SCHEME OF EXAMINATION

and SYLLABI

For

B.E. (Information Technology)

1st – 8th semester

For

Batch

2020-24

Dept. of Information Technology

UIET, Panjab University Chandigarh

Vision of Dept. of Information Technology:

The Department of Information technology aims to develop information technology engineers who work professionally and creatively for the advancement of technology and betterment of society.

Mission of Dept. of Information Technology:

- To impart quality education by developing information technology facilities, faculty and resources that generates professionals who are leaders for a dynamic information society.
- To develop a collaborative culture, so as to nurture an environment of increased research amongst the students and faculty.
- To encourage hands-on learning by fostering industrial partnerships to create real world solutions through innovation, product development, entrepreneurship and consultancy services.
- To enhance human potential by encouraging transparency and accountability amongst all stakeholders, in order to nurture ethical values in students.

Programme Educational Objectives (PEOs)

- **PEO 1**: Graduates are prepared to be employable in industry and possess knowledge of engineering & IT concepts, practices and tools to support design, development, application and maintenance of IT enabled products and projects.
- **PEO 2***:* Graduates are prepared to pursue higher education in their area of interest.
- **PEO 3***:* Graduates are prepared to possess professional skills like team work, ethics, competence in written & oral communication.

Program Specific Outcomes (PSOs)

Students will be able to:

1. Understand and apply analytical and computational techniques for solving problems in the information technology discipline.
2. Design and develop efficient and innovative software/hardware systems using concepts and tools of database systems, operating systems, computer networks, embedded systems and related technologies.

Revised Programme Outcomes (POs) of Department of I.T.

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions 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 considerations.
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 conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
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.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

EXAMINATION NOTE:

The Semester question paper of a subject will be of 50 marks having 7 questions of equal marks. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two sections having three questions each and the candidate is required to attempt at least two questions from each section.

2.0   Credit System

2.1 All B.E programmes are organized around semester-based credit system of study. The credit system is based on continuous evaluation of a student's performance/progress and includes flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

2.2 Performance/progress of a student is measured by the number of credits that he/she has earned (completed satisfactorily). Based on the course credits and grades obtained by the student, grade point average is calculated, subject to his qualification of minimum grade in each subject.

2.3 Course Credit Assignment:

Each course has a certain number of credits assigned to it depending on the associated number of lecture, tutorials and laboratory contact hours in a week. A few courses are without credit and are referred to as non-credit (NC) courses.

Lectures and Tutorials: One lecture hour or one tutorial hour per week per semester is assigned one credit.

Practical / Laboratory Work: One laboratory hour per week per semester is assigned half credit.

The credits are rounded off to the nearest whole number.

For each lecture or tutorial the self study component is 1 hour/week

2.4   Earning Credits :

At the end of every course, a letter grade is awarded in each course for which a student has registered. On obtaining a pass grade (at least 'D' grade), the student accumulates the course credits as earned credits. Performance of a student is measured by the number of credits that he/she has earned and by the weighted grade point average. Grades obtained in audit courses are not counted towards the calculation of grade point average. However, a pass grade ('D' grade) is essential for earning credits from an audit course.

3.0 Grading System

3.1 The grades and their respective description, along with grade points are listed in the Table-I given below.

Table-1

Grade	Grade Point	Description
A+	10	Outstanding
A	9	Excellent
B+	8	Very Good
B	7	Good
C+	6	Average
C	5	Below average
D	4	Marginal
F	0	Very Poor
I	-	Incomplete
NP	-	Audit Pass
NF	-	Audit Fail

W	-	**Withdrawal**
X	-	**Unsatisfactory**
S	-	**Satisfactory Completion**

4.0 Evaluation System

4.1 Continuous Assessment**:**

There shall be continuous evaluation of the student during the semester. For evaluation purpose, total marks assigned to each subject shall be distributed as :
Two Mid semester Examination (Minor-1 and Minor-2) with 30 % of total marks assigned to the subject. Best Marks of one of these two will be considered for award of sessional.

Assignments/Class projects/Short class tests/MCQ based quizzes/Projects/Presentations/Group discussions/ Attendance with 20 % of total marks assigned to the subject.
One End Semester Examination (Major Examination) with 50% of total marks assigned to the subject. It is compulsory to appear in End Semester Examination and secure at least 20% marks of total End semester exam marks.
If a candidate secures less than 20% marks of total End semester exam marks, he/she will be awarded F grade.

4.2 Method for the Award of Grades:

For the award of grades in a course, all component wise evaluation shall be done in terms of marks. The components include: Midterm-1 and Midterm-2 examinations, Assignments/projects/class presentations/Attendance, and End semester examination as per regulation 4.1. After converting the marks obtained in percentage , the grades will be assigned as per the guidelines given below :

Table-2

Sr. No.	Marks	Grade	Grade Point
1.	**≥ 90**	**A+**	**10**
2.	**≥80 &< 90**	**A**	**9**
3.	**≥70 &< 80**	**B+**	**8**
4.	**≥60 &< 70**	**B**	**7**
5.	**≥50 &< 60**	**C+**	**6**
6.	**≥45 &< 50**	**C**	**5**
7.	**≥40 &< 45**	**D**	**4**
8.	**<40**	**F**	**0**

5.0   Evaluation of Performance

5.1   The performance of a student shall be evaluated in terms of two indices, viz. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).
SGPA is the grade point average for the semester, and CGPA is the cumulative grade point average for all the completed semesters at any point in time.
The earned credits (E.C) are defined as the sum of course credits for course in which A+ to D grade has been obtained. For U.G students (B.E), credits from courses in which NP or S grade has been obtained are also added.

