registers.	**8 Hours**
Unit-2:	**Boolean algebra:** Definition, Properties, Law's. **Digital Logic Circuits**: Logic Gates: AND, OR, NOT Gates and their Truth Tables, NOR, NAND &XOR Gates; Demorgan's Theorem; Map Simplification; Minimization Techniques: K Map Two, Three and More variables maps; Sum of Product & Product of Sums; Don't care conditions; Combination & Sequential Circuits; Half adder &Full adder; Full subtractor and decimal adder, Code Conversion; Multilevel NAND and NOR Circuits; Multiplexers and Demultiplexers; ROM Working & Circuit.	**8 Hours**
Unit-3:	**Sequential logic**: Flip-Flops: RS, D, JK & T Flip-Flop, Triggering in flip flops, Analysis of Clocked Sequential Circuits; State Reduction and Assignment; flip flop excitation tables; Design procedure and Design of Counters; Design with equations; Registers; Counters and the memory unit; Shift registers; Ripple counters and Synchronous counters; Timings sequence digital logic families; Processor organization; General Register Organization; Stack Organization and Addressing Modes.	**8 Hours**
Unit-4:	**Computer Registers and I/O:** Registers transfer logic; Intel Register Transfer; Arithmetic Logic and Shift Micro Operation; Conditional; Constant Statement; Fixed Point Binary Data Floating Point Data; Instruction Codes; Input-output organizations- I/O Interface; Properties of simple I/O Devices and their controller; Isolated vs. Memory-mapped I/O; Modes of data transfer; Synchronous & Asynchronous data transfer.	**8 Hours**

Unit-5:	**Computer Organization:** Block Level Description of the Functional Units as Related to the Execution of a Program; Fetch; decode and Execute Cycle. **Memory organization:** Auxiliary Memory; Magnetic Drum; Disk & Tape; Semi-conductor memories; Memory; Hierarchy; Associative memory; Virtual memory; Address space & memory space; Address mapping; page table; Page replacement; segmentation; Cache memory; Hit ratio; Mapping techniques; Writing into Cache.	**8 Hours**
Text Books:	1. Mano, M., *Computer System Architecture*, Prentice Hall of India.	
Reference Books:	1. Tannenbaum, O., *Structured Computer Organization*, Prentice Hall of India. 2. Hayes, P.J., *Computer Organization*, McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	1 https://www.digimat.in/nptel/courses/video/117105078/L14.html 2http://www.nptelvideos.in/2012/12/digital-computer-organization.html 3https://www.youtube.com/watch?v=TH9nd-KdVHs&list=PL2DC54ABD5C0221FE	

Course Code: EAS301	**Basic Science Course-V**	L-3
	BTech- Semester-III	T-0
	Mathematics-III	P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	**Understanding** the concepts of singularities, zeroes and poles, functions , relations, propositions, truth tables, logical equivalence and implications, converse, inverse, bi-conditional statements, negation of compound statements, tautologies and contradiction, arguments, fallacies, quantifiers.	
CO2.	**Applying** the concept of power series, Taylor's and Laurent's series, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Residue theorem.	
CO3.	**Applying** the core mathematics concept to solve the problems.	
CO4.	**Analyzing** the method of least squares and curve fitting of straight line and parabola, solution of cubic and bi-quadratic equations, correlation and regression, Binomial distribution, Poisson distribution and Normal distribution.	
CO5.	**Evaluating** the real integral of the type $\int\limits_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$, Line integral in the complex plane.	
Course Content:		
Unit-1:	**Functions of a Complex Variable**: Analytic functions; C-R equations and harmonic functions; Line integral in the complex plane; Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions; Liouvilles theorem.	**8 Hours**
Unit-2:	**Functions of a Complex Variable II**: Representation of a function by power series; Taylor's and Laurent's series; Singularities, zeroes and poles; Residue theorem, evaluation of real integral of the type $\int\limits_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$.	**8 Hours**
Unit-3:	**Statistical Techniques:** Moments, Moment generating functions, Skewness, Kurtosis, Curve Fitting and Solution of Equations: Method of least squares and curve fitting of straight line and parabola, Solution of cubic and bi-quadratic equations, Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution.	**8 Hours**
Unit-4:	**Propositional Calculus:** Propositions: Algebra, Conditional; Truth tables; Logical Equivalence andimplications; Converse; Inverse; Contra-positive; Bi-conditional statements; Negation of Compound statements; Tautologies and Contradiction; Normal Forms; Arguments; Fallacies; Quantifiers,.	**8 Hours**
Unit-5:	**Set Theory:** Concepts, Operations, Identities, Venn diagram, Cartesian product.**Relation**: Definition, Types, Pictorial representation, Composition.**Function**:Definition, classification, types and composition.	**8 Hours**

	Combinatorics: Principles, Permutation and Combination, Recurrence Relations and Generating Functions,Mathematical Induction.
Text Books:	1. Grewal B.S., *Higher Engineering Engineering Mathematics*, Khanna Publishers.
Reference Books:	1. Kreyszig E., *Advanced Engineering Engineering Mathematics*, Wiley Eastern. 2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers. 3. Narayan Shanti, *A Text book of Matrices*, S. Chand. 4. Bali N.P., Engineering Engineering Mathematics-III, Laxmi Publications. 5. Lipchitz, S. & Lipson S., *Discrete Mathematics*, Outline series Tata McGraw Hill. *** Latest editions of all the suggested books are recommended.**
Additional Electronic Reference Material :	1 https://www.youtube.com/watch?v=xlUFkMKSB3Y 2https://www.youtube.com/watch?v=P7gVp333B6M&list=PL562D06BCD5F9B956 3 https://www.youtube.com/watch?v=Eqdbe0RF5kQ&list=PLLy_2iUCG87DEfQ7Wp0B9OmAnYKBZUvfn

Course Code: EAS303	Humanities and Social Science Course-III BTech- Semester-III	L-2 T-0 P-0 C-2
	Human Values & Professional Ethics	

Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the Importance of Science & Technology for the welfare of humanity,	
CO2.	Understanding the Human and Ethical perspectives in developing and using Technologies	
CO3.	Understanding the Ethical Responsibilities and its application for business, profession and organizational groups	
CO4.	Understanding the individual & corporate responsibilities in regard of society	
CO5.	Remembering the Inculcate the habits of human values, moralities in profession and crisis management	
Course Content:		
Unit-1:	Introduction to Value Education: Understanding of Morals, Values and Ethics; Need, Content and Process for Value Education. Attributes of A Good Character- Integrity, Work Ethic, Respect For Others, Living Peacefully, Cooperation, Commitment, and Empathy etc. Spirituality: Introduction to Yoga and Meditation for Professional Excellence and Stress Management. Understanding Harmony in the Family and Society.	8 Hours
Unit-2:	Ethics & Technology: Impact of Technological Growth on Society and Value System; Reports of Club of Rome, Appropriate Technology Movement of Schumacher, Problems of Technology Transfer, Technology Assessment Impact Analysis, Human Operator in Engineering Projects & Industries, Problems of Man-Machine Interaction, Human Centered Technology, Safety and Risk Analysis.	8 Hours
Unit-3:	Ethics of Profession: Ethical Issues in Engineering Practice, Conflicts of Interest: Conflicts between Business Demands and Professional Ethics. Social and Ethical Responsibilities of Technologists. Ethical Issues at Workplace: Discrimination, Cybercrime, Plagiarism, Sexual Misconduct, Fraudulent Use of Institutional Resources. Intellectual Property Rights and its uses. Whistle blowing and beyond, Case studies	8 Hours
Unit-4:	Profession and Human Values: Values Crisis in Contemporary Society; Value Spectrum of Good Life; Integrated Personality. Modern Search for a Good Society: Justice, Democracy, Secularism, Rule of Law. Values in Indian Constitution. Canons of ethics: Ethics of Virtue; Ethics of Duty; Ethics of Responsibility	8 Hours
Unit-5:	Global Issues & Professional Ethics: MNCs & Morality; Case Study: Bhopal Gas Tragedy. Environmental Ethics: Disposal of Plastic Waste, e-Waste, Industrial. Computer Ethics: Problems in Computer Ethics. Weapons Development: Impact on Society & Humanity. Moral Leadership; Corporate Social Responsibility. Engineering Council of India.	8 Hours

B. Tech (Computer Science & Engineering) Specialization In Application Development using Cloud And Analytics Platforms Syllabus as per CBCS (2019-20)

Text Books:	1.R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Value Education.	
Reference Books:	1. Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA 2. E.F. Schumacher, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain. 2. A Nagraj, Jeevan Vidya ekParichay, Divya Path Sansthan, Amarkantak. 3. Sussan George, How the Other Half Dies, Penguin Press. Reprinted. 4. PL Dhar, RR Gaur, Science and Humanism, Commonwealth Purblishers. 5. A.N. Tripathy, Human Values, New Age International Publishers. 6. E G Seebauer& Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	1https://www.youtube.com/watch?v=1xFZ7ZVVJeA&list=PLXcPnJsWbdxujUIptbSdeJXC0Jd-InxFG 2https://www.youtube.com/watch?v=nlh9V5gd8hg&list=PLbMVogVj5nJQ20ZixllzM69agBq-m8ndV 3 https://www.youtube.com/watch?v=cFOZplkRqsk	

Course Code: TMUGE301	Humanities and Social Science Course-IV BTech- Semester-III **English Communication -III**	L-2 T-0 P-2 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Remembering and understanding the English grammar and vocabulary.	
CO2.	Understanding the art of public speaking and strategies of reading comprehension.	
CO3.	Applying correct vocabulary and sentence construction during public speaking or professional writing.	
CO4.	Aanalyzing different types of sentences like simple, compound and complex.	
CO5.	Drafting notice, agenda and minutes of the meeting.	
CO6.	Demonstrating speaking skills during common conversation and power point presentation.	
Course Content:		
Unit-1:	**English Grammar & Vocabulary** • Correction of Common Errors (with recap of English Grammar with its usage in practical context.) • Synthesis : Simple , complex and compound sentence Commonly used Idioms & phrases (Progressive learning whole semester) *One relevant Case Study/ Case let from the unit.*	**8 Hours**
Unit-2:	**Speaking Skills** • Art of public speaking • Common coversation • Extempore • Power Point Presentation (PPt) Skills**:** Nuances of presenting PPTs *One relevant Case Study/ Case let from the unit.*	**8 Hours**
Unit-3:	**Comprehension Skills** • Strategies of Reading comprehension: Four S's • How to solve a Comprehension (Short unseen passage: 150-200 words) *One relevant Case Study/ Case let from the unit.*	**8 Hours**
Unit-4:	**Professional Writing** a) Preparing Notice,Agenda & Minutes of the Meeting *One relevant Case Study/ Case let from the unit.*	**8 Hours**
Unit-5:	**Value based text reading:** Short story a) The Barber's Trade Union – Mulk Raj Anand *One relevant Case Study/ Case let from the unit.*	**8 Hours**

Text Books:	Singh R.P., An Anthology of Short stories, O.U.P. New Delhi	
Reference Books:	**1.** Allen, W. *"Living English Structure"* Pearson Education, New Delhi. **2.** Joseph, Dr C.J. & Myall E.G. "*A Comprehensive Grammar of Current English*" Inter University Press, Delhi **3.** Wren & Martin "*High School English Grammar and Composition*" S.Chand&Co.Ltd., New Delhi. **4.** Norman Lewis "*Word Power Made Easy*" Goyal Publications & Distributers, New Delhi. **5.** Media (P) Ltd. Meerut. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	1 https://www.youtube.com/watch?v=6xFaXIwwq0s&list=PLzJaFd3A7DZtnTdtOxvjO3GLPd1WVe6oq 2 https://www.youtube.com/watch?v=0AM35Nu5McY&list=PLwytTXNlljX6cEAsR1TsbKpEwGSJieaQ9 3 https://www.youtube.com/watch?v=ZrG_IE8IrgU&list=PLbMVogVj5nJSEQYH2dVtcXN9I4n8hF0VY	

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			**60 Marks**		
20 Marks (Best 2 out of Three CTs) *(From Unit- I, III,IV & V)*	10 Marks (Oral Assignments) *(Unit –II)*	10 Marks (Attendance)	40 Marks (External Written Examination) *(From Unit- I, III,IV & V)*	20 Marks (External Viva)* *(Unit –II)*	**100**

*Parameters of External Viva

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:*External Viva will be conducted by 2-member committee comprising*

a) *One Faculty teaching the class*
b) *One examiner nominated by University Examination cell.*
Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Course Code: TMUGA-301	Value Added Audit Course-I BTech- Semester-III **Foundation Course in Quantitative Aptitude-I**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Solving complex problems using criss cross method, base method and square techniques.	
CO2.	Applying the arithmetical concepts of Average, Mixture and Allegation.	
CO3.	Evaluating the different possibilities of various reasoning based problems in series, Blood relation and Direction.	
CO4.	Operationalizing the inter-related concept of Percentage in Profit Loss and Discount, Si/CI and Mixture/Allegation.	
Course Content:		
Unit-1:	**Speed calculations** Squares till 1000,square root, multiplications: base 100, 200 300 etc., 11-19, crisscross method for 2X2, 3X3, 4X4, 2X3, 2X4 etc., cubes, cube root	**2 Hours**
Unit-2:	**Percentages** Basic calculation, ratio equivalent, base, change of base, multiplying factor, percentage change, increment, decrement, successive percentages, word problems	**5 Hours**
Unit-3:	**Profit Loss Discount** Basic definition, formula, concept of mark up, discount, relation with successive change, faulty weights	**5 Hours**
Unit-4:	**SI and CI** Simple Interest, finding time and rate, Compound Interest, difference between SI and CI, Installments	**2 Hours**
Unit-5:	**Averages** Basic Averages, Concept of Distribution, Weighted Average, equations	**2 Hours**
Unit-6:	**Mixtures and allegations** Mixtures of 2 components, mixtures of 3 components, Replacements	**4 Hours**
Unit-7:	**Number and alphabet series** Number series, alphabet series	**2 Hours**
Unit-8:	**Blood relations** Indicating type, operator type, family tree type	**2 Hours**
Unit-9:	**Ranking** Linear ranking, complex ranking	**1 Hours**
Unit-10:	**Direction sense** Simple statements, shadow type	**1 Hours**
Unit-11:	**Cubes and dices** Concept of cubes, rotation type, Dices, regular dices, irregular dices	**4 Hours**
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal	

	• R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal *** Latest editions of all the suggested books are recommended.**	

Course Code: ECS355	Laboratory Course-IX	L-0 T-0 P-4 C-2
	BTech- Semester-III	
	Data Structure using C++ (Lab)	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Analyzing Data representation and operations using tree and graph.	
CO2.	Analyzing the Concept of recursion and its types with examples.	
CO3.	Implementing all the operations on Stack, Queue, and Linked List.	
CO4.	Implementing of sorting techniques.	
CO5.	Implementing of searching techniques.	
Course Content:		
	1. To write programs implementing Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort. 2. To write programs implementing Searching programs: Linear Search, Binary Search. 3. To write programs Array implementation of Stack, Queue, Circular Queue, Linked List. 4. To write programs implementing Stack, Queue, Circular Queue, Linked List using dynamic memory allocation. 5. To write program implementing Binary tree. 6. To write programs implementing Tree Traversals (pre-order, in-order, post-order). 7. To write programs implementing graph traversal (BFS, DFS). 8. To write programs implementing minimum cost spanning tree, shortest path.	
Text Books:	1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science (Automata, Languages and Computation)", PHI	
Reference Books:	1. Martin J. C., "Introduction to Languages and Theory of Computations", TMH 2. Papadimitrou, C. and Lewis, C.L., "Elements of theory of Computations", PHI 3. Cohen D. I. A., "Introduction to Computer theory", John Wiley & Sons 4. Kumar Rajendra, "Theory of Automata (Languages and Computation)", PPM* **Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	1 https://www.youtube.com/watch?v=-aIRqNnUvEg&list=PL85CF9F4A047C7BF7 2 https://www.youtube.com/watch?v=al4AK6ruRek&list=PLbMVogVj5nJSd25WnSU144ZyGmsqjuKr3 3 https://www.youtube.com/watch?v=CwihAY_fgRE&list=PLEAYkSg4uSQ1cnL10WUDWnO6O3sZdRDdy	

Course Code: IBD351	Laboratory Course-X	L-0 T-0 P-4 C-2
	BTech- Semester-III	
	OOPS with JAVA (LAB)	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Analyzing the concept of object oriented model.	
CO2.	Analyzing the efficiency of various machines based upon their functionality and limitations.	
CO3.	Applying the concepts to design various machines.	
CO4.	Implementing basics of various methods used for computations like Swing, Applet	
CO5.	Implementing the concept of OOPS basic terminology used.	
Course Content:		
	To work on Eclipse and Write Java programs based on theory paper topics with complete details	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: EEC351	Laboratory Course-XI BTech- Semester-III **Digital Logic & Circuit (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Analyzing different combinational circuits with its truth table.	
CO2.	Implementing of various registers and transistor.	
CO3.	Implementing of CMOS integrated circuit and conversion.	
CO4.	Implementing the BCD to binary conversion	
CO5.	Implementing the GATES to conversion	
Course Content:		
	1. To study of following combinational circuits: Multiplexer, Demultimplexer and Encoder. Verify truth tables of various logic functions. 2. To study of various combinational circuits based on: AND/NAND Logic blocks and OR/NOR Logic blocks. 3. To study various waveforms at different points of a transistor bi-stable multi-vibrator and its frequency variation with different parameters. 4. To design a frequency divider using IC-555 timer. 5. To study various types of registers and counters. 6. To study Schmitt trigger circuit. 7. To study transistor as table multi-vibrator. 8. Experimental study of characteristics of CMOS integrated circuits. 9. Interfacing of CMOS to TTL and TTL to CMOS. 10. BCD to binary conversion on digital IC trainer. 11. Testing of digital IC by automatic digital IC trainer. 12. To study OP-AMP as Current to Voltage & Voltage to Current converters & comparator.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS401	Professional Core Course-VI	L-3
	BTech- Semester-IV	T-0
	Theory of Computation	P-0
		C-3