Points earned in a semester =

$$\sum(Course\ Credits \times Grade\ Points)\ for\ courses\ in\ which\ A+$$

$$to\ D\ grade\ has\ been\ obtained$$

The SGPA is calculated on the basis of grades obtained in all courses, except audit courses and courses in which S/Z grade is awarded, registered for the particular semester.

$$SGPA = \frac{\sum_{Semester}(Course\ Credits \times Grade\ Points)_{for\ all\ courses\ except\ audit\ and\ S/Z\ grade\ Courses}}{\sum_{Semester}(Course\ Credits)_{except\ audit\ and\ S/Z\ grade\ Courses}}$$

$$SGPA = \frac{Points\ Secured\ in\ the\ Semester}{Credits\ Registered\ the\ Semester, excluding\ audit\ and\ ^{S}/_{Z}\ grade\ courses}$$

The CGPA is calculated as given below :

$$CGPA = \frac{\sum_{All\ Semester}(Course\ Credits \times Grade\ Points)_{for\ all\ courses\ with\ pass\ grade\ except\ audit\ and\ S/Z\ grade\ Courses}}{\sum_{All\ Semester}(Course\ Credits\ earned)_{except\ audit\ and\ S/Z\ grade\ Courses}}$$

SCHEME OF EXAMINATION AND SYLLABI FOR
B.E. (Information Technology) Batch 2020-24
Teaching Scheme For B.E   First Year- First Semester

Course Code	Course Name	Option	Hours per week			Credits	Marks		
			L	T	P		Internal Assessment	University Exam	Total
-	Choice Based Physics Course	Theory	4	0	0	4	50	50	100
-	Choice Based Physics Course (P)	Practical	0	0	3	1.5	50	0	50
ASM 101	Calculus	Theory	4	1	0	5	50	50	100
ESC X01	Programming for Problem Solving	Theory	3	0	0	3	50	50	100
ESC X51	Programming for Problem Solving (P)	Practical	0	0	4	2	50	0	50
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
ITC 101	Introduction to Information Technology	Theory	2	0	0	2	50	50	100
Total			**13**	**1**	**11**	**19.5**	**350**	**200**	**550**

First Year- Second Semester

Course Code	Course Name	Option	Hours per week L	T	P	Credits	Internal Assessment	University Exam	Total
ASC X01	Applied Chemistry	Theory	4	0	0	4	50	50	100
ASC X51	Applied Chemistry (P)	Practical	0	0	3	1.5	50	0	50
ASM 201	Differential Equations and Transforms	Theory	4	1	0	5	50	50	100
HSMC X01	Professional Communication	Theory	2	0	0	2	50	50	100
HSMC X51	Professional Communication (P)	Practical	0	0	2	1	50	0	50
ITC 201	Object Oriented Programming using C++	Theory	3	0	0	3	50	50	100
ITC 251	Object Oriented Programming using C++ (P)	Practical	0	0	4	2	50	0	50
ESC X08	Basic Information Theory and Communication	Theory	2	0	0	2	50	50	100
ESC X58	Basic Information Theory and Communication (P)	Practical	0	0	2	1	50	0	50
ITC 252	Web and Open Source Technologies (P)	Practical	0	0	2	1	50	0	50
Total			**15**	**1**	**13**	**22.5**	**500**	**250**	**750**

SUMMER TRAINING (TWO WEEKS)

Subject Code	Subject Name	L-T-P	Contact hrs/week	Credits	Assessment
ST 251	**PRODUCT RE-ENGINEERING AND INNOVATION**	0-0-20	20	Nil	Satisfactory / Unsatisfactory

NOTE: The students will undergo a mandatory "Summer Training" of two weeks in their respective departments after their second semester exams. It will be non-credited mandatory course, the result of which (satisfactory/unsatisfactory) will be reflected in their second semester mark sheet

Teaching Scheme for B.E. Second Year

Second Year- Third Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		
		L-T-P	Contact hrs/week	Credits	Category	Internal Ass.	Univ. Exam	Practical (Internal)
ASM 301	Linear Algebra and Probability Theory	3-1-0	4	4	BS	50	50	-
PCIT301	Data Structures	3-1-0	4	4	PC	50	50	
PCIT351	Data Structures(P)	0-0-3	3	1.5	PC	-		50
ESC301	Digital Electronics	3-1-0	4	4	ES	50	50	
ESC351	Digital Electronics(P)	0-0-3	3	1.5	ES			50
PCIT302	Computer Architecture and Organization	3-1-0	4	4	PC	50	50	-
PCIT303	Database Management System	3-1-0	4	4	PC	50	50	-
PCIT353	Database Management System(P)	0-0-3	3	1.5	PC	-	-	50
Total		**15-5-9**	**29**	**24.5**		**250**	**250**	**150**

Total Marks: 650   **Total Credits: 24.5**

Second Year- Fourth Semester

Subject Code	Subject Name	Scheme of Teaching			Category	Scheme of Examination		
						Theory		Practical (Internal)
		L-T-P	Contact hrs./week	Credits		Internal Ass.	Univ. Exam	
HSMC-401	Elective- I (from Humanities and Social Sciences)	3-0-0	3	3	HS	50	50	-
ASM-401	Discrete Structures	3-1-0	4	4	BS	50	50	-
PCIT401	Microprocessor & Assembly Language Programming	3-1-0	4	4	PC	50	50	-
PCIT451	Microprocessor & Assembly Language Programming(P)	0-0-3	3	1.5	PC	-	-	50
PCIT402	Computer Networks	3-1-0	4	4	PC	50	50	-
PCIT452	Computer Networks(P)	0-0-3	3	1.5	PC	-	-	50
PCIT403	Operating System	3-1-0	4	4	PC	50	50	-
PCIT453	Operating System(P)	0-0-3	3	1.5	PC	-	-	50
PCIT404	Educational tour	-	-	-	-	-	-	-
Total		**15-4-09**	**28**	**23.5**		**250**	**250**	**150**

Total Marks: 650   **Total Credits: 23.5**

Elective-I (from Humanities and Social Sciences**)**
● HSMC-401a   Economics
● HSMC-401b   Introduction to Psychology
● HSMC-401c   Sociology
● HSMC-401d   Russian Language

Teaching Scheme for B.E. Third Year

Third Year - Fifth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical (Internal)
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	
PCIT501	Network Security and Cryptography	3-1-0	4	4	PC	50	50	-
PCIT551	Network Security and Cryptography(P)	0-0-2	2	1	PC	-	-	50
PCIT502	Design and Analysis of Algorithms	3-1-0	4	4	PC	50	50	-
PCIT552	Design and Analysis of Algorithms(P)	0-0-3	3	1.5	PC	-	-	50
PCIT503	Artificial Intelligence	4-0-0	4	4	PC	50	50	-
PCIT553	Artificial Intelligence(P)	0-0-3	3	1.5	PC			50
PEIT501a, PEIT501b, PEIT501c, PEIT 501d, PEIT501e, PEIT501f, PEIT 501g.	Professional Elective-I	3-0-0	3	3	PE	50	50	-
PEIT551a, PEIT551b, PEIT551c, PEIT 551d,PEIT 551e,PEIT 551f,	Professional Elective-I (P)	0-0-3	3	1.5	PE	-	-	50
PWIT551	Industrial Training (after 4th semester)	0-0-0	0	1	PW	-	-	50
HSMC 501	Cyber Laws & IPR	3-0-0	3	3	HS	50	50	-
PWIT552	Project-1	0-0-2	2	1	PW	-	-	50
Total		**16-2-13**	**31**	**25.5**		**250**	**250**	**300**

Total Marks: 800   **Total Credits: 25.5**

Professional Elective-I		
(Choose any one from the following)		
Sr No.	**Subject**	**Subject Code**
1	Java Programming/Technologies	PEIT501a
2	UNIX Network Programming	PEIT501b
3	Python Programming	PEIT501c
4	Mobile Application Development	PEIT501d
5	Data Acquisition & Hardware Interfacing	PEIT501e
6	Wireless Communication Technologies	PEIT501f
7	Software as a Medicine	PEIT501g

Third Year - Sixth Semester

Subject Code	Subject Name	Scheme of Teaching				Scheme of Examination		
						Theory		Practical (Internal)
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	
PCIT601	Theory of Computation	3-1-0	4	4	PC	50	50	-
PCIT602	Machine Learning	4-0-0	4	4	PC	50	50	-
PCIT652	Machine Learning (P)	0-0-3	3	1.5	PC	-	-	50
PEIT601a, PEIT601b, PEIT601c, PEIT601d	Professional Elective-II	3-0-0	3	3	PE	50	50	-
PEIT602a, PEIT602b, PEIT602c, PEIT602d	Professional Elective-III	3-0-0	3	3	PE	50	50	-
HSMC601	**Environment Sciences	0-0-0	-	Non-Credit	HS	-	50	-
OEIT601	*Open Elective-I	3-0-0	3	3	OE	50	50	
PWIT651	Project-II	0-0-2	2	1	PW	-	-	50
Total		**16-1-5**	**22**	**19.5**		**250**	**300**	**100**

Total Marks: 650   **Total Credits: 19.5**

**Environment Sciences is a compulsory, self-study course. It can be undertaken through any department of Panjab University, Chandigarh OR Through Massive Open Online Courses (MOOCs) offered by Swayam or NPTEL

*Open Electives can be taken by opting for any course being offered by any department of Panjab University, Chandigarh OR Through Massive Open Online Courses (MOOCs) offered by Swayam or NPTEL

Teaching Scheme for B.E. Fourth Year

Fourth Year - Seventh Semester

| Subject Code | Subject Name | Scheme of Teaching | | | Scheme of Examination | | | |
| | | | | | | Theory | | |
		L-T-P	Contact hrs./week	Credits	Category	Internal Ass.	Univ. Exam	Practical (Internal)
PCIT701	Digital Signal Processing	3-1-0	4	4	PC	50	50	-
PCIT751	Digital Signal Processing(P)	0-0-3	3	1.5	PC	-	-	50
PCIT702	Compiler Design	3-1-0	4	4	PC	50	50	-
PEIT701, PEIT701, PEIT701, PEIT701d	Professional Elective -IV	3-0-0	3	3	PE	50	50	-
OEIT701	*Open Elective-II	3-0-0	3	3	OE	50	50	-
PWIT751	Industrial Training (after 6th Semester)	0-0-0	0	1	PW	-	-	50
PWIT752	Project-III	0-0-4	4	2	PW	-	-	100
Total		**12-2-7**	**21**	**18.5**		**200**	**200**	**200**

Total Marks: 600   **Total Credits: 18.5**

*Open Electives can be taken by opting for any course being offered by any department of Panjab University, Chandigarh OR Through Massive Open Online Courses(MOOCs) offered by Swayam or NPTEL.

Fourth Year - Eighth SemesterOption-1

Subject Code	Subject Name	Scheme of Teaching			Scheme of Examination			
						Theory		
		L-T-P	Contact hrs./week	Credits	Type	Internal Ass.	Univ. Exam	Practical (Internal)
PCIT801	Embedded System Design	3-1-0	4	4	PC	50	50	-
PCIT851	Embedded System Design (P)	0-0-3	3	1.5	PC	-	-	50
PCIT802	Cloud Computing	3-1-0	4	4	PC	50	50	-
PEIT801a, PEIT801b, PEIT801c, PEIT801d	Professional Elective-V	3-0-0	3	3	PE	50	50	-
HSMC801a, HSMC801b, HSMC801c, HSMC801d, HSMC801e, HSMC801f	Management Elective(Choice Based Elective)	3-0-0	3	3	HS	50	50	-
OEIT 801	*Open Elective-III	3-0-0	3	3	OE	50	50	-
PWIT851	Project IV	0-0-4	4	2	PW	-	-	100
PWIT852	Seminar	0-0-2	2	1	PW	-	-	50
Total		**15-2-9**	**26**	**21.5**		**250**	**250**	**200**
	Total Marks:700					**Total Credits: 21.5**		
				OR OPTION – 2				
Sub Code	**Sub Name**	**Duration**	**Credits**		**Int. Ass.**	**Marks**	**Grand Total**	
PWIT853	Industrial Training	6 months	21.5		300	400	700	

*Open Electives can be taken by opting for any course being offered by any department of Panjab University, Chandigarh OR Through Massive Open Online Courses(MOOCs) through Swayam or NPTEL.

**Mapping has to be 3 level: 1 (low or slight), 2 (moderate or medium), 3 (substantial or high) OR – (for no mapping).

Choice Based Management Elective		
(Choose any one from the following)		
Sr No.	Subject	Subject Code
1	Principles of Management	HSMC 801a
2	Business Environment and Business Laws	HSMC 801b
3	Entrepreneurship and Project management	HSMC 801c
4	Financial Management	HSMC 801d
5	Marketing Management	HSMC 801e
6	Human Resource Management	HSMC 801f

Professional Electives

Code	Bucket Domain	Professional Elective-II	Professional Elective-III	Professional Elective-IV	Professional Elective-V
A	**Information and Communication Technology**	Internet of Things PEIT601a	Principles of Telecommunication and Information Theory PEIT602a	Software Defined Network PEIT701a	Optical Communication PEIT801a
B	**Image Processing**	Computer Graphics PEIT601b	Multimedia System PEIT602b	Human Computer Interaction PEIT701b	Digital Image Processing PEIT801b
C	**Security**	Cyber Attacks PEIT601c	Cyber Forensics PEIT602c	Block Chain Technology PEIT701c	Intrusion Detection Systems PEIT801c
D	**Software Engineering**	Software Engineering PEIT601d	Software Project Management PEIT602d	Agile Software Development PEIT701d	Software Testing & Quality Assurance PEIT801d