Course Outcomes:	On completion of the course, the students will be :
CO1.	Understanding the fundamentals of Computational theory and basic terminology used.
CO2.	Understanding basics of various machines used for computations like FSM, PDA, TM.
CO3.	Understanding the grammar, language, formation of regular expression in FA, minimization of FA and CFG.
CO4.	Analyzing the efficiency of various machines based upon their functionality and limitations.
CO5.	Applying the concepts to design various machines like FSM, PDA etc.
Course Content:	
Unit-1:	**Fundamentals:** Strings, Alphabet, Language, Operations, Finite state machine, Definitions, Finite automaton model, acceptance of strings and languages, Deterministic finite automaton and non deterministic finite automaton, Transition diagrams and language recognizers, Chomsky hierarchy of languages.	**8 Hours**
Unit-2:	**Finite Automata:** NFA with € transitions-Significance, Acceptance of languages. Conversions and Equivalence, Equivalence between NFA with and without null transitions, NFA to DFA conversion, Minimization of FSM, Equivalence between two FSM`s, Finite Automata with output-Moore and Mealy machines.	**8 Hours**
Unit-3:	**Regular Languages:** Regular sets, Regular expressions, Identify rules, Constructing finite Automata for a given regular expressions, Conversion of finite automata to regular expressions, Pumping lemma of regular sets. **Grammar Formalism:** Regular grammars-right linear and left linear grammars, Equivalence between regular linear grammar and FA, Context free grammar, Derivation trees, Sentential forms, Rightmost and leftmost derivation of strings.	**8 Hours**
Unit-4:	**Context Free Grammars:** Ambiguity in context free grammars. Minimization of context free grammars, Chomsky normal form, Greiback normal form, Pumping lemma for context free languages.	**8 Hours**
Unit-5:	**Push Down Automata:** Push down automata, Definition, Model, Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, Introduction to Tuning Machine, TM Definition, TM Model, Design of TM.	**8 Hours**
Text Books:	1. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science (Automata, Languages and Computation)", PHI
Reference Books:	1. Martin J. C., "Introduction to Languages and Theory of Computations", TMH 2. Papadimitrou, C. and Lewis, C.L., "Elements of theory of Computations", PHI 3. Cohen D. I. A., "Introduction to Computer theory", John Wiley & Sons

	4. Kumar Rajendra, "Theory of Automata (Languages and Computation)", PPM* **Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material :	1 https://www.youtube.com/watch?v=-aIRqNnUvEg&list=PL85CF9F4A047C7BF7 2 https://www.youtube.com/watch?v=al4AK6ruRek&list=PLbMVogVj5nJSd25WnSU144ZyGmsqjuKr3 3 https://www.youtube.com/watch?v=CwihAY_fgRE&list=PLEAYkSg4uSQ1cnL10WUDWnO6O3sZdRDdy	

	Professional Core Course-VII	L-3
Course Code: ECS405	**BTech- Semester-IV**	**T-0**
		P-0
	Computer Based Numerical & Statistical Techniques	**C-3**

Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding to find solutions of non-linear equations using bisection method, Newton's methods and False Position method and implement using a computer. Also solve integration with the help of Trapezoidal rule and Simpson's rules.	
CO2.	Applying to solve large systems of simultaneous linear equations.	
CO3.	Applying to Solve Finite differences with the help of some operators like Shift operator and also find data after analysis of given data using various numerical methods like Newton's method, Lagrange's method etc and implement using a computer.	
CO4.	Analyzing the Employ appropriate regression models to determine statistical relationships.	
CO5.	Applying basic statistical inference techniques, including confidence intervals, hypothesis testing and analysis of variance, to science/engineering problems.	
Course Content:		
Unit-1:	**Linear Equations**: Direct Method; Gauss Jordan and Gauss Elimination Methods; Pivoting; Iterative methods; Jacobi and Gauss Seidel methods;	**8 Hours**
Unit-2:	**Non-Linear Equations:** Bisection Method, Regula-Falsi Method, Newton-Raphson Method, Rate of Convergence, Numerical Integration and Differentiation; Trapezoidal and Simpson's rule, Derivatives from Newton's Forward polynomial.	**12 Hours**
Unit-3:	**Interpolation:** Finite Difference; Newton's Forward and Backward Interpolation Formulae; Central Difference Formulae; Gauss Forward and Backward Difference Formulae; Newton's Divided Difference Formula; Lagrange's Interpolation Formula.	**10 Hours**
Unit-4:	**Representation and Analysis:** Curve Fitting; Cubic Spline and Approximation: Method of Least Squares, Fitting of Straight Lines, Polynomials and Exponential Curves. **Frequency Chart:** Histogram, Frequency Curve, Pi-chart.**Regression analysis:** Linear and Non-linear, Multiple Regression.	**4 Hours**
Unit-5:	**Time Series and Forecasting:** Moving Averages; Smoothening of curves; Forecasting Models and Methods; Statistical Quality Controls Methods, **Testing of Hypothesis:** Test of Significance; Chi- square Test; T-Test; ANOVA; F-Test; Application to Medicine; Agriculture.	**6 Hours**

Text Books:	1. Raman, R., *Computer Oriented Numerical Methods*, Prentice Hall of India.	
Reference Books:	1. Veerarajan, T. Ramachandran, T., *Theory and Problems in Numerical Method*, Tata McGraw Hill. 2. Niyogi, P., *Numerical Analysis and Algorithms,* Tata McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/111/107/111107105/ https://nptel.ac.in/courses/11/107/1107105/ https://nptel.ac.in/	

Course Code: IBD411	**Professional Core Course-VIII** **BTech- Semester-IV** **Information Management Basics**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding importance of databases in real life.	
CO2.	Understand the operation of electronic logic elements	
CO3.	Understanding to Bloom the Triggers and Views in databases	
CO4.	Understanding Entity-Relationship model.	
CO5.	Understanding the Grasp about the SQL, Oracle Database queries.	
CO6.	Analyzing to Learn different types of databases.	
Course Content:		
Unit-1:	Relational Databases, Installation and Planning, Data Modeling, Data Modeling and Database Design, Relational Databases, Introduction to RDBMS, Understanding a Table, Relational Concepts	**8 Hours**
Unit-2:	Database Query Languages, Simple SQL Queries, Retrieving Data from Multiple Tables, Scalar Functions and Grouping, Database Query Languages, Column Functions and Grouping, Union, Using Sub-queries	**8 Hours**
Unit-3:	Relational Database Design, Views and Results during DB Design, Problem Statement, Relational Database Design, Entity Relationship Model, Data and Process Inventories, Tuple Types, From Tuple Types to Tables, Integrity Rules, Indexes, Logical Data Structures Organization; Stack Organization and Addressing Modes.	**14 Hours**
Unit-4:	Distributed Databases, Distributed Data, Physical Database Design, Physical Implementation, Intermediate SQL, Maintaining Data, Information Storage and Retrieval, Data Moving Data, Mapping- DB2 vs. Oracle.	**10 Hours**
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD413	Professional Core Course-IX BTech- Semester-IV Agile Development Methodologies	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the Blooming in the techniques used in agile and their benefits.	
CO2.	Understanding the lifecycle of a project, including alternative configurations and other project management models.	
CO3.	Understanding how the Agile Project Management process can enable planning, management and control for predictable agile project deliveries	
CO4.	Analyzing the roles and responsibilities within agile projects.	
CO5.	Analyzing the philosophy and principles of Agile.	
Course Content:		
Unit-1:	Project, Project Execution Methodologies- Waterfall Model, V-Model, Agile Deep Dive, DevOps Fundamentals, Git, Maven, Docker	8 Hours
Unit-2:	Scrum, Scrum Team, Roles and Responsibilities of Scrum Team, Sprints, Scrum Artifacts, Product Backlogs, Sprint Burndown Chart, Impediment List	8 Hours
Unit-3:	Sprint Planning, Scrum Meetings, PBR, Sprint Goal, User Stories, Definition of Done, Team Velocity, Defect Density, Scrum Scaling, Scrum Practices, Scrum Vs Kanban, Xtreme Programming, Xtreme Programming vs Scrum.	8 Hours
Unit-4:	Puppet, Jenkins, Junit, Nagios, Introduction of a Use case for CI/CD Pipeline, Problem Solving with DevOps	8 Hours
Unit-5:	Advanced DevOps Concepts, Automatic Rollback, Automatic Provisioning, what is Cloud, IBM Cloud, DevOps using IBM Cloud	8 Hours
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: ECS406	Professional Core Course-X BTech- Semester-IV Operating System	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the concepts and implementation of various Memory management policies and usage of the virtual memory.	
CO2.	Understanding the concepts and states of process, also evaluating the use of various scheduling algorithms and finding the suitability for their usage.	
CO3.	Understanding and Analyzing various issues in Inter Process Communication (IPC) and the role of OS in IPC, also understanding the various characteristics of deadlock and applying the learnt concepts and algorithm to avoid and recover from the deadlock.	
CO4.	Analyzing and Understanding the Basics of operating system along with the types and main functionalities of the operating system.	
CO5.	Analyzing the file management policies and disk structure along with scheduling algorithm for applying it to solve the disk scheduling problems.	
Course Content:		
Unit-1:	**Operating System:** History, Types: Batch System, Time Sharing System, Real Time System, Multiprogramming, Distributed System; Functions; Services; System calls; System programs; Virtual machines.	8 Hours
Unit-2:	**Process Management:** Concept, States, Control Block, Scheduling; CPU, Criteria, Algorithms, Preemptive& Non Preemptive.	8 Hours
Unit-3:	**Process Synchronization:** Critical Section, Race Condition, Synchronization Hardware, Semaphores, Classical Problems of Synchronization. **Deadlocks:** Characterization, Avoidance, Detection & Recovery.	8 Hours
Unit-4:	Memory Management: Contiguous Allocation, External and Internal Fragmentation, Paging & Segmentation. Virtual Memory: Concept, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.	8 Hours
Unit-5:	File Management: Directory Structure, Allocation Methods; Contiguous; Linked; Indexed: Free Space Management; Disk: Structure, Scheduling Algorithms, Management.	8 Hours
Text Books:	1. Silbershatz, A. and Galvin, P., *Operating System Concept*, Addison-Wesley.	
Reference Books:	1. Flynn, M., *Understanding Operating System*, Thomson Press. 2. Tannenbaum, O., *Operating System Concept*, Addison-Wesley. 3. Joshi, R.C., and Tapaswi, S., *Operating Systems*, Wiley-Dreamtech. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105214/ https://nptel.ac.in/courses/106/106/106106144/ https://nptel.ac.in/courses/106/102/106102132/	

Course Code: EHM403	Humanities and Social Science Course-V BTech- Semester-IV **Management Concepts & Organizational Behavior**	L-2 T-0 P-0 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the Concept and importance of management and its functions, organizational behavior, challenges for management	
CO2.	Understanding the Perception and Thinking process of individual, personality traits and its importance	
CO3.	Understanding the Theories of motivation and leadership and its importance, applicability into business	
CO4.	Understanding the Flow and formation of powers and politics in organizational groups	
CO5.	Understanding the Organizational Change and its importance, applicability into business	
Course Content:		
Unit-1:	Introduction to Management: Meaning, nature and importance of management; Management functions; Managerial Skills. Planning: Introduction, Importance of Planning, Types of Plans, Planning & Decision Making Process	**8 Hours**
Unit-2:	Organizing and staffing: Meaning, Importance & Process of Organizing, Organizational Structure & its types, Delegation of Authority, Staffing: Meaning & importance. Directing: Importance & Functions, Controlling: Importance and Process, Measures for Effective Control & Control Techniques.	**8 Hours**
Unit-3:	Organizational Behaviour (OB): Concept, Characteristics, Key Elements of OB, Models of OB. Perception: Concept, Process & Importance. Attitudes & Job Satisfaction. Personality: Concept, Types & Theories, Learning: Concept & Theories of Learning.	**8 Hours**
Unit-4:	Motivation: Concepts, Principles, Theories. Leadership: Concept, Function & Style. Group Dynamics: Definition, Stages of Group Development, Types & Group Decision Making. Power and Politics: Concept, Sources, Approaches to Power, Political Implications of Power.	**8 Hours**
Unit-5:	Organizational Change: Concept, Resistance to change & its Management, Implementation of Change. Conflict: Concept, Sources, Types and Resolution of Conflict, Stress: Meaning, Causes, Consequences & Managing Stress. Culture: Concept, Characteristics, Elements of Culture.	**8 Hours**
Text Books:	1. Prasad L.M., Principles and Practice of Management, Sultan Chand	
Reference Books:	1. Robbins Stephen P., Organizational Behavior Pearson Education 2. Koontz, Harold, Cyril 'O' Donnell, And Heinz Weihrich,	

	Essentials of Management, Fourth Edition, McGraw-Hill, Singapore 3. Srivastava & Chunawalla, Management Principles and Practices, Macmillan 4. Koontz, Principles of Management, Tata McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/105/110105033/ https://freevideolectures.com/course/3502/organizational-behaviour-i https://nptel.ac.in/courses	

Course Code: **TMUGE401**	**Humanities and Social Science Course-VI BTech- Semester-IV** **English Communication -IV**	**L-2 T-0 P-2 C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Remembering and understanding the English grammar and vocabulary.	
CO2.	Understanding the essentials of effective listening and speaking.	
CO3.	Understanding the corporate expectations and professional ethics.	
CO4.	Applying correct vocabulary and sentence construction during professional writing or job interviews.	
CO5.	Aanalyzing different types of interviews.	
Course Content:		

Unit-1:	**Vocabulary & Grammar**
	    • Homophones and Homonyms
	    • Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
	    • Transformation of sentences
	
	One relevant Case Study/ Case let from the unit.
		12 Hours

Unit-2:	**Essence of Effective listening & speaking**
	    (05 hours)
	    • Listening short conversation/ recording (TED talks / Speeches by eminent personalities)
	     Critical Review of these abovementioned
	Impromptu
	
	One relevant Case Study/ Case let from the unit.
		8 Hours

Unit-3:	**Professional Writing**
	    i. Proposal: Significance, Types, Structure & AIDA
	    ii. Report Writing: Significance ,Types, Structure& Steps towards Report writing
	
	One relevant Case Study/ Case let from the unit.
		8 Hours

Unit-4:	**Job Oriented Skills**
	    a) Cover Letter
	    b) Preparing Règumè and Curriculum-Vitae
	    c) Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
	    d) Corporate Expectation & Professional ethics: Skills expected in corporate world
	
	One relevant Case Study/ Case let from the unit.
		8 Hours

Unit-5:	**Value based text reading:** Short story
	(05 hours)
	    A Bookish Topic – R.K. Narayan
	    One relevant Case Study/ Case let from the unit.
		8 Hours

Text Books:	1. Singh R.P., An Anthology of Short stories, O.U.P. New Delhi.
Reference Books:	• Raman Meenakshi & Sharma Sangeeta, *"Technical Communication-Principles & Practice"* Oxford University Press, New Delhi. • Mohan K. & Sharma R.C., "*Business Correspondence of Report Writing",*TMH, New Delhi. • Chaudhary, Sarla "Basic Concept of Professional Communication" Dhanpat Rai Publication, New Delhi. • Kumar Sanjay &Pushplata "*Communication Skills*" Oxford University Press, New Delhi. • Agrawal, Malti "*Professional Communication*" KrishanaPrakashan Media (P) Ltd. Meerut. *** Latest editions of all the suggested books are recommended.**

Evaluation Scheme

Internal Evaluation			External Evaluation		Total Marks
40 Marks			**60 Marks**		
20 Marks (Best 2 out of Three CTs) **(Unit –I, III,IV & V)**	10 Marks (Oral Assignments) **(Unit –II& IV)**	10 Marks (Attendance)	40 Marks (External Written Examination) **(Unit –I, III,IV & V)**	20 Marks (External Viva)* **(Unit –II& IV)**	**100**

*Parameters of External Viva

Content	Body Language	Communication skills	Confidence	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:*External Viva will be conducted by 2-member committee comprising*

a) *One Faculty teaching the class*
b) *One examiner nominated by University Examination cell.*
   Each member will evaluate on a scale of 20 marks and the average of two would be the 20 marks obtained by the students.