Credit Distribution Table

	1 Sem	2 Sem	3 Sem	4 Sem	5 Sem	6 Sem	7 Sem	8 Sem	Total
HS Humanities and Social Sciences including Management courses **(8)**		3		3	3			3	**12**
BS Basic Sciences**(24)**	10.5	10.5	4	4					**29**
ES Engineering Science/Workshop**(14)**	7	3	5.5						**15.5**
PC Professional Core **(56)**	2	6	15	16.5	16	9.5	9.5	9.5	**84**
PE Professional Elective **(24)**					4.5	6	3	3	**16.5**
PW Project/Seminar/Internship **(16)**					2	1	3	3	**9**
Open Elective**(8)**						3	3	3	**9**
Total	**19.5**	**22.5**	**24.5**	**23.5**	**25.5**	**19.5**	**18.5**	**21.5**	**175**

Course Code	ASP X01
Course Title	Applied Physics
Type of Course	
L T P	4 0 3
Credits	4
Total Lectures	45
Course Assessment Methods	50
End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Oscillations Complete mathematical treatment for mechanical as well as electrical free, damped and forced oscillators.Simple harmonic oscillator and solution of the differential equation, Physical characteristics of SHM.Superposition of two SHMs executing in same and perpendicular direction of same frequency and different frequencies, Lissajous figures. Superposition of n SHMs	**(4)**
Damped Oscillations: Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. Use of damping in shock absorbers and seismic dampners.	**(4)**
Forced Oscillations: States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, vibration insulator.	**(4)**
Electromagnetic waves: Maxwell equations and their significance. Electromagnetic waves in vacuum conducting medium and non-conducting medium. Energy and momentum carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves for oblique and normal incidence.	**(8)**
	(5)
SECTION-B	
Modern Optics **Polarization:** Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction, optical activity. Use of polarization in testing of materials, working of LCDs, projecting 3D movies.	**(7)**
Lasers: Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, Applications of lasers in optical communication and storage, laser machining, defence, geophysical sciences.	**(7)**
Fibre Optics: Basics of optical fibre - its numerical aperture, coherent and incoherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical	**(7)**

fibre in communication systems, medical sciences, defence, mechanical applications .

RECOMMENDED BOOKS
Reference Books:
1. Introduction to Solid State Physics, Charles Kittel
2. Solid State Physics, S.O. Pillai
3. Physics for Engineers (Prentice Hall India) - N.K. Verma
4. Physics of Vibrations and Waves (5th Edition, John Wiley & Sons) – H.J.Pain
5. Optics – Ajoy Ghatak
6. Introduction to Electrodynamics, David J. Griffiths.

COURSE INFORMATION SHEET

Course Code	ASP X51
Course Title	Applied Physics (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

SYLLABUS

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.
   (ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Laurant's Half shade/ Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.
9. To determine the velocity of ultrasonic waves in different liquids using ultrasonic interferometer.
10. To study the frequency response and to find resonant frequencies of LCR series and parallel circuits. Also to find the quality factor and band width in LCR.
11. To determine the value of acceleration due to gravity and radius of gyration using bar pendulum.
12. Study of transverse and longitudinal standing waves and the measurement of the frequency of the electrically maintained Tuning fork.
13. To study damping effects in spring mass system.

COURSE INFORMATION SHEET

Course Code	ASP X02
Course Title	Quantum Physics
Type of Course	
L T P	4 0 3
Credits	4
Total Lectures	45
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Special Theory of Relativity Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, Postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation, Relativistic momentum, Minkowski space .(Section 1.1 to 1.5, 1.7 to 1.9 of Book 1).	**(8)**
Origin and Postulates of Quantum Mechanics Quantum theory of light, Blackbody Radiation, Photoelectric effect, Compton effect, X-rays production, spectrum & diffraction (Bragg's law), pair production, photons & gravity, Gravitational Red Shift, Black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and its applications .	**(9)**
Postulates of quantum mechanics, wave function, Born interpretation and normalization, Schrodinger theory, Time-dependent and Time-independent Schrodinger equation, Operators (Adjoint operator, Identity operator, Hermitian operator, unitary operator etc.), expectation values, Ehrenfest theorem (7) (Sections 2.1-2.10, 3.1-3.5, 3.7-3.10, 5.1-5.7 of Book 1)	**(7)**
SECTION-B	
Applications of Quantum Mechanics Particle in a box (infinite potential well), Potential step, Finite Potential Well and Barrier, Tunneling, Linear harmonic oscillator (one-dimensional), 3-D rigid box and degeneracy (9) (Sections 5.8 – 5.11 of Book 1)	**(9)**
Application of Quantum Mechanics to Solids Free Electron theory of Metals (Classical and Sommerfield), Bloch's theorem for particles in a periodic potential, Kronig-Penney Model and origin of energy bands, conductors, insulators and semiconductors, Fermi level, density of states, Effective mass, Specific heat of solids (Sections 6.35-6.38, 6.40, 6.41, 7.1-7.5 of book 4 and Section 1 of Chapter 10 of Book 2).	**(12)**

References:

1. Concepts of Modern Physics, by Arthur Beiser (McGraw-Hill)

2. Introduction to Solids by Leonid V. Azaroff

3. Elementary Solid state Physics by M.Ali Omar (Pearson Education)

4. Solid State Physics, by C. Kittel (Wiley Eastern)

5. Solid State Physics, by S.O. Pillai (New Age International)

COURSE INFORMATION SHEET

Course Code	ASP X52
Course Title	Quantum Physics (**P**)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
2. To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
3. To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
4. To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
5. To study the Balmer Series of Hydrogen spectrum using diffraction grating and calculate Rydberg constant.
6. To evaluate charge on an oil drop using Millikan's oil drop method.
7. To verify Rutherford's alpha scattering formula using a mechanical model.
8. To calculate charge to mass ratio of an electron using Thompsonś method.
9. To determine Hall coefficient of a given semiconductor material and evaluate charge carrier type, density and mobility of charge carriers.
10. To study temperature dependence of resistivity of a semiconductor using four probe method and determine the energy band gap of a given semiconductor.
11. To determine the velocity of ultrasonic waves in different liquids using ultrasonic interferometer.
12. To study probability theory using coins.
13. To study probability and statistics using two dice.

COURSE INFORMATION SHEET

Course Code	ASP X03
Course Title	Physics of Materials
Type of Course	
L T P	4 0 3
Credits	4
Total Lectures	45
Course Assessment Methods	50
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Crystal structure: Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids) Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes) Structure of polymers, crystallinity of long chain polymers Crystal Structure analysis, X-ray diffraction and Bragg's law, Experimental methods for study of X-ray diffraction pattern, Crystal Defects (Point, line, surface and volume imperfections)	**(14)**
Diffusion: Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors).	**(3)**
Elastic, Anelastic and Viscoelastic Behaviour Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour .	**(3)**
	(7)
SECTION-B	
Plastic Deformations and strengthening mechanisms : Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals and polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth.	**(5)**
Fracture, Fatigue and Creep : Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effect .	**(5)**
Phase Diagrams : One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys ,Binary Eutectic Systems, Development	**(6)**

of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, the Iron-Carbon system.	
Phase Transformations: Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement	**(4)**

RECOMMENDED BOOKS			
S.No.	NAME	AUTHORS	PUBLISHER
1.	Material science and engineering – An Introduction	William D Callister	6Th edition, John Willey and Sons.
2.	Material Science and Engineering – A First Course	V. Raghvan	4th edition, Eastern economy edition
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Introduction to Solids	Leonid V Azaroff	Tata McGraw Hill, 3rd edition.

COURSE INFORMATION SHEET

Course Code	ASP X53
Course Title	Physics of Materials (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. To study the quantized energy of the first excited state in Argon using the Frank-Hertz Set-up.

2. To find the value of Planck's constant and evaluate the work function of cathode material by use of photoelectric cell.

3. To study various characteristics of photovoltaic cell: (a) Voltage-current characteristics (b) loading characteristics (c) power-resistance characteristics and (d) inverse squarelaw behavior of photocurrent with distance of source of light from photovoltaic cell.

4. To study the response of a photoresistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.

5. To determine Hall coefficient of a semiconductor material and then evaluate the type, density and mobility of charge carrier in a given semiconductor material.

6. To study the hysteresis loop of magnetic material (iron, nickel and steel) and determine its retentivity, coercivity and energy dissipated per unit volume per cycle of hysteresis.

7. To study temperature dependence of resistivity of a semiconductor material using four probe method and further deduce the band gap of this semiconductor.

8. To determine the Curie temperature of a ferroelectric material by measuring dielectric constant as a function of temperature.

9. To determine thermal conductivity of bad conductor by using guarded plate method (Lee's disc method).

COURSE INFORMATION SHEET

Course Code	ASM 101
Course Title	Calculus
Type of Course	
L T P	4 1 0
Credits	5
Total Lectures	45
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Objectives (CO)	1. To understand the behaviour of infinite series and its use. 2. To learn the concepts of functions of two and more than two variables and their applications. 3. To learn the methods to evaluate multiple integrals and their applications to various problems. 4. To understand the concepts of Vector calculus and their use in engineering problems.
Course Outcome	1. The students are able to test the behaviour of infinite series. 2. Ability to analyze functions of more than two variables and their applications. 3. Ability to evaluate multiple integrals and apply them to practical problems. 4. Ability to apply vector calculus to engineering problems

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
FUNCTIONS OF ONE VARIABLE Sequences and Series: Sequences, Limits of sequences, Infinite series, series of positive terms, Integral test, Comparison test, Ratio test, Root test. Alternating series, Absolute and Conditional Convergence, Leibnitz test. Power series: radius of convergence of power series, Taylor's and Maclaurin's Series. (Scope as in Chapter 10, Sections 10.1 – 10.9 of Reference 1). Integral Calculus: Length of curves, Volume (disk and washer method) and surface areas of revolution (Scope as in Chapter 6, 6.1, 6.3, 6.4 of Reference 1).	
DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor's theorem (statement only), Maxima and minima of a function of two and three variables, Lagrange's method of multipliers (Scope as in Chapter 14, Sections 14.1-14.4, 14.6-14.10 of Reference 1).	
SECTION-B	
INTEGRAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES Double and triple integrals, Change of order of integration, Change of Variables, Applications to	

area, volume and surface area. (Scope as in Chapter 15 of Reference 1).	
VECTOR DIFFERENTIAL CALCULUS Vector-valued functions and space curves and their tangents, integration, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 13, Sections 13.1-13.5 Chapter 14, Section 14.5 of Reference 1).	
VECTOR INTEGRAL CALCULUS Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green's theorem in the plane, Surface Areas and Surface Integrals, Stoke's Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 16 of Reference 1).	

RECOMMENDED BOOKS

S. No.	NAME	AUTHORS	PUBLISHER
1.	Calculus	Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas	12th edition, Pearson Education.
2.	Advanced Engineering Mathematics	E. Kreyszig.	8th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications

COURSE INFORMATION SHEET

Course Code	ESC X01
Course Title	**Programming for Problem Solving**
Type of Course	
L T P	
Credits	
Total Lectures	
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Objectives (CO)	1. To develop simple algorithms for solving arithmetic and logical problems. 2. To translate the algorithms to programs using C language and their execution. 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program. 5. To use arrays, pointers and structures to develop algorithms and programs

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Unit–1: Introduction to Programming **Introduction to components of a computer system:** Memory, processor, I/O devices, storage, operating system, concept of assembler, compiler, interpreter, loader and linker. **Concept of algorithm:** Representation of an algorithm, flowchart, Pseudocode with examples, converting algorithms to programs. **Programming Basics:** Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code. Components of C language, standard I/O in C, data types, variables and constants, memory storage, storage classes	**(06)**
Unit –2: Expressions and Statements **Expressions and their evaluation:** Operands and Operators, formation of expressions using arithmetic, relational, logical and bitwise operators, precedence and associativity rules , mixed operands, type conversion and evaluation of expressions. **Statements:** Simple and compound statements, Conditional Branching: if and switch statements, nested if-else, dangling else problem, use of break and default with switch. Iteration and loops: use of while, do while and for loops, nested loops, use of break and continue statements.	**(10)**
Unit– 3: Arrays & Basic Algorithms **Arrays:** Array notation and representation, manipulating array elements, using multi-dimensional arrays, character arrays and strings. **Basic Algorithms:** Searching and Sorting Algorithms (Bubble, Insertion and Selection), finding roots of equations, notion of order of complexity through example programs.	**(07)**
SECTION-B	
Unit–4: Functions Introduction, advantages of modularizing a program into functions, types of functions, passing parameters to functions: call by value, call by reference, passing arrays to functions, recursion with example programs.	**(9)**