Course Code: ECS453	Laboratory Course- XII BTech- Semester-IV Computer Based Numerical & Statistical Techniques(Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying floating point arithmetic operations and deduce errors involved in polynomial interpolation.	
CO2.	Applying Algebraic and transcendental equation	
CO3.	Applying formulae by Bessel's, Newton, Sterling, and Lagrange's.	
CO4.	Applying method of least square and showing frequency chart, regression analysis etc.	
CO5.	Applying numerical integration and differentiations.	
Course Content:		
	1. To write a program implementing floating point arithmetic operations i.e., addition, subtraction, multiplication and division. 2. To write a program to deduce errors involved in polynomial interpolation. 3. To write programs implementing Algebraic and transcendental equations using Bisection, Newton-Raphson, Iterative, method of false position, rate of conversions of roots in tabular form for each of these methods. 4. To write a program implementing formulae by Bessel's, Newton, Sterling, and Lagrange's. 5. To write a program implementing method of least square curve fitting. 6. To write a program implementing numerical differentiation. 7. To write a program implementing numerical integration using Simpson's 1/3 and 3/8 rules, trapezoidal rule. 8. To write a program showing frequency chart, regression analysis, Linear square fit, and polynomial fit.	
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code:	Laboratory Course -XIII	L-0

IBD451	BTech- Semester-IV	T-0
	Information Management Basics (Lab)	P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying to Execute different queries to create a simple and complex database.	
CO2.	Implementing the different functions on the given table.	
CO3.	Applying to execute how to deal with different tables in one database.	
CO4.	Analyzing the steps to create any database from scratch using ER model.	
CO5.	Applying to Execute patterns to retrieve data from table.	
Course Content:		
	To Study Database Management System with Relational Concepts, Study SQL Queries working on IBM DB2 Database. **LIST OF EXPERIMENTS** 1. To write a program to Create Table, SQL for Insertion, Deletion, Update and Retrieval using aggregating functions. 2. To write a program in PL/SQL, Understanding the concept of Cursors. 3. To write a program for implementing Join, Union & intersection etc. 4. To write a program for Creating Views, Writing Assertions Triggers. 5. To write a program for Creating Forms, Reports etc. 6. To write codes for generating read and update operator in a transaction using different situations. 7. To write a program to Implement 2PL concerning central algorithm. 8. To develop code for understanding of distributed transaction processing. Students are advised to use Developer 2000 Oracle 8+ version for above experiments. However, depending on the availability of Software's students will use Server/DB2 for implementation.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD453	Laboratory Course- XIV BTech- Semester-IV **Agile Development Methodologies (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Implementing the software projects in a continuous and faster way.	
CO2.	Implementing the various tools used in DevOps and applying them in project development.	
CO3.	Implementing the commands used in DevOps tools.	
CO4.	Implementing the various communication and team collaboration techniques used in software development process.	
CO5.	Applying the DevOps approach in the project development to increase speed, efficiency and decreased risk.	
Course Content:		
	To Study AGILE METHODOLOGIES and other modelling Concepts. Create a Modeled Diagram having a) Create 1 interface b) Create 5 classes c) Rename it again d) Delete one class from diagram e) Delete one class from model	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS455	Laboratory Course-XV BTech- Semester-IV **OS lab with Software Engineering (LAB)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding and identify various methods to perform the basic operations on a UNIX based operating system.	
CO2.	Understanding and analyzing the methods of creating SRS and various diagrams using software engineering paradigms.	
CO3.	Implementing and understanding the file read, write and access methods and perform the operations on a file in UNIX.	
CO4.	Applying the learnt concept to implement and simulate the various CPU scheduling and Page replacement algorithms.	
CO5.	Applying the DevOps approach in the project development to increase speed, efficiency and decreased risk.	
Course Content:		
	LIST OF EXPERIMENTS 1. To implement CPU Scheduling Algorithms • FCFS • SJF • SRTF • PRIORITY • ROUND ROBIN 2. Simulate all Page Replacement Algorithms • FIFO • LRU 3. Simulate Paging Technique of Memory Management Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner. SOFTWARE ENGINEERING LAB For any given case/ problem statement do the following; 1. Prepare a SRS document in line with the IEEE recommended standards. 2. Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case. 3. Draw the activity diagram. 4. Identify the classes. Classify them as weak and strong classes and draw the class diagram. 5. Draw the sequence diagram for any two scenarios. 6. Draw the collaboration diagram. 7. Draw the state chart diagram. 8. Draw the component diagram. 9. Perform forward engineering in java. (Model to code conversion)	

	10. Perform reverse engineering in java. (Code to Model conversion) 11. Draw the deployment diagram.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: TMUGA-401	Value Added Course-II BTech- Semester-IV **Analytical Reasoning**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying the arithmetical concepts in Ratio Proportion Variation.	
CO2.	Employing the techniques of Percentage, Ratios and Average in inter related concepts of Time and Work, Time Speed and Distance.	
CO3.	Identifying different possibilities of reasoning based problems of Syllogisms and Venn diagram.	
CO4.	Examining the optimized approach to solve Visual Reasoning based problem.	
Course Content:		
Unit-1:	**Ratio, proportions and variations** Concept of ratios, proportions, variations, properties and their applications	**5 Hours**
Unit-2:	**Time and Work** Same efficiency, different efficiency, alternate work, application in Pipes and Cisterns	**5 Hours**
Unit-3:	**Time Speed Distance** Average speed, proportionalities in Time, Distance, trains, boats, races, circular tracks	**8 Hours**
Unit-4:	**Logs and Surds** Concept and properties of logs, surds and indices	**1 Hours**
Unit-5:	**Coding and decoding** Sequential coding, reverse coding, abstract coding	**2 Hours**
Unit-6:	**Syllogisms** Two statements, three statements	**4 Hours**
Unit-7:	**Logical connectives** 100-50 rule, sequential options, irregular options	**2 Hours**
Unit-8:	**Deductive Logic** Basic concept and applications	**1 Hours**
Unit-9:	**Venn diagram** Basic concept and applications	**1 Hours**
Unit-10:	**Visual Reasoning** Odd men out, sequential output	**1 Hours**
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude	

B. Tech (Computer Science & Engineering) Specialization In Application Development using Cloud And Analytics Platforms Syllabus as per CBCS (2019-20)

	• R2:-Quantitative Aptitude by R.S. Agrawal
	• R3:-M Tyra: Quicker Maths
	• R4:-Nishith K Sinha:- Quantitative Aptitude for CAT
	• R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com
	• R6:-Logical Reasoning by Nishith K Sinha
	• R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal
	* Latest editions of all the suggested books are recommended.

Course Code: ECS511	Professional Core Course-XI BTech- Semester-V **Computer Architecture**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the theory and architecture of central processing unit.	
CO2.	Understanding the concepts of parallel processing, pipelining and interprocessor communication.	
CO3.	Understanding the impact of instruction set architecture on cost-performance of computer design.	
CO4.	Understanding dynamic scheduling methods and their adaptation to contemporary microprocessor design.	
CO5.	Analyzing microprocessor architecture and apply assembly language programming.	
Course Content:		
Unit-1:	**Parallel Computing:** Concepts, Architecture, Classification Schemes, Applications, Parallelism in Uni-processor Systems, Parallel Computer structures. **Pipelining Processing:** An overlapped Parallelism, Instructions and Arithmetic.	8 Hours
Unit-2:	**Principles of Designing Pipelined Processors**: Internal forwarding and register tagging, Hazard detection and resolution, Job sequencing and collision prevention, Characteristics of Vector processing, multiple vector task dispatching, SIMD array processors, Masking and Data routing.	8 Hours
Unit-3:	**SIMD Interconnection Network:** Static, Dynamic networks, Cube interconnection network, ShuffleExchange and Omega Network, SIMD matrix multiplication. **Multiprocessor Architecture:** Tightly and loosely coupled multiprocessors.	8 Hours
Unit-4:	**Multiprocessor Scheduling**: Strategies and Deterministic Scheduling Models, Data Flow computing and Data Flow Graph, 8 Bit and 16 Bit Intel Microprocessor Architecture and Register set.	8 Hours
Unit-5:	**Assembly Language Programming Based on Intel 8085: Instructions:** Data Transfer, Arithmetic, Logic, Branch operations; Looping Counting, Indexing, Programming Techniques, Counters and Time Delays, Stacks and Subroutines, Conditional call and Return Instructions, Advanced Subroutine Instructions.	8 Hours
Text Books:	1. Hwang, K., *Computer Architecture and parallel processing*, McGraw Hill	
Reference Books:	1. Tabak, D., *Advanced Microprocessor*, McGraw Hill. 2. Hall, D.V, *Microprocessor and Interfacing, Program and hardware*, Tata McGraw Hill.	

	* Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105163/ https://nptel.ac.in/courses/106/102/106102062/ https://www.youtube.com/watch?v=msqxkEKFg8I	

Course Code: ECS510	Professional Core Course-XII BTech- Semester-V **Computer Network**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the fundamentals of computer networks, their types, transmission modes, and various reference models.	
CO2.	Understanding error-free transmission of data along with data collision.	
CO3.	Understanding addressing techniques and transmission modes of a network.	
CO4.	Understanding the working of application layer protocols and the impact of network security tools on an existing systems.	
CO5.	Applying various routing and congestion control algorithms over a network and Identify Quality of service parameters and addressing techniques.	
Course Content:		
Unit-1:	**Network:** Goals, Applications, Components; Direction of Data flow networks, Categories, Types of Connections, Topologies, Protocols and Standards, ISO / OSI model, Transmission Media, Types, ISDN, Routers.	**8 Hours**
Unit-2:	**Medium Access Sub-Layer:** Channel Allocations, ALOHA protocols, Error detection and correction: Parity, LRC, CRC, Hamming code, Flow Control and Error control; Stop and wait, Go back-N, ARQ, Selective repeat ARQ, Sliding Window, HDLC, Ethernet: IEEE-802.3, 802.4, 802.5, 802.11, FDDI, SONET , Bridges.	**8 Hours**
Unit-3:	**Network Layer:** Internet works, Packet Switching and Datagram Approach, IP addressing methods, Sub netting, Routing: Distance Vector, Link State.	**8 Hours**
Unit-4:	**Transport Layer:** Duties, Multiplexing, Demultiplexing, Sockets. **Protocols:** User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Congestion Control, Quality of Services (QOS), Integrated Services.	**8 Hours**
Unit-5:	**Application Layer:** Domain Name Space (DNS), File Transfer Access and Management, Electronic Mail, Virtual Terminals, WWW, Security, Cryptography.	**8 Hours**
Text Books:	1. Forouzan, B.A., *Data Communication and Networking*, Tata McGraw Hill	
Reference Books:	1. Stallings, W., *Data and Computer Communication*, Macmillan Press. 2. Keshav, S., *An Engineering Approach on Computer Networking*, Addison-Wesley. 3. Larry, L.P. and Peter, S.D*., Computer Network,* Harcourt Asia.	

	* Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105081/ https://nptel.ac.in/courses/106/105/106105080/ https://www.youtube.com/watch?v=3DZLItfbqtQ	

Course Code: ECS503	Professional Core Course-XIII BTech- Semester-V Analysis and Design of Algorithm	L-3 T-1 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the basic concept of algorithm design, algorithm efficiency, run time complexity computation, divide and conquer concept of algorithm design, binary search algorithm analysis, divide and conquer approach analysis.	
CO2.	Understanding concept of greedy method in problem solving, exact optimization solution for minimum cost spanning tree, approximate solution for knapsack problem, single shortest path computation.	
CO3.	Applying concept of dynamic programming in problem solving, dynamic programming vs divide and conquer, shortest path computation application, matrix multiplication application, traveling salesman problem application, longest common subsequence application.	
CO4.	Applying concept of graph problem to get solutions of depth first search method, breadth first search method, back tracking, 8-queen problem, knapsack problem.	
CO5.	Analyzing the concept of branch and bound method, LC searching bounding, FIFO branch and bound, 0/1 knapsack problem, travelling salesman problem, complexity measures, polynomial v/s non-polynomial time complexity, NP-hard and NP-complete problem.	
Course Content:		
Unit-1:	**Algorithms:** Design paradigms, Motivation, Concept of algorithmic efficiency, Run Time Analysis Asymptotic Notations, Divide and conquer, Structure of divide-and-conquer algorithms, Binary search, Quick sort, Analysis of divide and conquer.	**8 Hours**
Unit-2:	**Greedy Method:** Paradigms; Exact optimization solution (minimum cost spanning tree), approximate solution (Knapsack problem), Single source shortest paths.	**8 Hours**
Unit-3:	Dynamic Programming: Concepts, Dynamic programming vs. divide and conquer, Applications, Shortest path in graph, Matrix multiplication, Traveling salesman Problem (TSP), Longest Common sequence(LCS).	**8 Hours**
Unit-4:	**Graph searching and Traversal:** Methods (Depth First search (DFS) and Breadth First Search (BFS)), back tracking, 8-Queen problem, Knapsack problem.	**8 Hours**
Unit-5:	**Brach and Bound:** LC searching Bounding, FIFO branch and bound, LC, Applications, 0/1Knapsack problem, Traveling Salesman Problem. **Computational Complexity:** Complexity Measures, Polynomial vs. Non-polynomial Time complexity, NP- hard and NP-complete classes, Examples.	**8 Hours**
Text Books:	**1**Coremen, L.,*Introduction to Algorithms*, Prentice Hall of India.	
Reference Books:	**1.** Bratley, B., *Fundamental of Algorithms*, Prentice Hall of India.	

	2. Goodrich, M.T., *Algorithms Design*, John Wiley. **3.** Aho, A.V., *The Design and analysis of Algorithms,* Pearson Education. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/101/106101060/ https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/105/106105164/	

Course Code: IBD514	**Professional Core Course-XIV** **BTech- Semester-V** **Cloud Application Development**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding to Earn basic knowledge of Cloud Technologies in use today	
CO2.	Understanding the Importance of security in cloud computing	
CO3.	Understanding Cloud Segments and Cloud Deployment Models	
CO4.	Analyzing the Strategic plan to move applications and services to the Cloud	
CO5.	Analyzing the Static Application Development using Service models	
Course Content:		

Unit-1:	**Introduction to Cloud Computing and different cloud vendors**
	Defining cloud computing ,Describing the factors that lead to the adoption of cloud computing , Describing the choices that developers have when creating cloud applications , Describing infrastructure as a service, platform as a service, and software as a service, Types of Cloud, Defining the services provided by other cloud providers.
	  CLOUD COMPUTING LANDSCAPE
	    • Cloud impact in our lives
	    • Cloud enterprise adoption
	    • Cloud services
	    • Summary & resources
	  CLOUD INDUSTRY ADOPTION
	    • Drivers for Digital Transformation
	    • Cloud Impact in Banking
	    • Cloud Impact in Education
	  Summary & resources
		8 Hours

Unit-2:	**Getting started with IBM Cloud**
	 API PLATFORM REVOLUTION
	 •Cloud Culture of Change
	    • API Platforms Landscape
	    • APIs driving the Cloud platform revolution
	    • Summary & resources
	 DATA IN THE CLOUD
	    • Where and how will data be used?
	    • Why use NoSQL?
	    • Attributes of NoSQL databases
	    • Summary & resources
	 CLOUD AND AI
	    • AI Industry Adoption
	    • AI Evolution
	    • Empowered Cloud Apps with AI
	    • Summary & resources
		8 Hours

Unit-3:	**Cloud Foundary and DevOps**
	    • CLOUD FOR MULTI-CHANNEL
	      • • The Need for a Multi-channel platform
		8 Hours

	• • Multi-channel platform characteristics • • Rapid and Intelligent • • Summary and resources • CLOUD SECURITY • • Cloud Security landscape • • Security concerns in microservices • • OAuth protocol • • Summary & resources • DEVOPS FRAMEWORK • • What is DevOps? • • DecOps Agile Culture • • DevOps Lifecycle Summary & resources	
Unit-4:	ACME AIRLINE CLOUD ADOPTION • Prepare your Environment • Creating an APP • Developing an App • Acme Business Case- Preparing the APP • Prepare Your Environment • Creating an App • Developing an App • Acme Business Case – Preparing the App MAINTENANCE CREW CLOUD APP • Digital App Builder Data Sets • Cloud Management • Return to the Digital App Builder • Preview Dataset in Action ADD AI TO MAINTENANCE CREW APP • Create Cloud Cognitive Services • Connect Services to your App • Train and Implement Cognitive Services ADD MULTI-CHANNEL SUPPORT • Android Studio • Enabling Android in Digital App Builder • Preview your APP in Android Device SECURE THE MAINTENANCE CREW APP • Login Security • Mobile Phone Authorization • Test new security functionality EXPLORE TOOLCHAINS • Enable Toolchains • Create and Explore the Garage Method • Finalize the Creation of Toolchain • Agile Planning • Continuous Integration and Delivery • Manage IBM Cloud Apps • Manage App Using New Relic & PagerDuty • Slack and PagerDuty Integration • Learn from Users	**8 Hours**

Unit-5:	DEVELOP & TEST MICROSERVICES • Create Microservices Toolchain • Configure Tool Integrations • Configure Tool Integrations • View Build & Deployment Actibity • Manager Access • Configure Pager Duty • Submit an Issue • Modify Code Identify an Error • Fix the Problem and Deploy • Fix the Problem and Deploy • Explore the DevOps Insights • Improve Deployment Management • Improve Visibility • • Delete Tools and Artifacts	**8 Hours**
Text Books:	*Text Material & resources: IBM Course Material* **CLOUD APPLICATION DEVELOPMENT**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD515	Professional Core Course-XV BTech- Semester-V HADOOP Fundamentals	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding to Earn basic knowledge of Hadoop fundamental	
CO2.	Understanding the Importance of security in Hadoop	
CO3.	Understanding Segments and HiveDeployment Models	
CO4.	Analyzing the Strategic plan to move applications and services to big data	
CO5.	Analyzing the Static Application Development using Service models	
Course Content:		
Unit-1:	Introduction to Big Data Topics - What is Big Data and where it is produced? Rise of Big Data, Compare Hadoop vs traditional systems, Limitations and Solutions of existing Data Analytics Architecture, Attributes of Big Data, Types of data, other technologies vs Big Data.	8 Hours
Unit-2:	Hadoop Architecture and HDFS Topics - What is Hadoop? Hadoop History, Distributing Processing System, Core Components of Hadoop, HDFS Architecture, Hadoop Master – Slave Architecture, Daemon types - Learn Name node, Data node, Secondary Name node. Hadoop Clusters and the Hadoop Ecosystem Topics - What is Hadoop Cluster? Pseudo Distributed mode, Type of clusters, Hadoop Ecosystem, Pig, Hive, Oozie, Flume, SQOOP.	8 Hours
Unit-3:	Hadoop MapReduce Framework Topics - Overview of MapReduce Framework, MapReduce Architecture, Learn about Job tracker and Task tracker, Use cases of MapReduce, Anatomy of MapReduce Program. MapReduce programs in Java Topics - Basic MapReduce API Concepts, Writing MapReduce Driver, Mappers, and Reducers in Java, Unit Testing MapReduce Programs	8 Hours
Unit-4:	Hive and HiveQL Topics - What is Hive?, Hive vs MapReduce, Hive DDL – Create/Show/Drop Tables, Internal and External Tables, Hive DML – Load Files & Insert Data, Hive Architecture & Components, Difference between Hive and RDBMS, Partitions in Hive	8 Hours
Unit-5:	Apache SQOOP, Flume Topics - Why and what is SQOOP? SQOOP Architecture, Benefits of SQOOP, Importing Data Using SQOOP, Apache Flume Introduction, Flume Model and Goals, Features of Flume, Flume Use Case. NoSQL Databases Topics - What is HBase? HBase Architecture, HBase Components, Storage Model of HBase, HBase vs RDBMS, Introduction to Mongo DB, CRUD, Advantages of MongoDB over RDBMS, Use case.	8 Hours
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: ECS506	Professional Elective Course-I BTech- Semester-V **ERP System**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying the waterfall model in the development of e-commerce applications.	
CO2.	Analyzing the design and implementation of an e-commerce application with a shopping cart.	
CO3.	Analyzing the user-centered design guidelines in developing user-friendly websites.	
CO4.	Analyzing the bullwhip effect in a supply chain, analyze the causes, and recommend possible solutions.	
CO5.	Analyzing different types of portal technologies and deployment methodologies commonly used in the industry.	
CO6.	Analyzing the Design and implement an e-commerce application with a shopping cart.	
CO7.	Applying the bullwhip effect in a supply chain, analyze the causes, and recommend possible solutions.	
Course Content:		
Unit-1:	**ERP & related technologies:** Overview (evolution, Definition , Advantages),Business process Re-Engineering; Systems: Management information, Decision support, Executive information, Supply chain management, Implementation life cycle, future description of ERP.	**8 Hours**
Unit-2:	**ERP** - **Modules** "An Overview": Functions and Processes of Resource Management, Basic Modules of ERP System-HRD, Personnel Management, Training and Development, Skill Inventory , Reason for the growth of ERP market.	**8 Hours**
Unit-3:	**ERP** - **Resource Management Perspective**: Material Planning and Control, Inventory, Forecasting, Manufacturing, Production Planning, Production Scheduling, Production Control, Sales and Distribution, Finance, Resource Management In global scenario, dynamic data management in complex global scenario.	**8 Hours**
Unit-4:	**ERP** – Information System Perspective: Evolution of Application Software Technology Management, Technology Partners, Supply Chain Management, Customer Relationship Management, Information Communication Technology, E-Business, EDI	**8 Hours**
Unit-5:	**ERP-Key Managerial Issues**: Concept Selling, IT Infrastructure, Implication of ERP Systems on Business Organization, Critical success factors in ERP System, ERP Culture Implementation Issues, Resistance to change, Public Service and Organizations (PSO) Project, ERP Selection issues, Return on Investment, Pre and Post Implementation	**8 Hours**