Unit – 5: Structures , Union, Enums and Bit-fields Defining, declaring and usage of structures, unions and their arrays, passing structures and unions to functions, introduction to enums and bit-fields.	**(6)**
Unit – 6: Pointers and File handling **Pointers:** Introduction, declaration, applications, dynamic memory allocation (malloc, calloc, realloc, free), use of pointers in self-referential structures. **File handling:** File I/O functions, standard C pre-processors, defining and calling macros, command-line arguments.	**(7)**

Text books:
1. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. Programming in C: A practical approach by Ajay Mittal, Pearson Education, 2010
3. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
4. Computer Basics and C Programming by V.Rajaraman , PHI Learning, 2015.
5. Computer Concepts and Programming in C, E Balaguruswamy, McGraw Hill
6. Computer Science- A Structured Programming Approach Using C, by Behrouz A.Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning – 2007

Course Code	ESC X51
Course Title	**Programming for Problem Solving (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

	I. To formulate the algorithms for simple problems II. To translate given algorithms to a working and correct program III. To be able to correct syntax errors as reported by the compilers IV. To be able to identify and correct logical errors encountered at run time V. To be able to write iterative as well as recursive programs VI. To be able to represent data in arrays, strings and structures and manipulate them through a program VII. To be able to declare pointers of different types and use them in defining self-referential structures. VIII. To be able to create, read and write to and from simple text files.

SYLLABUS

Lab1: Familiarization with programming environment
Lab 2: Simple computational problems using arithmetic expressions
Lab 3: Problems involving if-then-else structures
Lab 4: Iterative problems e.g., sum of series
Lab 5: 1D Array manipulation, Arrays: searching, sorting
Lab 6: Matrix problems, String operations
Lab 7: Simple functions and parameter passing
Lab 8: Numerical methods (Root finding, numerical differentiation, numerical integration)
Lab 9: Recursive functions
Lab 10: Pointers and structures
Lab 11: File operations

COURSE INFORMATION SHEET

Course Code	ESC X53
Course Title	WORKSHOP (P)
Type of Course	
L T P	
Credits	
Total Lectures	
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50
Course Objectives (CO)	1. Know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals. 2. Understand different Mechanisms, Use of Machines, Tools and Equipment. 3. Knowledge of basic Manufacturing Processes in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal.Smithy, Foundry and Carpentry Workshops.
Course Outcome	1. Familiarity with common machines, Tools and Equipment in basic Workshop Practices. 2. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions. 3. Applications of Basic Workshop Practices..

SYLLABUS

Instruction for Students: Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions shall be carried out by the students.

Welding Workshop :
(Theory)Joining Processes, Welding and its Classification, Welding Processes, Fusion Welding, Pressure Welding, Electric Arc Welding, Gas Welding, Resistance Welding, Metal Inert gas Welding, Welding Joints, Welding Positions, Welding defects, Welding Applications, Basic welding design and Procedures, identification of materials,
Jobs: Butt Joint in Flat Position using SMAW, Lap Joint using Spot Welding, Edge Joint in Horizontal Position using SMAW, Tee Joint in Flat position using SMAW, Corner Joint in vertical position using SMAW.
Defect Identification and marking, Edge preparation and Fillet making, Tacking, Distortion identification.

Electronics Workshop
To know about Soldering mechanism and techniques, Familiarity with Electronic Components / symbols, Testing of electronic components, Application of Soldering : Circuit Assembly
List of Jobs :
Practice of Soldering and de-soldering, Identification and testing of a) passive electronic components b) Active electronic components, Assembly of Regulated Power supply circuit.

Electrical Workshop
Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B's etc., Electric Shock and its management.
Electric Tools: Conversance with various tools and to carry out the following:
1. Measurement of wire sizes using SWG and micrometer
2. Identification of Phase and neutral in single phase supply
Jobs:
To control a lamp with a single way switch

To control a lamp from two different places
To assemble a fluorescent lamp with its accessories
To control a lamp, fan and a three pin socket in parallel connection with single way switches

Fitting Shop

Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc, Safety precautions and Practical demonstration of tools and equipments

Jobs:

To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling.

Smithy Workshop

Introduction of Smithy and Forging process, Tools and Equipment's, Operations, Heat Treatment processes, Advantages, Dis-advantages, Defects and Safety precautions.

Jobs:

Drawing and Upsetting Practice using Open Hearth Furnace, Cold working process practice, Heat Treatment \: Annealing and hardening process.

Machine Shop

Application, Function and different parts, Operations of Lathe, Type of Cutting Tools and their materials, Drill machine Types, applications and Functions. Hacksaw machines and functions, Work Holding devices and tools, chucks, Vices, machine Vices, V Block, Measuring Instruments uses, Shaper and Milling machine Applications.

Jobs:

To perform Marking, Facing, Turning,taper Turing, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine,Hacksawing practice on Power hacksaw,Shaping operation practice on Shaper.

Carpentry Shop

Classification of Tree, Timber. Advantages and uses of Timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,

Jobs:

Tee Joint, Cross Joint,Tenon Joint, L Shape Joint, Practice of Wood Working Lathe, Practice on multi-purpose Planer.

Foundry Shop

Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects.

Jobs:

Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Introduction to Basic Manufacturing Processes and Workshop Technology	Rajender Singh	New Age International Publication
2	Manufacturing Processes	Chapman	Viva Books Private Limited

Course Code	ITC 101
Course Title	**Introduction to Information Technology**
Type of Course	PC
L T P	2 0 0
Credits	2
Total Lectures	30
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Objectives (CO)	1. To understand about basics of computers and its architecture. 2. To have basic knowledge of different domains of information technology.
Course Outcome.	After completion of this course, the students are able to: I. Understand the basic principles of computers, processors and their architecture. II. Learn basic concepts related to different domains of information technology. III. Acquire knowledge about operating systems and database systems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Computer Basics Algorithms, A Simple Model of a Computer, Characteristics of Computers, Problem-solving Using Computers. Representation of Characters in computers, Representation of Integers, Representation of Fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes. Description of Computer Input Units, Other Input Methods, Computer Output Units (Printers, Plotters).	**(07)**
Processor Structure of Instructions, Description of a Processor, Machine Language and Instruction set. Processors used in desktops and lap tops. Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to Construct Memories, Magnetic Hard Disk, floppy Disk Drives, Compact Disk Read Only Memory, Magnetic Tape Drives. Specification of a desktop and Lap top computer currently available in the market (Specifications of processor, motherboard &chipset, memory, interface & capacity of hard disk & DVD drives, I/O ports)	**(08)**