	Issues.	
Text Books:	Leon, A., *Enterprise Resource Planning*, Tata McGraw Hill.	
Reference Books:	Sadagopan, S. *Enterprise Resource Planning*, Tata McGraw Hill.* **Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://www.youtube.com/watch?v=y0FIMuhZ7BI https://youtube.videoken.com/embed/NzyhYxUCjlg https://youtube.videoken.com/embed/NzyhYxUCjlg	

Course	Professional Elective Course-I	L-3

B. Tech (Computer Science & Engineering) Specialization In Application Development using Cloud And Analytics Platforms Syllabus as per CBCS (2019-20)

Code: EHM504	BTech- Semester-V **Engineering and Managerial Economics**	T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding meaning of Economics/Managerial Economics and its applicability	
CO2.	Understanding theories of consumer behavior, demand & supply analysis	
CO3.	Understanding Demand forecasting in business, Law of production and returns	
CO4.	Understanding market, structures and evaluation of price mechanism in different conditions	
CO5.	Understanding Correlation of macro and microeconomics concepts and business practices	
Course Content:		
Unit-1:	**Introduction:** Meaning, Nature & Scope of Economics, Meaning of Science, Engineering & Technology; Open, Closed & Mixed Economy. Microeconomics vs Macroeconomics, Managerial Economics and its Scope in Engineering Perspective.	**12 Hours**
Unit-2:	**Consumer Behavior:** Utility Analysis & Indifference Curve Analysis, Demand Analysis - Concepts, Determinates & Law of Demand. Elasticity of Demand- Concepts, Types & Importance of Elasticity of Demand in Managerial Decisions. Concepts of Supply.	**8 Hours**
Unit-3:	**Demand Forecasting:** Meaning, Significance and Methods of Demand Forecasting; Production & Cost: Production Function, Fixed Cost, Variable Cost, Average Cost, Marginal Cost, Laws Of Returns To Scale; Law Of Diminishing Returns To Scale; Market Equilibrium.	**8 Hours**
Unit-4:	**Market Structure:** Perfect Competition; Imperfect Competition: Monopolistic, Oligopoly, Duopoly and Price Determination in Various Market Conditions. **Macroeconomics:** Introduction to GDP, GNP, FDI, BOP, Foreign Exchange, Fiscal Policy, Monetary Policy.	**8 Hours**
Unit-5:	**Inflation:** Meaning, Types, Causes & Preventive Methods; National Income: Concept & its Measurement, Business Cycles: Meaning & Phases Of Business Cycle. Government Budget, Parallel Economy, Indian Sectoral Economy, Agriculture in the National Economy.	**8 Hours**
Text Books:	1. Koutsoyiannis, A : Modern Microeconomics, ELBS	
Reference Books:	1. Dwivedi, D.N., Managerial Economics, Vikas Publishing 2. Maheshwari, Y., Managerial Economics, Prentice Hall of India. 3. Mishra S.K. & Puri, V.K., Modern Macro Economic Theory, Himalayan Publishing House, 4. Edward Shapiro, Macro-Economic analysis, Tata Mc Graw Hill *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/101/110101005/ https://nptel.ac.in/courses/110/105/110105075/ https://nptel.ac.in/content/storage2/courses/110101005/downloads/Lecture%2001.pdf	

Course Code: ECS512	Professional Elective Course-I BTech- Semester-V **E-Commerce**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the term 'e-commerce' and the need of ecommerce.	
CO2.	Understanding the role of information systems in organizations, the strategic management processes, and the implications for the management.	
CO3.	Understanding about the importance of managing organizational change associated with information systems implementation.	
CO4.	Applying the application software skills such as analyzing spreadsheets, creating database, and Web browsing, that they have learned in other courses to apply to real-world business problems.	
CO5.	Analyzing the importance of managing organizational change associated with information systems implementation.	
Course Content:		
Unit-1:	**E-Commerce:** Definition, History, Advantages and Disadvantages, Types, E-business vs. E-commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of e-commerce, E-commerce models.	**12 Hours**
Unit-2:	**Network Infrastructure for E-Commerce:**IndustryFramework, Internet and Intranet based E- commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipment; Broad band telecommunication(ISDN, ATM, FRAMERELAY).	**8 Hours**
Unit-3:	**Mobile Commerce:** **Introduction: Mobile** commerce, advantages and disadvantages, e-commerce vs m-commerce, Mobile computing: Framework, Applications; Wireless application protocol, WAP technology; Mobile Information devices.	**8 Hours**
Unit-4:	**Electronic Payment Systems:** Overview, SET protocol, payment gateway, certificate, Types; Digital tokens: Smart cards, Credits Cards, Magnetic strip cards, E-cheques based EPS; online bank Risk. **On-line Commerce Environments**: Servers and commercial environments; Netscape product line; Netscape commerce server; Microsoft internet explorer and servers; open market.	**8 Hours**
Unit-5:	**EDI:** Applications in business, Legal: E-commerce law, Forms of agreement, Government policies and Agenda, EDI vs. E-Commerce, Value added network, EDI versus Internet and EDI over Internet. **Electronic Commerce Providers:** On-line Commerce options: Company profiles.	**8 Hours**
Text Books:	**1.** Kalakota, R., *Frontiers of E-Commerce,* Addison-Wesley.	
Reference Books:	**1.** Sadagopan, S. *Enterprise Resource Planning*, Tata McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/105/110105083/ https://www.youtube.com/watch?v=xKJjyn8DaAw https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf	

Course Code: ECS513	Professional Elective Course-I BTech- Semester-V Software Project Management	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the processes that exist primarily for supporting the management of software development, and are generally skewed toward addressing business concerns	
CO2.	Understanding the concepts to address specific management needs at the individual, team, division and/or organizational level	
CO3.	Applying a strong working knowledge of ethics and professional responsibility. Understanding effective organizational leadership and change skills for managing projects, project teams, and stakeholders.	
CO4.	Analyzing the leadership effectiveness in organizations ,team-building skills required to support successful performance	
CO5.	Analyzing the selection and initiation of individual projects and of portfolios of projects in the enterprise.	
Course Content:		
Unit-1:	**Project Management:** Introduction to Software Project Management, Need identification, Project Management Life Cycle, Project Initiation, Project Evaluation, Project Plan, Types of Project Plan, Milestones- Major and Minor **Software Metrics**: What and Why, Role of Metrics and Measurement, Scope of Software Metrics, Types of Software Metrics: Project Metrics, Process Metrics, Product Metrics, and Function based Metrics	**12 Hours**
Unit-2:	**Life Cycle Phases:** Project Life Cycle and Product Life Cycle**,** Engineering and Production Stages: Inception, Elaboration, Construction, Transition Phases. **Project Management Artifacts::**The Artifact Sets: Management Artifacts, Engineering Artifacts, Programmatic Artifacts. **Project Planning:** Objective, Milestone based planning, Resource Allocation, Critical Path, Project Elements, Size Estimation – Lines of Code (LOC), Work Breakdown Structures (WBS) and Function Point (FP), Effort Estimation, Cost Estimation	**8 Hours**
Unit-3:	**Project Scheduling:** CPM, PERT, Gantt Chart, Cost-Time Relations, Re-works **Project Monitoring and Control:** Dimensions of Project Monitoring and Control, Software Reviews, Type of Reviews – Inspections, Walkthroughs, Code Reviews **Improving Software Economics:** Reducing Software Product Size; Improving Software Processes: Improving Team, Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.	**8 Hours**
Unit-4:	**Risk Management:** Software Risks, Risk Identification, Risk Mitigation, Monitoring and Management **Change Management**: Exploring Challenges, Risking Comfort Zone, Managing Change **Configuration Management:** Baseline, Configurations Items(CIs), SCM Process, Version Control, Configuration Audit	**8 Hours**

Unit-5:	**Quality Management:** Quality Concept, Quality Control, Quality Assurance, ISO 9000 certification for software industry; SEI capability maturity model (CMMI); ISO vs. SEI CMMI, Six-Sigma Overview, Software Reviews, Software Measurements and metrics for Quality	**8 Hours**
Text Books:	Walker, R., *Software Project Management*, Pearson Education.	
Reference Books:	Shere, K. D., *Software Engineering and Management*, Prentice Hall** **Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105218/ https://www.youtube.com/watch?v=eOTcPOvT-H4 https://www.youtube.com/watch?v=Wk607ruc8P0	

Course Code: ECS-514	Professional Elective Course-I BTech- Semester-V **Software Testing**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding software testing	
CO2.	Understanding Basic concepts of Test Management	
CO3.	Applying Agile Methodology of software testing. Understanding how to author a software testing plan. Analyzing software Maintenance	
CO4.	Analyzing Black Box Techniques	
CO5.	Analyzing Control Flow & Data Flow. White Box Techniques: Cyclomatic Complexity	
Course Content:		
Unit-1:	**Software Testing:** Overview of Software Testing, Software Testing History, Importance of Software Testing, Software Test Life Cycle (STLC) and it's phases, Verification & Validation. Overview of Static & Dynamic Testing, Functional & Non-Functional Testing. Levels of Testing - Unit Testing, Integration Testing, System Testing, Acceptance Testing, Stubs & Drivers.	**12 Hours**
Unit-2:	**Functional Testing (Black Box Testing):** Overview, Black Box Techniques: Error Guessing, Decision Tables (DT), Cause Effect Graphing Technique, Boundary Value Analysis, Equivalence Class. Advantages & Disadvantages of Black Box Testing, Limitation of Black Box Testing.	**8 Hours**
Unit-3:	**Structural Testing (White Box Testing):** Overview, Control Flow & Data Flow. White Box Techniques: Cyclomatic Complexity, Basis Path Testing, DD-Paths, Graph Metrics, Mutation Testing, Mutation Score, Mutation Operands, Data Flow, Advantages & Disadvantages of White Box Testing, Limitation of White Box Testing**.**	**8 Hours**
Unit-4:	**Software Test Management & Test Planning:** Basic concepts of Test Management, Test Planning-Test Plan, Test Strategy, Test Estimation, Test Schedule. Test Design Techniques, Test Case Structure & preparation, Characteristics of a good Test Case, Test Case vs. Test Scenario. Test Environment. Test Execution. Test Closure & Test Report.Creating Test Cases from Requirements. Overview of Test Automation & Testing Tools.	**8 Hours**
Unit-5:	**Non-Functional Testing**: Alpha & Beta Testing, Regression Testing, Security Testing, Usability Testing, Load Testing, Stress Testing. Bug; Error; Fault; Failure. Prevention vs. Detection. Incident Management. **Software Quality Assurance**:Overview of Software Quality, Concept of Quality Standards (ISO 9001 and SEI Capability Maturity Model)	**8 Hours**
Text Books:	1.Software Testing and Quality Assurance: Theory and Practice", Sagar Naik, University of Waterloo, Piyu Tripathy, Wiley , 2008	
Reference Books:	1. "Effective methods for Software Testing "William Perry, Wiley. 2. "Software Testing - A Craftsman's Approach", Paul C. Jorgensen,	

	CRC Press, 1995.	
	3. "Software Testing", Srinivasan Desikan and Gopalaswamy Ramesh - Pearson Education 2006.	
	* Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105150/ https://www.youtube.com/watch?v=T3q6QcCQZQg	

Course Code: ECS552	Laboratory Course-XVI BTech- Semester-V **Analysis and Design of Algorithm (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying of BST and RB Tree.	
CO2.	Applying of AVL tree and operations.	
CO3.	Implementing of Dynamic and greedy approach and its problems.	
CO4.	Implementing of graph and its applications	
CO5.	Implementing of algorithms and its applications	
Course Content:		
	1 To write a program in C/C++ for insertion and deletion into binary search tree. 2. To write a program in C/C++ for creation of a Red Black tree and all the associated operations. 3. To write a program in C/C++ for implementing an AVL tree and all the associated operations. 4. To write a program in C/C++ for multiplication of two matrices using Stassen's matrix multiplication method. 5. To write a program in C/C++ to solve Knapsack problem. 6. To write a program in C/C++ to implement shortest path algorithms (Dijkastra's and Bellman's Algorithms). 7. To write a program in C/C++ for finding the minimum cost Spanning Tree in a connected graph. To write a program in C/C++ for solving 8-Queen's problem. 8. To write a program in C/C++ for finding the number of connected components in a Graph.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD553	Laboratory Course-XVII	L-0
	BTech- Semester-V	T-0
		P-4
	Cloud Application Development Lab	C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying the Static Application Development using Service models	
CO2.	Implementing the Strategic plan to move applications and services to the Cloud	
CO3.	Implementing Cloud Segments and Cloud Deployment Models	
CO4.	Implementing the Importance of security in cloud computing	
CO5.	Implementing basic knowledge of Cloud Technologies in use today	
Course Content:		
	To Study Client and Server side applications using IBM Rational Tools.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD554	Laboratory Course-XVIII BTech- Semester-V **HADOOP Fundamentals (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying the Strategic plan to move applications and services to big data	
CO2.	Implementing basic knowledge of Hadoop fundamental	
CO3.	Implementing Segments and HiveDeployment Models	
CO4.	Implementing the Importance of security in Hadoop	
CO5.	Implementing the Static Application Development using Service models	
Course Content:		
	To Study IBM Software Cognos Insight in following context ☐ Introduction to Cognos Insight ☐ Import Data ☐ Restructure Data ☐ Create Visualizations ☐ Construct a Workspace ☐ Format and Enter Data ☐ Share a Workspace ☐ End-to-End Workshop	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

	Project/Industrial Training/Seminar-I	
Course Code: **ECS591**	**BTech- Semester-V** **Industrial Training**	**L-0** **T-0** **P-0** **C-2**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding knowledge through research and development on latest technology.	
CO2.	Developing greater clarity about academic and career goals	
CO3.	Understanding of administrative functions and company culture	
CO4.	Applying critical reasoning and independent learning	
CO5.	Developing ability to effectively communicate solution to problems (oral, visual, written).	
Course Content:		
	Students will attend Industrial training of six weeks in any industry or reputed organization after the IV semester examination in summer vacation. The evaluation of this training shall be included in the V semester evaluation. The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal officer for coordination of the training. Students will also be required to prepare an exhaustive technical report of the training undertaken during the V semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director of the college. The student at the end of the V semester will present his report about the training before a committee constituted by the Director of the College which would be comprised of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director. The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.	

	Not more than three students would form a group for such industrial training/ project submission.		
Text Books:	*** Latest editions of all the suggested books are recommended.**		
Reference Books:	*** Latest editions of all the suggested books are recommended.**		

The marking shall be as follows.

Internal: 50 marks
By the Faculty Guide - 25 marks
By Committee appointed by the Director – 25 marks

External: 50 marks
By Officer-in-charge trainee in industry – 25 marks
By External examiner appointed by the University – 25 marks

Course Code: ECS555	Project/Industrial Training/Seminar-II BTech- Semester-V **MOOC Course**	L-0 T-0 P-0 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding various resources and platform of online learning.	
CO2.	Understanding the credit utilities to be earn from online platform	
CO3.	Understanding the current trends in the technology around the world.	
CO4.	Applying themselves in a competitive environment, weekly assignments and quiz.	
CO5.	Evaluating Various latest AI models and technologies in real world to shape the career.	
Course Content:		
	Evaluation Scheme for NPTEL/MOOC, Short Term Courses: University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted 2 credits as per the approval. Keeping this in mind the Academic Council in its_____, approved the University proposal and allowed a maximum of two credits to be allocated for MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through edX, Coursera, IIRS and NPTEL will be given a maximum credit of two with the course with minimum duration of 8 weeks in Mandatory to Pass Category. For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the Institution / University from time to time. 1. There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department/ Program coordinators/Principal being members of the Committee. 2. The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalise a list of courses to be offered with credits defined for each course and the mode of credit consideration of the student. The complete process including the approval of the Vice Chancellor shall be obtained by the College before the starting of MOOC/NPTEL courses. In case of	

	MOOC course the approval will be valid only for the semester offered. 3. Students will register for the course and the details of the students enrolling under the course along with the approval of the committee, and will be forwarded to the Examination department within thirty days of start of the MOOC Course by the Coordinator MOOC through the Principal of the College. 4. Internal and external marks will be same as offered by the MOOC course. 5. Where the MOOC course or Add-on on courses are only offering certificate of successful completion, and credit has been assigned to the course. If in case student did not clear the examination, further he/she can enroll for MOOC Course under SWAYAM in next semester / year with the same pattern stated in above points	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: TMUGA-501	Value Added Course-III BTech- Semester-V **Modern Algebra and Data Management**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying the concepts of modern mathematics Divisibility rule, Remainder Theorem, HCF /LCM in Number System.	
CO2.	Relating the rules of permutation and combination, Fundamental Principle of Counting to find the probability.	
CO3.	Applying calculative and arithmetical concepts of ratio, Average and Percentage to analyze and interpret data.	
CO4.	Correlating the various arithmetic concepts to check sufficiency of data	
Course Content:		
Unit-1:	**Number theory** Classification of Numbers, Divisibility Rules, HCF and LCM, Factors, Cyclicity(Unit Digit and Last Two digit), Remainder Theorem, Highest Power of a Number in a Factorial, Number of trailing zeroes	10 Hours
Unit-2:	**Data interpretation** Data Interpretation Basics, Bar Chart, Line Chart, Tabular Chart, Pie Chart, DI tables with missing values	6 Hours
Unit-3:	**Data Sufficiency** Introduction of Data Sufficiency, different topics based DS	5 Hours
Unit-4:	**Permutations and combinations** Fundamental counting, and or, arrangements of digits, letters, people in row, identical objects, rank, geometrical arrangements, combination: - basic, handshakes, committee, selection of any number of objects, identical and distinct, grouping and distribution, de-arrangements	6 Hours
Unit-5:	**Probability** Introduction, Probability based on Dice and Coins, Conditional Probability, Bayes Theorem	3 Hours
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal *** Latest editions of all the suggested books are recommended.**	

Course Code: TMUGS-501	Value Added Course-IV B.Tech- Semester-V **Managing Self**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Utilizing effective verbal and non-verbal communication techniques in formal and informal settings	
CO2.	Understanding and analyzing self and devising a strategy for self growth and development.	
CO3.	Adapting a positive mindset conducive for growth through optimism and constructive thinking.	
CO4.	Utilizing time in the most effective manner and avoiding procrastination.	
CO5.	Making appropriate and responsible decisions through various techniques like SWOT, Simulation and Decision Tree.	
CO6.	Formulating strategies of avoiding time wasters and preparing to-do list to manage priorities and achieve SMART goals.	
Course Content:		
Unit-1:	**Personal Development:** Personal growth and improvement in personality Perception Positive attitude Values and Morals High self motivation and confidence Grooming	**10 Hours**
Unit-2:	**Professional Development:** Goal setting and action planning Effective and assertive communication Decision making Time management Presentation Skills Happiness, risk taking and facing unknown	**8 Hours**
Unit-3:	**Career Development:** Resume Building Occupational Research Group discussion (GD) and Personal Interviews	**12 Hours**
Reference Books:	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education 2. Tracy, Brian, Time Management (2018), Manjul Publishing House	

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3. Hill, Napolean, Think and grow rich (2014), Amazing Reads
4. Scott, S.J., SMART goals made simple (2014), Createspace Independent Pub
5. https://www.hloom.com/resumes/creative-templates/
6. https://www.mbauniverse.com/group-discussion/topic.php
7. Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan
8. Burne, Eric, Games People Play (2010), Penguin UK
9. https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression

* Latest editions of all the suggested books are recommended.
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Course Code: ECS611	Professional Core Course-XVI BTech- Semester-VI Data Warehousing and Data Mining with R-Programming	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the various components of data warehousing.	
CO2.	Understanding the constructs and usage of R-Programming language for developers.	
CO3.	Understanding how to design the physical model of data warehouse.	
CO4.	Understanding various algorithms of Data Mining and its process.	
CO5.	Applying the programming concept to solve problems using R-Programming.	
CO6.	Analyzing the concept of data mining using R-Programming.	
Course Content:		
Unit-1:	**Introduction**: Motivation (for Data Mining), Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.	**8 Hours**
Unit-2:	**Concept Description:** Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases–Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.	**8 Hours**
Unit-3:	**Classification and Predictions**: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods KNN classifiers, Genetic Algorithm. **Cluster Analysis**: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis.	**8 Hours**
Unit-4:	**Overview of R programming** : Introduction to R, The S Philosophy, Basic Features of R, Free Software Design of the R , System Limitations of R, R Resources, Installation and getting started with the R interface. **Data Manipulation (dplyr, reshape2 packages) and Scoping Rules of R**: Data Frames, The dplyr Package, dplyr Grammar, Installing the dplyr	**8 Hours**

	package, select(), filter(), arrange(), rename(), mutate(), group_by(), Lexical Scoping: Why Does It Matter?, Lexical vs. Dynamic Scoping *One relevant Case Study/ Case let from the unit.*	
Unit-5:	**Data Warehousing:** Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Aggregation, OLAP Servers: ROLAP, MOLAP, HOLAP, Process Architecture, 3 Tier Architecture, Data Mart.	**8 Hours**
Text Books:	**1.** Paul R. P., *Fundamentals Of Data Warehousing*, John Wiley and Sons.	
Reference Books:	**1.** Anahony S., *Data Warehousing In the Real World: A Practical Guide for Building DecisionSupport Systems*, John Wiley and Sons. 2.Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd., 3. R Programming for Data Science, by Roger D. PengUsing R for Introductory Statistics, by John Verzani, Chapman & Hall/CRC, 2004, ISBN 1584884509 Advanced R, by Hadley Wickham, ISBN 9781466586963 *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/107/110107092/ https://www.youtube.com/watch?v=J326LIUrZM8	

Course Code: ECS612	Professional Core Course-XVII BTech- Semester-VI **Mobile Communication**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the basic concept of mobile computing, wireless networks, structure of mobile computing based application.	
CO2.	Understanding various schemes like Fixed Assignment Schemes, Random Assignment Schemes, Reservation Based Schemes**.**	
CO3.	Understanding the mobile IP, Key functionality of IP, Choose the required functionality at each layer for given application.	
CO4.	Understanding the hand-off process in mobile communication	
CO5.	Analyzing solution for each functionality at each layer x Use simulator tools and design Ad hoc networks	
Course Content:		
Unit-1:	**Introduction**: Issues in mobile computing, Study of Electromagnetic Spectrum: Radio wave, Microwave, Infrared, Overview of wireless communication, Cellular concept, sharing of Wireless channels: FDMA, TDMA, CDMA.	**8 Hours**
Unit-2:	**Global System for Mobile Communication (GSM):** Architecture, Mobility Management, and Network signaling; General Packet Radio Services (GPRS): GPRS architecture, GPRS Network nodes.	**8 Hours**
Unit-3:	**Mobile Data Communication:** WLANs (Wireless LANs); IEEE 802.11 standard; Mobile IP; Wireless Application Protocol (WAP); Mobile Internet Standards; WAP Gateway and Protocols Wireless Markup Languages (WML).	**8 Hours**
Unit-4:	**Third Generation (3G) Mobile Services:** International Mobile Telecommunications 2000 (IMT 2000) vision; Wideband Code Division Multiple Access (W-CDMA); and CDMA 2000: Quality of services in 3G.	**8 Hours**
Unit-5:	**Wireless Local Loop (WLL):** Architecture, Technologies; Global Mobile Satellite Systems; Case studies of Iridium and Global star systems; Bluetooth technology and Wi-Max.	**8 Hours**
Text Books:	**1.** Lin, Y. B. and Chlamatac, I, *Wireless and mobile Networks Architecture,* John Wiley & Sons	
Reference Books:	**1.** Talukdar, A. K. and Yaragal, R*., Mobile Computing,* Tata McGraw Hill. **2.** Theodore, S. R., *Wireless Communication- Principles and Practices,* Pearson Education. *** Latest editions of all the suggested books are recommended.**	

Additional Electronic Reference Material:	https://nptel.ac.in/courses/117/102/117102062/ https://www.youtube.com/watch?v=Ibaqg6P2-8k	

Course Code: IBD613	**Professional Core Course-XVIII** **BTech- Semester-VI** **Big Data Engineering**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the Concept of Big data and traditional data all its major differences and topics.	
CO2.	Understanding the Tools which are used to perform Operations on big Data	
CO3.	Understanding AI , ML and DL with its major modules	
CO4.	Analyzing the Different Alternatives Hadoop Tools and Hadoop Alternatives itself CO-4 Grasp all the relation between Big Data And Data Science	
CO5.	Analyzing the Live Working on IBM Watson Notebook Services	
Course Content:		
Unit-1:	• 4Vs of Big Data • types of Big Data • the industry sectors that are using Big Data and it's Use Cases • Hadoop overview • Hadoop Introduction • Hadoop architecture • HDFS Introduction • HDFS architecture • MapReduce v 1.0 and YARN differences and their architecture	**8 Hours**
Unit-2:	• Big data and Spark • Resilient Distributed Datasets • Spark's Scala and Python shells • Programming with Spark • Spark SQL • What is Hive • SQL for Hadoop • Hive and HBase • Pig • Characteristics of the Pig language • Sqoop • Sqoop commands	**8 Hours**
Unit-3:	• The need for data governance • How is security provided? • History of Hadoop security	**8 Hours**

	• Data Science - using the Scientific Method • AI >> Machine Learning >> Deep Learning • The Work of the Data Scientist • The art of Data Science in 5 steps	
Unit-4:	• Getting started with Jupyter Notebook • How notebooks help data scientists • Essential packages: NumPy, SciPy, Pandas, Scikit-learn, • Data visualizations: matplotlib • Data and notebooks in Jupyter	**8 Hours**
Unit-5:	• Big SQL integrates with RDBMS • Big SQL architecture • The relationship between Big SQL and Db2 • Creating a Big SQL table • Introduction to IBM Watson Studio • Analyzing data with Watson Studio	**8 Hours**
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: EHM601	Humanities and Social Science Course-VII	L-3 T-1 P-0 C-4
	BTech- Semester-VI	
	Entrepreneurship	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the meaning and concepts of Entrepreneurship	
CO2.	Understanding and applying the concepts and theories of motivation Analyzing different facet and forms of business	
CO3.	Understand, apply and evaluate different financing options	
CO4.	Understanding the government support policies and its applications	
CO5.	Understanding and applying remedies to sick businesses	
CO6.	Understanding and applying remedies to sick businesses	
Course Content:		
Unit-1:	**Entrepreneurship:** Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.	**8 Hours**
Unit-2:	**Motivation:** Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	**8 Hours**
Unit-3:	**Business:** Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	**8 Hours**
Unit-4:	**Financing and Accounting:** Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	**8 Hours**
Unit-5:	**Support to Entrepreneurs:** Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.	**8 Hours**
Text Books:	1. Khanka. S.S., "Entrepreneurial Development" S. Chand & Co. Ltd., Ram Nagar, New Delhi.	
Reference Books:	1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata	

	McGraw-Hill.	
	2. Mathew J Manimala, "Entrepreneurship theory at cross roads: paradigms and praxis" 2nd Edition Dream tech.	
	3. Rajeev Roy, 'Entrepreneurship', Oxford University Press.	
	4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad.	
	*Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/106/110106141/ https://www.youtube.com/watch?v=QoqohmccTSc	

Course Code: ECS606	Professional Elective Course-II BTech- Semester-VI Real Time Operating System	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding fundamentals of microprocessor 8085 and microprocessor 8086.	
CO2.	Understanding the concept of assembly language programming.	
CO3.	Understanding the concept of CPU module and peripheral interfaces.	
CO4.	Applying the concept of assembly language to solve problems	
CO5.	Analyzing the architecture and salient features of microprocessor and microcontrollers.	
Course Content:		
Unit-1:	**Real Time System:** Concept; Priorities; Embedded Systems; Task; Classification &Requirements; Deadlines; Soft and Hard Real Time Systems.	**8 Hours**
Unit-2:	**Real Time Operating System:** Evolution, Firm Real Time Systems, Task Management, Inter Process Communication, Case Studies: Maruti II, HART OS, VRTX.	**8 Hours**
Unit-3:	**Scheduling:** Characterizing Real Time Systems and Tasks, Task Assignment, Fixed and Dynamic Priority, Unprocessed (RM and EDF), Multiprocessor (Utilization Balancing, Next-fit for RM &Bin-Packing Assignment for EDF).	**8 Hours**
Unit-4:	**Tools:** Programming Languages, Real Time Databases. **Applications:** Real Time Communication, FDDI, Specification and Verification using Duration Calculus, Flow Control, Protocols for Real Time (VTCSMA, Window, IEEE 802.3, IEEE 802.4, IEEE 802.5, Stop and Go Protocol, Media Access Protocol)	**8 Hours**
Unit-5:	**Fault:** Concept, Classes, Fault Tolerant Real Time System, Clock; Need, Synchronization, Issues inReal Time Software Design.	**8 Hours**
Text Books:	1. Krishna, C.M., *Real Time Systems*, McGraw Hill.	
Reference Books:	1. Levi, S. T. and Agarwal K., *Real Time Systems*, McGraw Hill. 2. Joseph, M., *Real Time System: Specification, Validation & Analysis*, Prentice Hall of India. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://www.digimat.in/nptel/courses/video/106105172/L19.html https://www.youtube.com/watch?v=HlU5cYqGLZE	

Course Code: ECS607	Professional Elective Course-II BTech- Semester-VI Soft Computing	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the architecture and algorithms for artificial neural network.	
CO2.	Understanding the classical and fuzzy set along with membership function.	
CO3.	Applying the learnt concept for solving the numerical problems using fuzzy operations.	
CO4.	Applying fuzzy arithmetic and approximate reasoning on fuzzy sets.	
CO5.	Developing the uncertainty and non specificity for fuzzy and crisp set.	
Course Content:		
Unit-1:	**Neural Networks:** History, Overview of Biological Neuro-system, Mathematical Models. **Artificial Neural Networks:** Architecture, Learning: Rules, Paradigms, Supervised, Unsupervised and Reinforcement Learning; Training Algorithms: Perceptions, Training rules, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.	**8 Hours**
Unit-2:	**Fuzzy Logic:** Fuzzy Logic, Classical and Fuzzy Sets, Membership Function; Fuzzy rule generation.	**8 Hours**
Unit-3:	**Operations on Fuzzy Sets:** Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.	**8 Hours**
Unit-4:	**Fuzzy Arithmetic:** Numbers, Linguistic Variables, Arithmetic Operations on Intervals &Numbers, Lattice, Equations, Logic: Classical, Multi-valued, Propositions; Qualifiers, Linguistic Hedges.	**8 Hours**
Unit-5:	**Uncertainty based Information:** Information & Uncertainty, Non specificity of fuzzy & crisp sets, Fuzziness of Fuzzy Sets.	**8 Hours**
Text Books:	**1.** Simon, H., *Neural Networks,* Prentice Hall of India.	
Reference Books:	Kazuo, T., *An Introduction to Fuzzy Logic for Practical Applications*, Springer. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://www.digimat.in/nptel/courses/video/106105173/L01.html https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs23/	

Course Code: EEC606	Professional Elective Course-II BTech- Semester-VI Microprocessor & Application	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding fundamentals of microprocessor 8085 and microprocessor 8086.	
CO2.	Understanding the concept of assembly language programming.	
CO3.	Understanding the concept of CPU module and peripheral interfaces.	
CO4.	Applying the concept of assembly language to solve problems.	
CO5.	Analyzing the architecture and salient features of microprocessor and microcontrollers.	
Course Content:		
Unit-1:	**Introduction to Microprocessor:** 8085 Evolution of Microprocessor, Register Structure, ALU, Bus Organization, Timing and Control, Instruction set. Architecture of 16-bit Microprocessors: Architecture of 8086; (Bus Interface Unit, Execution unit) Register Organization, Bus operation, Memory segmentation..	**12 Hours**
Unit-2:	**Assembly Language Programming:** Addressing Modes and instruction set of 8086, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps, and subroutine call), Loop and string instructions, Assembler Directives.	**8 Hours**
Unit-3:	**CPU Module:** Signal Description of pins of 8086 and 8088, Clock generator, Address and Data bus De multiplexing, Buffering Memory Organization, Read and Write cycle Timings, Interrupt Structures, Minimum Mode and Maximum Mode Operations.	**8 Hours**
Unit-4:	**Peripheral Interfacing:** Programmed I/O, Interrupt Driven, I/O, DMA, Parallel I/O, (8255-PPI, Parallel port), 8253/8254 programmable Timer/Counter Interfacing with ADC.	**8 Hours**
Unit-5:	**Peripheral Interfacing (Contd.):** 8259 Programmable Interrupt controller, 8237 DMA controller Concept of Advanced 32 bit Microprocessors: Pentium Processor.	**8 Hours**
Text Books:	1. Gaonkar Ramesh S., *Microprocessor Architecture, Programming, and Applications with the8085*, Pen Ram International Publishing.	
Reference Books:	1. Liu and Gibson G.A., *Microcomputer Systems: The 8086/8088 Family*, Prentice Hall (India). 2. Brey, Barry B., *INTEL microprocessors*, Prentice Hall (India). Ram B., *Advanced Microprocessor & Interfacing*, Tata McGraw Hill *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/108/107/108107029/ https://nptel.ac.in/courses/108/105/108105102/	

Course Code: ECS603	Professional Elective Course-II BTech- Semester-VI Computer Graphics	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the basics concepts of computer graphics	
CO2.	Understanding output primitives generating algorithms	
CO3.	Understanding 2d and 3d transformation techniques	
CO4.	Understanding the concepts of window/viewport transformation	
CO5.	Understanding the concept of computer animation	
Course Content:		
Unit-1:	**Computer Graphics:** Areas, Overview of Graphic systems, Graphics primitives, Video-display devices, Raster-scan and Random-scan systems, Plasma displays, LCD, Plotters, Printers, Graphics monitors, Workstations and devices, Input techniques.	**12 Hours**
Unit-2:	**Output Primitives:** Points and lines, Line drawing algorithms, Circle and Ellipse algorithms. **Filled Area Primitives:** Scan line polygon fill algorithm, Boundary-fill and Flood-fill algorithms.	**8 Hours**
Unit-3:	**2-D Geometrical Transforms:** Translation, Scaling, Rotation, Reflection and Shear, Matrix representations and Homogeneous coordinates, Composite transforms, Transformations between coordinate systems. **2-D Viewing:** The viewing pipeline, viewing coordinate reference frame, Window to view-port coordinate transformation, Viewing functions, Cohen-Sutherland and Cyrus-Beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.	**8 Hours**
Unit-4:	**3-D Object Representation:** Polygon surfaces, Quadric Surfaces, Spline representation, Hermit curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, Basic illumination models, polygon-rendering methods. **3-D Geometric Transformations:** Translation, Rotation, Scaling, Reflection and shear transformations, Composite transformations, 3-D viewing, Viewing pipeline, Viewing coordinates, View volume, General projection transforms and clipping.	**8 Hours**
Unit-5:	**Visible Surface Detection Methods:** Classification, Back-face detection, Depth buffer, Scan-line, Depth sorting, BSP-tree methods, Area sub-division and Octree methods. **Computer Animation:** Design of animation sequence, general computer animation functions, Raster animation, Computer animation languages, Key frame systems, Motion specifications.	**8 Hours**
Text Books:	1. Hearn, D. and Pauline, B. M., *Computer Graphics C Version*, Pearson Education.	
Reference Books:	1. Zhigand, X., Roy, P., *Computer Graphics,* Tata McGraw Hill. 2. Rogers, D. F., *Procedural Elements for Computer Graphics*, McGraw Hill.	