SECTION-B	
Software Concepts Types of Software, Programming Languages, Software (Its Nature & Qualities), Programming Languages	**(4)**
Operating Systems History and Evolution. Main functions of OS Multitasking, Multiprocessing, Time Sharing,	**(4)**

Real Time OS with Examples.	
Database Management System Purpose and Organization of Database, Introduction to Data Models	**(2)**
Computer Generation & Classifications First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of computers.	**(3)**
Computers & Communications Introduction to Computer Networks, Types of Networks, OSI/TCP Model, LAN technologies (fast Ethernet & Gigabit Ethernet).	**(2)**

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Fundamentals of Computers	P. K. Sinha	BPB Publications
2.	Fundamentals of Computers	V. Rajaraman	3rd edition, PHI Publications
3.	Data and Computer Communications	William Stallings	PHI Publications
4.	Internet Working with TCP/IP	Douglas E. Coomer	PHI Publications
5.	An Introduction to Database Systems	C J Date	8th edition, Pearson Publications

Course Code	ASC X01
Course Title	Applied Chemistry
Type of Course	
L T P	
Credits	
Total Lectures	
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Objectives (CO)	To teach the fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.
Course Outcome.	1. The geometry and bonding in homonuclear, heteronuclear molecules and coordination compounds. Splitting of d-orbital in octahedral, tetrahedral and square planar field along with different properties of the coordination compounds. 2. How the molecules are arranged in three dimensional structure and how it leads to the phenomena of various types of isomerism. 3. The basic principles of spectroscopy and its use to determine the chemical structure. 4. The different thermodynamic laws, heat changes and energy calculations. 5. The role and mechanism of various heterogeneous and homogeneous catalysts in increasing reactions rate of many synthetically important chemical reactions. 6. The sustainable technology in design and synthesis of polymers for its variety of applications.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Chemical Bonding : Molecular orbital theory and its applications to the formation of homonuclear (H_2, N_2) and heteronuclear diatomic molecules (NO, CO, CN), Valence bond theory as applicable to coordination compounds and its limitations. Crystal Field Theory, Splitting of octahedral, tetrahedral and square planner complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its application.	**(6)**

Stereochemistry of Organic Compounds : Concept of isomerism. Types of isomerism. Optical isomerism–enantiomers, optical activity, properties of enantiomers, diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization, R & S systems of nomenclature. Geometric isomerism– determination of configuration of geometric isomers, E & Z system of nomenclature Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, Newman projection.	**(8)**
Spectroscopy : Spectroscopy: UV- Introduction, Lambert-Beer's Law, selection rules, electronic transitions, Application to simple organic molecules (auxochrome, chromophore), effect of conjugation and solvent on transition of organic molecules, Woodward-Fieser Rules for calculating λmax for dienes. Infrared Spectroscop- Introduction, Principle of IR spectroscopy-Fundamental vibrations, Application to simple organic molecules (effect of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequency), sample preparation for IR.	**(9)**
SECTION-B	
Thermodynamics Review of objectives and limitations of chemical thermodynamics, State functions, Thermodynamic equilibrium, work, heat, internal energy, enthalpy, heat capacity. Zeroth law of thermodynamics, First law of thermodynamics Reversible, isothermal and adiabatic expansion & compression of an ideal gas. Irreversible isothermal and adiabatic expansion of an ideal gas. Carnot cycle and efficiency of reversible engines, Enthalpy change and its measurement. Flame temperature, Second and third law of thermodynamics. Concept of entropy. Gibb's and Helmholtz equations. Simple numericals for calculating w, q, ΔE, ΔH and entropy.	**(10)**
Catalysis Catalysis and general characteristics of a catalytic reactions, Homogeneous catalysis, Heterogenous catalysis, Acid base catalysis and Enzyme catalysis – Michealis Menten equations, Application of catalysis for industrially important processes – Hydrogenation (Wilkinson's catalyst), Hydroformylation, Acetic acid process, Wacker process.	**(6)**
Polymers: General introduction, classification of polymers, Mechanism of addition and condensation polymerization, Idea of number average and weight average molecular masses of polymers, Properties and uses of polystyrene, polyester, polyamide, epoxy, phenol-formaldehyde and silicon resins.	**(6)**

RECOMMENDED BOOKS

S.No.	NAME	AUTHOR(S)	PUBLISHER
1.	Atkin's Physical Chemistry	Peter Atkins, Julio de Paula	7th Ed., Oxford University Press
2	Concise Inorganic Chemistry	J D Lee	5th Edition, Chapman & Hall, 2003
3	Organic Chemistry	Joseph M. Hornback	Brooke Cole Publishing Company U.S.A.
4	A Textbook of Engineering Chemistry	Shashi Chawla	Dhanpat Rai & Co. Pvt. Ltd., Delhi (2008)
5	Principles of Physical Chemistry	Puri, Sharma and Pathania	W.H. Freeman & Co. 2008.
6	Introductory Polymer Chemistry	G.S.Mishra	John Wiley & Sons, New York, 1993

7	Introduction to spectroscopy	D. S. Pavia, G.M. Lasmpman and G.S. Kriz	4th Edition, Thomson learning, Indian Edition 2012.
8	Basic Inorganic Chemistry.	F.A. Cotton, G. Wilkinson and P.L. Gaus	3rd Ed., John Wiley & Sons
9	Inorganic Chemistry-Principles of structure and reactivity	James E. Huheey, Ellen A. Keiter and Richard L. Keiter	4th Ed. Pearson Edu. Asia
10	Organic Chemistry	S. M. Mukherji, S. P. Singh & R. P. Kapoor	1st Edition, Vol. 2, 1985, New Age International Pvt. Ltd

COURSE INFORMATION SHEET

Course Code	ASC X51
Course Title	Applied Chemistry (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly and has to perform any eight experiments.