	3. Neuman, W. M. and Sprou,l R. F., *Principles of Interactive Computer Graphics*, McGraw Hill. 4. Harrington, S., *Computer Graphics*, McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/106/106106090/ https://nptel.ac.in/courses/106/102/106102065/	

Course Code: ECS610	**Professional Elective Course-II** **BTech- Semester-VI** **Cyber Law & Information Security**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding of the information system architecture and the involved components.	
CO2.	Understanding of the basic principles of Information Security, Online payment systems and related security issues along with the rules of E Governance.	
CO3.	Applying and regulating Cyber Laws dealing with Cyber Ethics by implementation of Intellectual Property Right in the areas of Copyright, Patent, Piracy and Plagiarism.	
CO4.	Analyzing the security of Cryptographic System and design and implementation issues related with Firewalls, Virtual Private Networks and Intrusion Detection Systems.	
CO5.	Analyzing the need of physical security in Information System, need of Biometric Security System and related challenges.	
Course Content:		
Unit-1:	History of Information Systems and its Importance, basics, Changing Nature of InformationSystems, Need of Distributed Information Systems, Role of Internet and Web Services,Information System Threats and attacks, Classification of Threats and Assessing DamagesSecurity in Mobile and Wireless Computing: Security Challenges in Mobile Devices, Authentication Service Security, Security Implication for organizations, Laptops Security Functions of various networking components- routers, bridges, switches, hub, gateway.	**12 Hours**
Unit-2:	Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles. Security Threats toEcommerce, Virtual Organization, and Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.	**8 Hours**
Unit-3:	Physical Security: Needs, Disaster and Controls, Basic Tenets of Physical Security and physical Entry Controls. Access Control- Biometrics, Factors in Biometrics Systems, Benefits, and Criteria for selection of Biometrics, Design Issues in Biometric Systems, InteroperabilityIssues, Economic and Social Aspects, Legal Challenges.	**8 Hours**
Unit-4:	Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public KeyCryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints,Firewalls, Design and Implementation Issues, Policies, Network Security: Basic Concepts,Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoringand Detection, Intrusion Detection. Virtual Private Networks: Need, Use of Tunneling withVPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.	**8 Hours**

Unit-5:	Laws, Investigation and Ethics: Cyber Crime, Information Security and Law, Types &Overview of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy andProtection, Domain Name, Software piracy, Plagiarism, Ethical hacking.	**8 Hours**
Text Books:	1Godbole," Information Systems Security", Willey	
Reference Books:	1. Yadav, "Foundations of Information Technology", New Age, Delhi 2. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill 3. Sood,"Cyber Laws Simplified", McGraw Hill *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/106/106106129/ https://www.youtube.com/watch?v=BvWvFAS1iP0	

Course Code: ECS614	Professional Elective Course-II BTech- Semester-VI **Multimedia And Animation**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding multimedia, it's applications, supporting hardware and hardware tools which provide basic information about multimedia	
CO2.	Applying various tools on image and video standards using JPEG, MPEG, MHEG along with color models and multimedia monitor bitmaps to properly represent a multimedia application.	
CO3.	Applying the multimedia drawing tools and techniques with the effect of animation using multi layer concepts supported by flash incorporating text, audio, video and graphics.	
CO4.	Applying the different compression approaches like lossy and lossless with the specifications of sampling variables associated with digital audio	
CO5.	Analyzing the basic information about the phase performing planning and production of a multimedia application using it's objects like text, sound and their specifications like MIDI with proper capturing.	
Course Content:		
Unit-1:	**Multimedia:** History, Objects, Scope in Business and Work, Production and Planning of Multimedia applications, Hardware, Memory and Storage devices, Communication devices, Software, Tools: Presentation and Object gen7eration, Video, Sound, Image capturing, Authoring, Card and Page based authoring.	**12 Hours**
Unit-2:	**Production and Planning:** Multimedia building blocks, Text, Sound (MIDI), Digital Audio File Formats, MIDI under windows environment, Audio and Video capture.	**8 Hours**
Unit-3:	**Multimedia Techniques:** Basic drawing, Advance animations, Macromedia products, Creating multilayer, Combining interactivity and multiple scenes, Creating transparency effects using text in Flash, Flash animation.	**8 Hours**
Unit-4:	**Digital Audio**: Concepts, Sampling variables, Compression of sound: Loss-Less, Lossy and silence compressions.	**8 Hours**
Unit-5:	**Representation and Compression:** Multimedia monitor bitmaps, Vector drawing, Lossy graphic compression, Colors, Image file formatted animations image standards: JPEG compression, Video representation, Video compression, MPEG standards, MHEG standards; Multimedia Applications, Planning and Costing proposal preparation, and Financing, Case study of a typical industry.	**8 Hours**
Text Books:	1. Andreas H., *Multimedia Basics*, Firewall Media.	
Reference Books:	1. Agarwal R. and Tiwari B.B., *Multimedia Systems*, Excel Books. 2. Rosch W. L., *Multimedia Bible*, Sams Publishing.	

	3. Ken M.,Croteau J., *Flash 4 Web Special Effects, Animation And Design Handbook*, Dreamtech.	
	4. Villamil-Casanova J., Molina L., *Multimedia-Production, Planning And Delivery,* Pearson Education.	
	* Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/content/storage2/courses/117105083/pdf/ssg_m1l1.pdf https://cse.iitkgp.ac.in/~pb/pb-graphics-2018.pdf	

Course Code: ECS613	**Professional Elective Course-II** **BTech- Semester-VI** **Compiler Design and Construction**	**L-3 T-0 P-0 C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the structure along with the lexical and syntactic analysis phase of a compiler.	
CO2.	Understanding various parsing techniques.	
CO3.	Understanding the intermediate code paradigms and apply them for solving various translation schemes.	
CO4.	Applying the various code optimization techniques and study code generation.	
CO5.	Analyzing the memory allocation schemes and the error detection on phases of compilation.	
Unit-1:	**Compiler Structure:** Compilers and Translators, Phases, Pass Structure,Bootstrapping. **ProgrammingLanguages:** High level languages, Lexical and syntactic structure, Data elements, Data Structure, Operations, Assignments, Program unit, Data Environments, ParameterTransmission. **Lexical Analysis:** Lexical Analyzer, Role, Design Approach, Implementation, LEX Capabilities. **Regular Expressions:** Transition Diagrams, Finite state Machines. **Syntactic Specifications of Programming Languages:** CFG, Derivation, Parse tree, Ambiguity, Capabilities.	**8 Hours**
Unit-2:	**Parsing Techniques:** Bottom–Up, Shift-Reduce, Operator Precedence, Top-Down with backtracking, Recursive Descent, Predictive, LR (SLR, Canonical LR, LALR), Syntax Analyzer Generator, YACC.	**8 Hours**
Unit-3:	**Intermediate Code Generation:** Forms**,** Three Address Code, Quadruples & Triples,Syntax Directed translation mechanism and attributed definition, Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, Procedure Calls, Case Statements, Postfix Translation.	**8 Hours**
Unit-4:	**Run Time Memory Management:** Static and Dynamic storage allocation, Stack based memory allocation schemes, Symbol Table management.**Error:** Semantic, Detection and Recovery for Lexical Phase, Syntactic phase.	**8 Hours**
Unit-5:	**Code Optimization and Code Generation:** Local Optimization, Loop Optimization, Peephole Optimization, Basic blocks and flow graphs, DAG (Directed Acyclic Graph), Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection.	**8 Hours**
Text Books:	**1.** Alfred, V.A., Ullman, J.D.*., Principles of Compiler Design*, Narosa Publishing House.	
Reference Books:	**1.** Holub, H.C., *Compiler Design in C,* Prentice Hall. **2**. Apple, A.W., *Modern Compiler Implementation in C: Basic Design*, Cambridge press. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/108/106108052/ https://nptel.ac.in/courses/128/106/128106009/	

Course Code: IBD653	Laboratory Course-XIX BTech- Semester-VI **Big Data Engineering (LAB)**	L-0 T-0 P-4 C-2
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understand the Execution Processing Hadoop frame working cluding HDFS and Map reduce	
CO2.	Understand the Data Science process Cycle with examples	
CO3.	Implementing Execute the Hadoop tools like Hive, pig, Sqoop ,hBaseetc	
CO4.	Implementing Execute the modules related to AI,ML and DL	
CO5.	Applying Live working on Jupyter Notebook on WatsonStudio	
CO6.	Applying Live Working on Spark on Watson using Scala ,python and R	
Course Content:		
	To Study and Practices on InfoSphere BigInsights and perform Hands on lab exercise ☐ Working with BigInsights ☐ MapReduce ☐ Introduction to BigInsights Analytics for Business Analysts ☐ Importing Data to InfoSphere BigInsights ☐ BigSheets Workflow ☐ BigSheets Collections ☐ BigSheets Navigation ☐ Working with BigSheets Collections ☐ BigSheets Readers and Extensions	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD654	Laboratory Course-XX BTech- Semester-VI Data Warehousing and Data Mining with R- programming (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding Modeling and design of data warehouse.	
CO2.	Understanding how to Install and Configure R Tool and R Studio.	
CO3.	Applying the concept to design a star and snowflake schema.	
CO4.	Analyzing R Explorer, Mining techniques and Attribute Relation File	
CO5.	Developing basic data warehouse applications along with the data visualization using R.	
CO6.	Understanding Modeling and design of data warehouse.	
Course Content:	LIST OF EXPERIMENTS	
	1. To develop an application to implement defining subject area, design of fact dimension table, data mart. 2. To develop an application to construct a multidimensional data. 3. To develop an application to implement data generalization and summarization technique. 4. To develop an application to extract association rule of data mining. 5. To develop an application for classification of data. 6. To develop an application for decision tree. 7. To develop an application to implement R PROGRAMMING loops. To develop an application to implement structure and components of an R-Programming	
Text Books:	* Latest editions of all the suggested books are recommended	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: TMUGA-601	Value Added Course-V	L-2 T-1 P-0 C-0
	BTech- Semester-VI	
	Advance Algebra and Geometry	

Course Outcomes:	On completion of the course, the students will be :	
CO1.	Implementing the rules of different geometrical concepts in Lines and Angles, Triangles, Area and volumes of different figures.	
CO2.	Recognizing the rules of Crypt-arithmetic and relate them to find out the solutions.	
CO3.	Illustrating the different Algebraic expressions in Quadratics, progressions etc.	
CO4.	Employing the concept of higher level reasoning in Clocks, Calendars and Puzzle Problems.	
CO5.	Correlating the various arithmetic and reasoning concepts in checking sufficiency of data.	
Course Content:		
Unit-1:	**Geometry and Mensuration** Lines and Angles, Triangles – Areas, Similar Triangles, Circles, Polygons, 2D Mensuration , 3D Mensuration	3 Hours
Unit-2:	**Functions** Introduction to Functions, Even and Odd Functions, Recursive	2 Hours
Unit-3:	**Crypt Arithmetic** Introduction of Crypt Arithmetic, Mathematical operations using Crypt Arithmetic, Company Specific Pattern	4 Hours
Unit-4:	**Quadratics** Introduction of Quadratic Equation, Relationship between equations, Maxima and Minima of Quadratic Equations, Range	2 Hours
Unit-5:	**Heights and Distance** Basic concept, Word problems	2 Hours
Unit-6:	**Progressions and special series** Introduction to AP, GP and HP, Common terms in Progressions, Arithmetic Geometric Progression, Sum of convergent series	3 Hours
Unit-7:	**Set theory** Introduction , Venn Diagrams basics, Venn Diagram – 3 sets, 4-Group Venn Diagrams	2 Hours
Unit-8:	**Data Sufficiency** Introduction, Blood relation based, direction based, ranking based	4 Hours
Unit-9:	**Problem Solving** Introduction, Puzzle based on 3 variable, Puzzle based on 4 variable	4 Hours
Unit-10:	**Clocks and calendars**	4 Hours

	Introduction , Angle based , faulty Clock, Interchange of hands, Introduction of Calendars, Leap Year , Ordinary Year	
Reference Books:	• R1:-Arun Shrama:- How to Prepare for Quantitative Aptitude • R2:-Quantitative Aptitude by R.S. Agrawal • R3:-M Tyra: Quicker Maths • R4:-Nishith K Sinha:- Quantitative Aptitude for CAT • R5:-Reference website:- Lofoya.com, gmatclub.com, cracku.in, handakafunda.com, tathagat.mba, Indiabix.com • R6:-Logical Reasoning by Nishith K Sinha • R7:-Verbal and Non Verbal Reasoning by R.S. Agrawal *** Latest editions of all the suggested books are recommended.**	

Course Code: TMUGS-601	Value Added Course-VI BTech- Semester-VI **Managing Work and Others**	L-2 T-1 P-0 C-0
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Communicating effectively in a variety of public and interpersonal settings.	
CO2.	Applying concepts of change management for growth and development by understanding inertia of change and mastering the Laws of Change.	
CO3.	Analyzing scenarios, synthesizing alternatives and thinking critically to negotiate, resolve conflicts and develop cordial interpersonal relationships.	
CO4.	Functioning in a team and enabling other people to act while encouraging growth and creating mutual respect and trust.	
CO5.	Handling difficult situations with grace, style, and professionalism.	
Course Content:		
Unit-1:	**Intrapersonal Skills:** Creativity and Innovation Understanding self and others (Johari window) Stress Management Managing Change for competitive success Handling feedback and criticism	**8 Hours**
Unit-2:	**Interpersonal Skills:** Conflict management Development of cordial interpersonal relations at all levels Negotiation Importance of working in teams in modern organisations Manners, etiquette and net etiquette	**12 Hours**
Unit-3:	**Interview Techniques:** Job Seeking Group discussion (GD) Personal Interview	**10 Hours**
Reference Books:	1. Robbins, Stephen P., Judge, Timothy A., Vohra, Neharika, Organizational Behaviour (2018), 18th ed., Pearson Education 2. Burne, Eric, Games People Play (2010), Penguin UK	

	3. Carnegie, Dale, How to win friends and influence people (2004), RHUK	
	4. Rathgeber, Holger, Kotter, John, Our Iceberg is melting (2017), Macmillan	
	5. Steinburg, Scott, Nettiquette Essentials (2013), Lulu.com	
	6. https://www.hloom.com/resumes/creative-templates/	
	7. https://www.mbauniverse.com/group-discussion/topic.php	
	8. https://www.indeed.com/career-advice/interviewing/job-interview-tips-how-to-make-a-great-impression	
	* Latest editions of all the suggested books are recommended.	

Course Code: **IBD715**	**Professional Core Course-XIX** **B.Tech- Semester-VII**	**L-3** **T-0** **P-0** **C-3**
	Spring Framework	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the detail concept of spring In real life.	
CO2.	Understanding the concept of Spring Framework easy from other programming Languages.	
CO3.	Understanding Machine Learning with some modules.	
CO4.	Understanding the Grasp how the data is predicted in spring framework.	
CO5.	Analyzing the relationship between spring and Hibernate.	
Course Content:		
Unit-1:	Introduction to Spring: – What is Spring, –How Spring fits into the Enterprise world, –Spring Modules Spring Core (Basic Concepts): What is a Core Container –Introduction to IOC –Types of DI –Setter DI vs Constructor DI –Resolving Constructor Confusion –Collection DI, Property Editors –Bean Factory Postprocessor	**8 Hours**
Unit-2:	Spring 3.0 features –Introduction to Spring MVC –Handler Mapping – Controllers –Validations –Handler Interceptors –Views –Form tags	**8 Hours**
Unit-3:	Spring Core (Advanced Concepts): P – Namespace –Dependency Check – Depends On –Factory Beans –Static Factory Method –Instance Factory Method –Aware Interfaces –Bean Lifecycle –Method Replacement –Lookup Method Injection, JDBC Template –Executing Statements –Running Queries – SQL Parameters	**8 Hours**
Unit-4:	Spring Core (3.0 Annotations): Spring VS Java Config Project –annotations – @Required –@Autowire – @PostConstruct – @PreDestroy –@Qualifier – @Resource –@Component –@Service –@Controller –@Named –Various Annotation based Post Processors.	**8 Hours**
Unit-5:	Spring AOP: AOP Concepts –Programmatic VS Declarative AOP – Programmatic AOP –Types of Advices –Types of Pointcuts –Working with proxies –Declarative AOP –Using AOP 2.0 Config element –OGNL Expressions –Aspect J AOP –Spring Transaction –Spring JDBC –Spring MVC –Spring ORM –Introduction To Hibernate –Hibernate Annotations vs JPA Annotations: – Hibernate Mappings –Hibernate Query Languages and Transactions and Caching –Spring Hibernate Integrations	**8 Hours**
Text Books:		
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS703	Professional Core Course-XX BTech- Semester-VII **Cryptography & Network Security**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding vulnerability and the weaknesses of unsecured network	
CO2.	Understanding information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of network security.	
CO3.	Applying different encryption and decryption techniques to solve problems related to confidentiality and authentication	
CO4.	Analyzing the performance of different encryption algorithms for verifying the integrity of varying message sizes.	
CO5.	Analyzing different digital signature algorithms to achieve authentication and create secure applications	
Course Content:		
Unit-1:	**Network Security:** Attacks; Services & Mechanisms; Conventional Encryption: Classical Encryption Techniques, Model and Steganography.	**8 Hours**
Unit-2:	**Encryption Schemes:** DES: Standard, Strength; Block Cipher Design Principles; Block Cipher Modes of Operation: Triples DES; Placement & Encryption Function: Key Distribution, Random Number Generation, Placement of Encryption Function.	**8 Hours**
Unit-3:	**Public-Key Cryptography:** Principles; RSA Algorithm; Key Management; Fermat's &Euler's Theorems; Primarily Miller Test; Chinese Remainder Theorem.	**8 Hours**
Unit-4:	**Message Authentication & Hash Functions:** Authentication: Requirements, Protocol, Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), **Digital Signatures**: Digital Signature Standard (DSS), Proof of Digital Signature Algorithm.	**8 Hours**
Unit-5:	**IP Security:** Electronic Mail Security; Pretty Good Privacy (PGP); S/MIME; Authentication Header; Encapsulating Security Payloads; Combining Security Associations; Key Management,. **Web Security:** Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set); **System Security**: Intruders; Viruses; Firewall Design Principles; Trusted Systems.	**8 Hours**
Text Books:	**1.** Stallings, W., *Cryptography and Network Security: Principles and Practice*, Prentice Hall.	
Reference Books:	Johannes, A. B., *Introduction to Cryptography*, Springer. *** Latest editions of all the suggested books are recommended.**	

Additional Electronic Reference Material:	https://nptel.ac.in/courses/108/108/108108123/ https://nptel.ac.in/courses/106/105/106105195/	

Course Code: IBD713	Professional Core Course-XXI BTech- Semester-VII **Advanced RDBMS**	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the DB2 Environment and Command Line Processor.	
CO2.	Understanding the concepts of Locking and Concurrency in DB2.	
CO3.	Understanding the Security Issues in DB2 and also the problem determination.	
CO4.	Applying DB2 queries to create Backup and Recovery.	
CO5.	Applying Database, Database Objects like Stored Procedure, Functions etc.	
Course Content:		
Unit-1:	Overview of DB2 9 on Linux, UNIX and Windows, Command Line Processor (CLP) and GUI usage, The DB2 environment	**8 Hours**
Unit-2:	Creating databases and data placement, Creating database objects, Moving data	**8 Hours**
Unit-3:	Backup and recovery, Locking and concurrency, Investigating DB2 locking	**8 Hours**
Unit-4:	Problem determination, Application issues and performance, Application performance tools, Security	**8 Hours**
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: IBD716	**Professional Core Course-XXII** **BTech- Semester-VII** **Artificial Intelligence**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the field of AI and its subfields machine learning, NLP and computer vision	
CO2.	Understanding the factors that influenced the advancements of AI in recent years	
CO3.	Understanding that what IBM Watson is and how it works	
CO4.	Understanding NLP, its history, applications and use cases	
CO5.	Understanding the relationship between AI and NLP	
CO6.	Analyzing the Use Watson API Explorer to interact with the Watson services REST API, to rest your cal s to the API and to view live responses from the server	
Course Content:		
Unit-1:	**AI LANDSCAPE** • Alimpactintheworldtoday • HistoryandEvolutionofAI • AIExplained • AITechnologies • Summary &Resources **AI INDUSTRY ADOPTION APPROACHES** • AI IndustryImpact • AutonomousVehicles • SmartRobotics • FutureWorkforceandAI • Summary &Resources	**8 Hours**
Unit-2:	**MACHINE LEARNING AND DEEP LEARNING** • MachineLearning Explained • Deep LearningExplained • Deep learningecosystem • Experiments • Summary &Resources **FUTURE TRENDS FOR AI** • Artificial IntelligenceTrends • Limitsofmachineandhuman • AIpredictionsinthenext5years	**8 Hours**

	• Summary andResources	
Unit-3:	**NATURAL LANGUAGE UNDERSTANDING** • NLPOverview • NLPExplained • Virtual AgentsOverview • VirtualAgentsfortheEnterprise • Summary andResources **COMPUTER VISION** • Computer VisionOverview • AIVisionthroughDeepLearning • ComputerVisionfortheEnterprise • Experiments SummaryandResources	**8 Hours**
Unit-4:	**Artifical Intelligence Analyst** • Explaining what NLP is • Describing different NLP processes • Listing tools and services for NLP • Identifying NLP use cases • Defining different components of NLP • Defining challenges within NLU • Explaining the NLP pipeline • Explaining the concepts of information extraction and sentiment analysis • Defining the capabilities of IBM Watson Natural Language Classifier (NLC)	**8 Hours**
Unit-5:	**Introduction to ChatBox** • Explaining what a chatbot is • Describe common applications of chatbots • Identifying factors that drive the growing popularity of chatbots • Listing examples of tools and services that you can use to create chatbots • What a workspace is • What an intent is • What an entity is • What a dialog is • What dialog nodes are • How the nodes in a dialog are triggered • How the dialog flow is processed • The advanced features of a chatbot • Creating a workspace	**8 Hours**

	- Defining intents - Defining entities - Building a dialog - Creating a Watson Conversation service instance - Creating a Conversation workspace - Adding intents - Building a dialog - Test in Slack - Defining CV - Know the history of CV and its advancement with AI - Listing tools and services for CV - Identifying CV use cases	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS713	Professional Elective Course-III BTech- Semester-VII **Data Compression**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the concept of loss less and lossy data compression techniques.	
CO2.	Understanding the methods of loss less image compression, text compression, and audio compression.	
CO3.	Understanding statistical basis and performance metrics for lossless as well as lossy compression	
CO4.	Analyzing the operation of a range of commonly used Compression techniques	
CO5.	Applying loss less and lossy data compression techniques in real-world applications.	
Course Content:		
Unit-1:	Introduction Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.	**8 Hours**
Unit-2:	Huffman coding The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.	**8 Hours**
Unit-3:	Arithmetic Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The BurrowsWheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.	**8 Hours**
Unit-4:	Mathematical Preliminaries for Lossy Coding Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform	**8 Hours**

	Quantizer, Adaptive Quantization, Non uniform Quantization.	
Unit-5:	Vector Quantization Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo Gray Algorithm, Tree structured Vector Quantizer. Structured Vector Quantizer.	**8 Hours**
Text Books:	Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers	
Reference Books:	1. Rafael C. Gonzalez and Richard E. Woods: Digital Image Processing, Addison-Wesley. 2. Gilbert Held: Data and Image Compression, John Wiley & Sons Ltd. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://www.youtube.com/watch?v=5wRPin4oxCo http://www.nptelvideos.com/video.php?id=989	

Course Code: ECS-716	Professional Elective Course-III BTech- Semester-VII Digital Image Processing	L-3 T-0 P-0 C-3
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding the different types of image transforms and their properties	
CO2.	Understanding the different techniques employed for the enhancement of images	
CO3.	Understanding the concept of image restoration & degradation models.	
CO4.	Understanding various image compression and color models like RGB, CMY.	
CO5.	Analyzing various image segmentation techniques to segment the digital image into sub-images.	
Course Content:		
Unit-1:	**Digital Image Fundamentals:** Representation; Elements of visual perception; Simple image formation model; Image sampling and quantization; Basic relationships between pixels; Imaging geometry; Review of matrix theory results: Row and Column ordering, Toeplitz, Circulant and Block matrices; Review of image transforms: 2D-DFT, FFT, WALSH, HADAMARD, HAAR, DCT and wavelet transforms.	8 Hours
Unit-2:	**Image Enhancement:** Spatial domain methods: Point processing, Intensity transformations, histogram processing; Image subtraction and averaging; Spatial filtering: Smoothing, Sharpening, Frequency domain methods; Filtering: Low pass, High pass filtering, Homomorphic filtering; Generation of spatial masks from frequency domain specifications.	8 Hours
Unit-3:	**Image Restoration:** Degradation model; Diagonalization of circulant and block Circulant matrices;Algebraic approaches: Inverse filtering, Wiener filtering, Constrained least squares restoration, Interactive restoration, Geometric transformations; Fundamentals of color image processing: Color models; RGB, CMY, YIQ, HIS; pseudo color image processing, intensity slicing, Gray level to color transformation.	8 Hours
Unit-4:	**Image Compression:** Redundancy: Coding, Inter Pixel, Psycho Visual; Fidelity criteria; Models; Elements of information theory; Error free compression: Variable length, Bit plane, Lossless predictive, Lossy compression, Lossy predictive, Transform coding. JPEG, MPEG, fractals.	8 Hours
Unit-5:	**Image Segmentation:** Detection of discontinuities: Point, Line and Edge and Combined detection; Edge linking and Boundary description; Local and global processing using HOUGH transform; Thresholding; Region oriented segmentation: Basic formulation, Region growing by pixel aggregation, Region splitting and merging; Use of motion in segmentation; Representation and description.	8 Hours
Text Books:	**1.** Gonzalez R. C., Woods R. E., *Digital Image Processing*, Pearson Education.	

Reference Books:	1. Pratt W. K., *Digital Image Processing*, John Wiley and Sons. 2. Boyle R., Sonka M., Hlavac V., *Image Processing, Analysis And Machine Vision*, Vikas Publishing House. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105032/ https://www.youtube.com/watch?v=i8RjituGfrQ	

Course Code: ECS717	**Professional Elective Course-III** **BTech- Semester-VII** **Android Programming**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the android framework	
CO2.	Understanding the various application components	
CO3.	Understanding view and viewgroup objects	
CO4.	Understanding custom views	
CO5.	Understanding different classes and interfaces which deals with database	
Course Content:		
Unit-1:	**Overview:** What is Android, Features of Android, Setting up Android Environment, Android Architecture, Application Framework. Application components (activities, services, Broadcast receivers, content providers). First sample application, Anatomy of Android application, Main activity file, Manifest file, Strings file, R file, Layout file, Running the application.	**12 Hours**
Unit-2:	**Emulator**-Android Virtual Device, Organizing and accessing the resources, Fragments, Intents & Filters, Basic UI Design, Form widgets, Text Fields, UI Controls, UI Layouts.	**8 Hours**
Unit-3:	**Event Handling**: Event Listeners and Handlers, Event Listeners Registration. Preferences, Menus, Custom Components, Tabs and Tab Activity	**8 Hours**
Unit-4:	Styles and Themes, Drag and Drop, Content Provider (SQLite Programming, SQLiteOpenHelper, SQLiteDatabase, Cursors).	**8 Hours**
Unit-5:	Location Based Services, Sending Emails, Sending SMS **Other developing platform** Intro to Objective-C Objective-C and Smalltalk,Objective-C, C , C++ and Mac OS X ,Objective-C and iPhone/iPad/iOS **Introduction iOS and SDK** iOS SDK: iPhone, iPod Touch, Xcode,Interface Builder iPhone Simulator, DebuggerClasses, Objects, Methods and Properties id, null, @interface,@end,@implementation,Archiving ,@property, @synthesizee, @dynamic,Data Types, control flow statement, More about Classes, More about Variables and Data Types Inheritance,Polymorphism, Dynamic Typing, and Dynamic BindingCocoa and Touch Cocoa Framework and Cocoa Classes Subclassing Xcode Simulator Interface Builder Nib files File's Owner Outlet Connections Action Connections Inspector.	**8 Hours**
Text Books:	1Carmen Delessio., *Sams Teach Yourself Android Application Development in 24 Hours,* SAMS	
Reference Books:	Jonathan Simon, *Head First Android Development*, O'Reilly	

	* Latest editions of all the suggested books are recommended.	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/106/106106147/ https://developer.android.com/studio/archive	

Course Code: ECS-754	Professional Elective Course-IV BTech- Semester-VII **Data compression (LAB)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying Huffman Coding algorithm in data compression.	
CO2.	Applying LZ77 approach in data compression.	
CO3.	Applying LZ78 approach in data compression.	
CO4.	Applying binary code algorithm for compression.	
CO5.	Applying partial match in prediction.	
Course Content:		
	LIST OF EXPERIMENTS 1. To write a program in C for implementing Huffman coding. 2. To write a program in C for implementing The LZ77 Approach. 3. To write a program in C for The LZ78 Approach. 4. To write a program in C for binary code. 5. To write a program in C for Prediction with Partial match	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS756	Professional Elective Course-IV BTech- Semester-VII Digital Image Processing (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Applying the spatial and frequency domain image enhancement techniques to enhance the brightness and contrast of the blurred images	
CO2.	Applying the image enhancement and Image restoration.	
CO3.	Applying the loss less and lossy image compression techniques to reduce the number of required bits as much as possible without losing image visual quality	
CO4.	Applying the image segmentation techniques to divide the images into sub-images.	
CO5.	Applying degradation models to improve the quality of blurred images.	
Course Content:		
	LIST OF EXPERIMENTS 1. To Write Program To Implement The Spatial Image Enhancement Functions On A Bitmap Image – (a) Mirroring (Inversion) (b) Rotation (Clockwise) (c) Enlargement (Double Size) 2. To Write Program To Implement (a) Low Pass Filter (b) High Pass Filter 3. To Write Program To Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter 4. To Write Program To Implement Smoothing And Sharpening Of An Eight Bit Color Image 5. To Write Program To Implement (a) Boundary Extraction Algorithm (b) Graham's Scan Algorithm 6. To Write Program To Implement (a) Edge Detection (b) Line Detection	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: ECS757	Professional Elective Course-IV BTech- Semester-VII Android Programming (Lab)	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding Activity	
CO2.	Understanding view system	
CO3.	Understanding menu and its types	
CO4.	Applying the web services and map based activity	
CO5.	Developing small android based applications.	
Course Content:		
	List of Experiments 1. Creating Applications with Multiple Activities and a Simple Menu using ListView 2. Creating Activities For Menu Items and Parsing XML Files 3. Writing Multi-Threaded Applications 4. Using WebView and Using the Network 5. Graphics Support in Android 6. Preferences and Content Providers 7. Location Services and Google Maps in Android	
Text Books:	* Latest editions of all the suggested books are recommended.	
Reference Books:	* Latest editions of all the suggested books are recommended.	

Course Code: IBD753	Laboratory Course-XXII BTech- Semester-VII **Advanced Rdbms (Lab)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Applying Database, Database Objects like Stored Procedure, Functions etc.	
CO2.	Applying DB2 queries to create Backup and Recovery.	
CO3.	Applying the queries of DB2 to implement Locking and concurrency.	
CO4.	Applying Application performance tools to check the performance of Objects.	
CO5.	Applying queries of DB2 to implement security.	
Course Content:		
	Practical on DB2, Creating databases and data placement, Creating database objects, Moving data, Security and related exercises. 1. Creating databases and data placement 2. Creating database objects, Moving data 3. Backup and recovery 4. Locking and concurrency 5. Investigating DB2 locking 6. Application issues and performance 7. Application performance tools 8. Security	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD755	Laboratory Course-XXI BTech- Semester-VII **Spring Framework (LAB)**	L-0 T-0 P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the execution of Spring framework In real life.	
CO2.	Implementing the different modules to predict data.	
CO3.	Implementing to Execute different functions to search pattern in the files.	
CO4.	Analyzing the data from different datasets with different modules.	
CO5.	Applying the concept of Spring framework.	
Course Content:		
	To study Fundamentals of Spring Framework & its related practices.	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: IBD756	Laboratory Course-XXIII BTech- Semester-VII Artificial Intelligence (Lab)	L-0 T-0 P-4 C-2
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding NLP, its history, applications and use cases	
CO2.	Understanding the relationship between AI and NLP	
CO3.	Implementing Watson API Explorer to interact with the Watson services REST API, to rest your cal s to the API and to view live responses from the server	
CO4.	Implementing field of AI and its subfields machine learning.	
CO5.	Implementing IBM Watson is and how it works	
Course Content:		
	SETTING UP YOUR CLOUD ACCOUNT • ObtainanIBMcloudaccount • Applypromotioncode **INFERRINGAGEFROMPHOTOSWITHAI** • Create a Node-REDaccount • Populate Node-REDcanvas • Runfacerecognitionwebpage **CREATING AN AI VIRTUAL ASSISTANT** • Createadialogskill • Createavirtualassistant • Loadvirtualassistantwithvariousdialogskills • Integrateyourassistant **INTELLIGENT SEARCHES ON AIRBNB** • CreateDiscoveryService • Createdatacollection • Uploadandenrichdata • ExploreNegativeSentiments • WorkwithDiscoveryAPI(Optional) **BUILDINGYOUROWNTRANSLATORWITHAI** • Construct a Node-REDflow • CreateaTelegrambot • CreateatranslatordialogusingWatson services • IntegrateNode-REDwithTelegram **ANALYZE,CLASSIFY,&DETECTOBJECTS** • UsetheGeneralpre-trainedclassifierto identifyobjectsinanimage • Buildcustomclassifiertobettersuityour specificimages • Detectobjectswithinanimage	

	-CLASSIFYINGIMAGESUSINGNODE-RED	
	- ProvisionaNode-REDboilerplate - ImporttheNode-REDflow - InstallzipnodefromManagePalettemenu - Connectyournode-REDappwithVisual Recognitionservice	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: ECS791	Project/Industrial Training/Seminar-IV BTech- Semester-VII **Industrial Training & Presentation**	L-0 T-0 P-0 C-4
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding research and development on latest technology.	
CO2.	Understanding greater clarity about academic and career goals	
CO3.	Understanding of administrative functions and company culture	
CO4.	Analyzing a capacity for critical reasoning and independent learning	
CO5.	Developing ability to effectively communicate solution to problems (oral, visual, written).	
Course Content:		
	Students will have to undergo industrial training of six weeks in any industry or reputed organization after the VI semester examination in summer. The evaluation of this training shall be included in the VII semester evaluation. The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the VI semester and shall be the nodal officer for coordination of the training. Students will prepare an exhaustive technical report of the training during the VII semester which will be duly signed by the officer under whom training was undertaken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director of the college. The student at the end of the VII semester will present his report about the training before a committee constituted by the Director of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director. The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned. Not more than three students would form a group for such industrial training/ project submission. The marking shall be as follows. Internal: 50 Marks By the faculty guide - 25 marks	

	By committee appointed by the director – 25 marks External: 50 Marks By officer-in-charge trainee in industry – 25 marks By external examiner appointed by the university – 25 marks	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	
Course Code: ECS799	**Project/Industrial Training/Seminar-V** **BTech- Semester-VII** **PROJECT WORK PHASE- 1** **(Synopsis, Literature Survey & Presentation)**	**L-0 T-0 P-8 C-4**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the phases of SDLC and performing initial investigation about project.	
CO2.	Understanding to design ER-Diagram and DFD of the project.	
CO3.	Applying the designing procedures to design database.	
CO4.	Developing SRS Document for the project..	
CO5.	Developing Forms and Front end of the Project.	
Course Content:		
	A group of students, not more than three, will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified in the starting of the VII semester. The group will carry out the literature search and collect required material for carrying out the project. The group will prepare a report not exceeding 15 pages at the end of semester. The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester the student shall present the progress of project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner. The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.	

	The marking shall be as follows. Internal: 50 Marks By The Faculty Guide - 50 Marks By Committee Appointed By the Director – 50 Marks External: 50 Marks By External Examiner Appointed By the University – 50 Marks	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

Course Code: EHM801	Humanities and Social Science Course-VIII B.Tech- Semester-VIII	L-3 T-0 P-0 C-3
	PROJECT MANAGEMENT FOR ENGINEERS	
Course Outcomes:	On completion of the course, the students will be :	
CO1.	Understanding Project Management & its evaluation	
CO2.	Understanding and analysis the technical feasibility of a project	
CO3.	Understanding financial system and analyze the use of funding mechanism	
CO4.	Understanding the application of laws related to business and project execution	
CO5.	Understanding Financial Accounting and Financial Statements for business	
Course Content:		
Unit-1:	Project Management & Sources of Funds: Project Management-Introduction, Need, Phases and Processes of Project Management. Financial Markets as Sources of Funds: Money Market & Capital Market. Overview of Regulatory Framework of Financial System in India- SEBI, RBI, and NABARD	**8 Hours**
Unit-2:	Project Feasibility & Analysis: Project Identification, Generation Of Ideas, SWOT Analysis, Screening and Project Rating Index. Market & Demand Analysis: Collection of Data, Market Survey, Project Risk Analysis	**8 Hours**
Unit-3:	Project Technical Analysis: Selection of Technology, Plant Capacity, Structures and Civil Work. Location- Factors, Costs, Availability of Resources. Environmental Aspects, Project Implementations. Financial Analysis: Project Cost, Cost of Production, Cost of Capital, Time Value of Money.	**8 Hours**
Unit-4:	Regulatory Framework for Project: Legal Environment of Business, Law of Contract- Meaning and Concepts, Contract of Agent and Agency, Power of Attorney, Consumer Protection Law-Introduction, Rights of Consumers, Complaints & its Remedies, Intellectual Property Law- Introduction, Rights from Patents & Copyright, Infringement its Remedies, Overview of Companies Act, Foreign Exchange Management Law, Labour Laws in India, Various Project Approvals from Local, State & Central Government.	**8 Hours**
Unit-5:	Basics of Accounting for Project: Introduction, Meaning of Account & Accountancy, Book-keeping, Accounting Process, Users of accounting information, Double Entry Accounting, Accounting Equation. Introduction to Trial Balance, Trading Account, Profit and Loss Account, Balance Sheet, Cash Flow and Fund Flow. Budget- Meaning of a Budget & Budgeting, Budgetary Control, Types of Budgets.	**8 Hours**
Text Books:	1. Chaudhary, S., Project Management, Tata Mc Graw Hill Publications	

B. Tech (Computer Science & Engineering) Specialization In Application Development using Cloud And Analytics Platforms Syllabus as per CBCS (2019-20)

Reference Books:	1. Bhole L.M., Financial Institutions and Markets, Tata McGraw-Hill 2. Srivastava, R.M & Nigam Divya, Management of Financial Institutions, Himalaya 3. Goyal B.B., Project Management: A Development Perspective, Deep & Deep Publications. *** Latest editions of all the suggested books are recommended.**
Additional Electronic Reference Material:	https://nptel.ac.in/courses/110/104/110104073/ https://www.youtube.com/watch?v=gEhr0ZAL2zE

Course Code: ECS812	Professional Core Course-XXIII B.Tech- Semester-VIII	L-3 T-0 P-0 C-3
	Big Data Analytics	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	*Understanding* the requirement of Big data with respect to 5 V's .	
CO2.	*Understanding* the basic storage structure used in Big data with respect to clusters.	
CO3.	*Understanding* the Hadoop Ecosystem and its components.	
CO4	*Analyzing* the data processing in Big data with HIVE , PIG and HBASE.	
CO5	*Analyzing* the functionality and working of Zookeeper for monitoring Servers in Cluster.	
Course Content:		
Unit-1:	**INTRODUCTION TO BIG DATA:** Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.	**8 Hours**
Unit-2:	**INTRODUCTION HADOOP:** Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.	**8 Hours**
Unit-3:	**HADOOP ARCHITECTURE:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.	**8 Hours**
Unit-4:	**HIVE AND HIVEQL, HBASE:**Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase conceptsAdvanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper	**8 Hours**
Unit-5:	**Big Data Analytics:** Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.	**8 Hours**
Text Books:	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.	

Reference Books:	1. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012. 2. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013. 3. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014 4. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013. Chris Eaton, Dirk Deroos, Tom Deutsch et al., "Understanding Big Data", McGrawHIll, 2012 *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/104/106104189/ https://www.youtube.com/watch?v=3SK9iJNYehg	

Course Code: ECS-811	Professional Elective Course-V B.Tech- Semester-VIII NATURAL LANGUAGE PROCESSING	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the VC dimension and PAC learning models for noise reduction, model selection and generalization	
CO2.	Understanding the role of Bayesian Decision theory for classification	
CO3.	Understanding dimensionality reduction principles for scaling and analysis of models	
CO4.	Understanding the concept of clustering and maximization algorithm	
CO5.	Understanding the back propagation in multilayer neural networks and role of perceptrons in ANN models	
Course Content:		
Unit-1:	Introduction: Machine learning problems, Types of learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised Learning: Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization	**8 Hours**
Unit-2:	Bayesian Decision Theory:Classification, Losses and Risks, Association Rules, Dimensionality Reduction:Subset Selection, Principal Components Analysis, Multidimensional Scaling, Linear Discriminant Analysis	**8 Hours**
Unit-3:	Clustering: Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Supervised Learning after Clustering, Hierarchical Clustering, Classification: Decision Trees, Univariate Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data.	**8 Hours**
Unit-4:	Artificial Neural Networks:Introduction, neural network representation, perceptrons, multilayer networks and back propogation algorithm	**8 Hours**
Unit-5:	Local Models: Introduction, Competitive Learning, Radial Basis Functions, Incorporating Rule-Based Knowledge, Normalized Basis Functions, Competitive Basis Functions, Learning Vector Quantization, Hierarchical Mixture of Experts.	**8 Hours**
Text Books:	1. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2010. .	
Reference Books:	1. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007. *** Latest editions of all the suggested books are recommended.**	

Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105158/ https://www.youtube.com/watch?v=05ONoGfmKvA

Course Code: ECS-809	Professional Elective Course-V B.Tech- Semester-VIII **PATTERN RECOGNITION**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the concept of a pattern and the various approaches of pattern recognition.	
CO2.	Understanding the basic methods of feature extraction, feature evaluation, and dimension reduction of feature vectors.	
CO3.	Understanding various supervised and unsupervised learning approaches.	
CO4.	Understanding machine learning concepts and range of problems that can be handled by machine learning.	
CO5.	Applying both supervised and unsupervised classification methods to detect and characterize patterns in real-world data.	
Course Content:		
Unit-1:	Introduction: Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test	**8 Hours**
Unit-2:	Statistical Patten Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminate functions	**8 Hours**
Unit-3:	Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminate analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.	**8 Hours**
Unit-4:	Nonparametric Techniques: Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.	**8 Hours**
Unit-5:	Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.	**8 Hours**
Text Books:	1Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification",	
Reference Books:	S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, Academic Press, 2009. **∗ Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/117/105/117105101/ https://www.youtube.com/watch?v=ZGUIaomeJ-k	
Course Code: ECS-810	**Professional Elective Course-V B.Tech- Semester-VIII**	**L-3 T-0**

	NEURAL NETWORK	P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the human brain, role of neurons, neuroscience, neuro-computing and learning process in neurons	
CO2.	Understanding the basic models and functions of neurons & perceptrons	
CO3.	Analyzing the role of mean square and gradient descent algorithm for non linearly separable problems	
CO4.	Analyzing the model consisting of multilayer neurons using back propagation for better reliability and approximation	
CO5.	Applying the principal component, features of Recurrent network and temporal feed forward network and display their computer simulation	
Course Content:		
Unit-1:	Neuro computing and Neuroscience Historical notes, human Brain, neuron Mode, Knowledge representation, N.N Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation.	**8 Hours**
Unit-2:	Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems in NN.	**8 Hours**
Unit-3:	Multilayered network architecture, back propagation algorithm, heuristics for making BP algorithm performs better, approximation properties of RBF networks and comparison with multilayer perceptron	**8 Hours**
Unit-4:	Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis.	**8 Hours**
Unit-5:	Analyticity of activation function, Complexity analysis of network models, Soft computing, Neuro-Fuzzy-genetic algorithm Integration.	**8 Hours**
Text Books:	**1.** J.A. Anderson, An Intoduction to Neural Networks, MIT	
Reference Books:	1. R.L. Harvey, Neural Network Principles, PHI 2. Kosko, Neural Network and Fuzzy Sets, PHI *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference	https://nptel.ac.in/courses/106/106/106106184/	

Material:	https://www.youtube.com/watch?v=O5xeyoRL95U	
Course Code: **ECS814**	**Professional Elective Course-V** **B.Tech- Semester-VIII** **BLOCK CHAIN TECHNOLOGY**	**L-3** **T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding of the history of Block-chain ,different models and protocols	
CO2.	Understanding the basic of crypto-currency and different algorithms used in it.	
CO3.	Understanding the concept of Bitcoin and analysis of its properties using mathematical induction	
CO4.	Understanding the concept of Ethereum, Ethereum Virtual Machine (EVM) and smart concepts	
CO5.	Understanding the concept of Zero Knowledge proofs and protocols	
Course Content:		
Unit-1:	The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS)	**8 Hours**
Unit-2:	cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography	**8 Hours**
Unit-3:	Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.	**8 Hours**
Unit-4:	Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts.	**8 Hours**
Unit-5:	(Trends and Topics) - Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash.	**8 Hours**
Text Books:	1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.	
Reference Books:	1. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium	

	on security and Privacy, 2015 (article available for free download) { curtain raiser kind of generic article, written by seasoned experts and pioneers}. 2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048) . (serious beginning of discussions related to formal models for bitcoin protocols). 3. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454) . A significant progress and consolidation of several principles). 4. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916) ***Latest editions of all the suggested books are recommended.**
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105184/ https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/

Course Code: ECS805	Professional Elective Course-VI B.Tech- Semester-VIII	L-3 T-0 P-0 C-3
	DISTRIBUTED SYSTEM	
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding fundamental characteristics of distributed system.	
CO2.	Understanding the concept of distributed objects and remote invocation methods.	
CO3.	Understanding different distributed models for remote communication.	
CO4.	Understanding the security mechanism and protocols for distributed transactions.	
CO5.	Analyzing the concept of distributed algorithms and their performance associated with security issues and distributed deadlock.	
Course Content:		
Unit-1:	Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport and vectors logical clocks, Causal ordering of messages, global state, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms	**8 Hours**
Unit-2:	Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.	**8 Hours**
Unit-3:	Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL& Millicent. Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.	**8 Hours**
Unit-4:	Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for	**8 Hour**

	concurrency control. Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data	s
Unit-5:	Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.CORBA Case Study: CORBA RMI, CORBA services.	**8 Hours**
Text Books:	1. Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill	
Reference Books:	1. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed. 2. Gerald Tel, "Distributed Algorithms", Cambridge University Press *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/105/106105214/ https://www.youtube.com/playlist?list=PLsyIUObW5M3CAGT6OdubyH6FztKfJCcFB	

	Professional Elective Course-VI	L-3
Course Code: **ECS812**	**B.Tech- Semester-VIII** **CONCEPTS OF IOT (INTERNET OF THINGS)**	**T-0** **P-0** **C-3**
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the concepts of IOT	
CO2.	Understanding the architecture, different models and design principles of IOT.	
CO3.	Understanding the different technologies related to IOT.	
CO4.	Understanding the concepts of smart city development in IOT.	
CO5.	Applying IOT concepts in real word scenario like industrial automation, wireless communication etc.	
Course Content:		
Unit-1:	Introduction to Internet in general and Internet of Things: Introduction to Internet: layers, protocols, packets, services; Local Area Networks, MAC level, link protocols such as: point-to-point protocols, Ethernet, WiFi 802.11, cellular Internet access, and Machine-to-Machine (M2M).	**8 Hours**
Unit-2:	**IoT Technology Fundamentals:** IoT definitions: overview, applications, potential & challenges, and architecture; Devices and gateways, Local and wide area networking; Data management, Business processes in IoT, Everything as a Service(XaaS), IoT Analytics, Knowledge Management.	**8 Hours**
Unit-3:	**IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home.	**8 Hours**
Unit-4:	**IoT Architecture-State of the Art –** Introduction, State of the art, **Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model; IoT Reference Architecture:	**8 Hours**

	Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	
Unit-5:	**Real-World Design Constraints-** Introduction, Technical Design constraints, Data representation and visualization, Interaction and remote control. Uses of IoT in Industrial Automation, Commercial Building Automation, Wireless communication, etc.	**8 Hours**
Text Books:	1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence"**, 1st Edition, Academic Press, 2014.	
Reference Books:	1. Vijay Madisetti and Arshdeep Bahga, **"Internet of Things (A Hands-on-Approach)"**, 1st Edition, VPT, 2014. 2. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything"**, 1st Edition, Apress Publications, 2013 *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://www.digimat.in/nptel/courses/video/106105166/L01.html https://www.youtube.com/watch?v=p4xqO_QAv-w	

Course Code: ECS813	**Professional Elective Course-VI** **B.Tech- Semester-VIII** **MACHINE LEARNING**	L-3 T-0 P-0 C-3
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the learning and different types of learning approaches that could be used for implementing Machine Learning problems.	
CO2.	Understanding the key elements of Machine Learning and the importance of model selection and generalization	
CO3.	Understanding the various components of Bayesian Decision Theory and Dimensionality Reduction for solving Machine Learning problems	
CO4.	Understanding the various approaches of Clustering and Classification for improving the learning capability of machine	
CO5.	Understanding the functions based on various rules and parameters for implementing competitive learning in Machine Learning	
Course Content:		
Unit-1:	**Introduction to Machine Learning:** Introduction; History, Advantages, Scope and Applications; Learning Algorithms: Supervised Learning; Unsupervised Learning; Semi-Supervised Learning; Reinforcement Learning. **Decision Trees:** Introduction, Scope, Advantages; Hunt's algorithm for learning a decision tree; Details of tree induction;	**8 Hours**
Unit-2:	**KNNs, SVMs and Naïve Bayes:** Examples of few text classification problems; Naïve Bayes for text classification; Introduction to KNN algorithm; Decision boundary KNN Vs Decision tree; What is the best K; KNN Problems; Feature selection using KNNs; Linear Classifiers; Learning non-linear patterns.	**8 Hours**
Unit-3:	**ANN and Regression:** Motivation for Artificial Neural Network; Perceptron Algorithm; Decision Boundary for a single Neuron; Introduction to Linear Regression; R^2: Coefficient of Determination; Logistic regression vs Linear Regression; Can we use Regression Mechanism for Classification?; Logistic Regression – Deriving the Formula; Logistic Regression for Multi-class Classification; Logistic Regression Decision Boundary.	**8 Hours**
Unit-4:	**Feature Selection:** Introduction to feature selection: what, why, how and where?; Feature selection vs feature extraction; Feature subset selection using Filter based methods; Wrapper Methods; Wrapper Methods vs Filter Methods; Model based machine learning with regularization; Regularization using L2 and L1.	**8 Hours**

Unit-5:	**Sequence Labeling, Clustering:** Introduction to Sequence Learning; Sequence Labeling as Classification; Probabilistic Sequence Models; Hidden Markov Model; Three Problems of an HMM. Basics of Clustering; Applications of Clustering; Understanding Distance based Clustering; K-means Algorithm; Hierarchical (Agglomerative) clustering; Evaluation of cluster quality	**8 Hours**
Text Books:	**1.** Brian, O, *Management Information System*, Tata McGraw Hill.	
Reference Books:	**1.** Brian, O*., Introduction to Information System*, McGraw Hill. **2.** Jawadekar, W., *Management Information System*, Tata McGraw Hill. **3.** Jain, S., *Management Information System*, Tata McGraw Hill. *** Latest editions of all the suggested books are recommended.**	
Additional Electronic Reference Material:	https://nptel.ac.in/courses/106/106/106106139/ https://www.youtube.com/watch?v=CzdWqFTmn0Y	

Course Code: ECS855	Laboratory Course -XXIV B.Tech- Semester-VIII	L-0 T-0
	BIG DATA (LAB)	P-2 C-1
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	*understanding* the concept to work with basic linux commands.	
CO2.	*Applying* the concept to install a standalone Hadoop cluster Node.	
CO3.	*Applying* the concept to read and write data into HDFS from Linux environment.	
CO4.	*Applying* the concept to solve a problem using MAP Reduce programming.	
CO5.	*Analyzing* the concept for data processing using HIVE.	
Course Content:	**LIST OF EXPERIMENTS**	
	1. Introduction, use and assessment of most recent advancements in Big Data technology along with their usage and implementation with relevant tools and technologies. 2. Map Reduce application for word counting on Hadoop cluster. 3. Unstructured data into NoSQL data and do all operations such as NoSQL query with API. 4. K-means clustering using map reduce. 5. Page Rank Computation. 6. Data retrieval from AQL. 7. Data Retrieval from JQL 8. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics	

Course Code: ECS899	Project/Industrial Training/Seminar-VI BTech- Semester-VIII **PROJECT WORK PHASE- II**	L-0 T-0 P-12 C-6
Course Outcomes:	**On completion of the course, the students will be :**	
CO1.	Understanding the process of Project development.	
CO2.	Applying the knowledge to develop applications based on SRS Document.	
CO3.	Applying the learning to develop applications on different platforms like Window, Web based or Mobile based applications to specific set of problem and their solutions.	
CO4.	Evaluating the test cases results after testing of the project along with different roles.	
CO5.	Developing good quality project to solve real world applications.	
Course Content:		
	Students should devote themselves to prepare something tangible, which could be a working model of their thoughts based on their subject of choice. The project shall be finalized by the students based on the VII semester project work report and shall be completed and submitted at least one month before the last teaching day of the VIII semester, date of which shall be notified in the academic calendar. The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester student shall present the final project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner. The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Principal. The marking shall be as follows. Internal: 50 Marks	

	By The Faculty Guide - 50 Marks By Committee Appointed By the Director – 50 Marks External: 50 Marks By External Examiner Appointed By the University – 50 Marks	
Text Books:	*** Latest editions of all the suggested books are recommended.**	
Reference Books:	*** Latest editions of all the suggested books are recommended.**	

The marking shall be as follows.
Internal: 50 Marks
By The Faculty Guide - 25 Marks
By Committee Appointed By the Director – 25 Marks
External: 50 Marks
By External Examiner Appointed By the University – 50 Marks