1. Verify Lambert Beer's law using spectrophotometer and $CoCl_2$ or $K_2Cr_2O_7$ solution.
2. To determine the strength of an acid solution by using conductivity meter.
3. Determination of saponification number of oil.
4. Preparation of a phenol formaldehyde resin.
5. Experiments on TLC (determination of Rf values and identification of various compounds).
6. To determine the heat of a neutralization reaction.
7. To determine the heat of solution of given compound.
8. Determination of total hardness of a water sample.
9. Determination of copper.
10. Determination of chloride ion and dissolved O_2 in water.
11. Preparation of an inorganic complex/organic compound

Course Code	ASM 201
Course Title	**Differential Equations and Transforms**
Type of Course	
L T P	
Credits	
Total Lectures	
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Objectives (CO)	To learn the methods to formulate and solve linear differential equations and their applications to engineering problems 1.To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform 2.To apply Laplace transforms to solve ordinary differential equations. 3.To learn the concept of Fourier series, integrals and transforms. 4.To learn how to solve heat, wave and Laplace equations.
Course Outcome.	1. The student will learn to solve Ordinary Differential equations. 2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations. 3. Students will understand the nature and behaviour of trigonometric (Fourier) series and apply it to solve boundary value problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
ORDINARY DIFFERENTIAL EQUATIONS Review of geometrical meaning of the differential equation, directional fields, exact differential equations(scope as in chapter 8, sections 8.1 – 8.10 of reference 5), solution of differential equations with constant coefficients; methods of differential operators (scope as in chapter 9, sections 9.1 – 9.5 of reference 5). Non-homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters, reduction by order (scope as in chapter 9, section 9.7, 9.10 of reference 5). Power series method of solution (scope as in chapter 10, section 10.2 of reference 5)	**(6)**

Laplace Transforms Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac's Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 6, Sections 6.1 – 6.6 of Reference 2).	**(8)**

SECTION-B	
Fourier Series and Transforms: Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 11, Sections 11.1 – 11.2, 11.4-11.5, 11.7 – 11.9 of Reference 2).	()
Partial Differential Equations: Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 1).	()
Boundary Value Problems: D'Alembert's solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation (Scope as in Chapter 12, Sections 12.1, 12.3 – 12.4, 12.6, 12.9 of Reference 2).	()

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Elements of Partial Differential Equations	Ian N. Sneedon	McGraw Hill,Singapore 1957.
2.	Advanced Engineering Mathematics	E. Kreyszig.	10th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications
7.	Theory and problems of Differential Equations	Frank Ayers	Shuam outline series, McGraw-Hill, Singapore, 1957

COURSE INFORMATION SHEET

Course Code	HSMC X01
Course Title	**Professional Communication**
Type of Course	
L T P	
Credits	
Total Lectures	
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Objectives (CO)	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
Course Outcome.	

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
English Grammar Subject-verb agreement , Noun-pronoun agreement , Misplaced modifiers , Articles ,Prepositions , Tenses, One word substitutes , Idioms and Phrases , Active-Passive , Synonyms -Antonyms	**(6)**
Basic Writing Skills Sentence Structures, Use of phrases and clauses in sentences , Importance of proper punctuation , Creating coherence , Organizing principles of paragraphs in documents, Techniques for writing precisely , Paragraph , Essay and Letter writing .	**(5)**
Communication details Four Fundamental communication methods namely Writing, Speaking, Listening and Reading ,7Cs of Communication , Barriers to Communication.	**(3)**
SECTION-B	
Communication in Organizations Formal- Informal Communication, Communication Networks, Intra and Inter Firm Communication	**(3)**
Modes of Communication Emerging channels of communication , Telephone and Email Etiquettes, Non-Verbal Communication, Cross-culture communication, Formal Presentations .	**(3)**
Communication methods *Reports and their types , Layout of a report , writing a report ,Office notice , Memo ,Business proposals, Minutes of meeting*	**(5)**

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.

(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007

(iii)On Writing Well. William Zinsser. Harper Resource Book. 2001

(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

COURSE INFORMATION SHEET

Course Code	HSMC X51
Course Title	Professional Communication (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Outcome	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Practical

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

1. Telling something about oneself

2. Story Telling and Event

3. Listening Comprehension

4. Pronunciation, Intonation, Stress and Rhythm

5. Common Everyday Situations: Conversations and Dialogues

6. Communication at Workplace

7. Facing an Interview

8. Formal Presentations

COURSE INFORMATION SHEET

Course Code	ITC 201
Course Title	**Object Oriented Programming using C++**
Type of Course	PC
L T P	3 0 4
Credits	5
Total Lectures	45
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Objectives (CO)	1. To provide students in-depth theoretical base and fundamentals of Object Oriented Programming paradigm. 2. To prepare students to design and code various projects using C++.
Course Outcome.	After completion of this course, the students are able to: I. Understand the fundamentals of Object Oriented Programming paradigm. II. Learn and apply core objected oriented concepts like classes, objects and overloading, code reusability. III. Learn how the data flows between the programs and files in Object Oriented framework and implement various file handling operations. IV. Analyze information systems in real-world settings and prepare an Object Oriented design for the same.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Principles of Objected Oriented Programming Advantages of OOP, comparison of OOP with Procedural Paradigm	**(3)**
C++ Constructs Tokens, Expressions and control structures, various data types, and data structures, Variable declarations, Dynamic Initializations, Operators and Scope of Operators, Typecasting, Unformatted and formatted console I/O Operations.	**(3)**
Functions Classes and Objects: Prototyping, Referencing the variables in functions, Inline, static and friend functions. Memory allocation for classes and objects. Arrays of objects, pointers to member functions.	**(5)**

Constructors and Destructors Characteristics and its various types, Dynamic Constructors, Applications, Order of Invocation, C++ garbage collection, dynamic memory allocation.	**(5)**
Polymorphism Using function and Operator overloading, overloading using friend Functions, type conversions from basic data types to user defined and vice versa	**(5)**
SECTION-B	
Inheritance Derived classes, types of inheritance, various types of classes, Invocation of Constructors and Destructors in Inheritance, aggregation, composition, classification hierarchies, metaclass/abstract classes.	**(6)**
Pointers Constant pointers, Use of this Pointer, Pointer to derived and base classes, virtual functions, Bindings, Pure virtual Functions and polymorphism	**(5)**
I/O Operations and Files Classes for files, Operations on a file, file pointers	**(4)**
Generic Programming With Templates Definition of class template, Function Templates, Overloading Template Functions, Class templates and member functions templates with parameters, Standard C++ classes, persistent objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators and vectors	**(6)**
Introduction to object oriented Analysis and Design Object Oriented System, Analysis and Design	**(3)**

RECOMMENDED BOOKS			
S.No.	**Name**	**Author**	**Publishers**
1	Programming with C++, 2nd Edition	Bala Guruswamy	Tata McGraw Hill
2	C++ Primer Plus	Prata	Pearson Education
3	The C++ Programming Language	Bjarne Stroutstrup	Prentice Hall of India
4	The Complete Reference to C++	Schildt	Tata McGraw Hill
5	OOPs Using C++	Sanjeev Sofat	Khanna Publishers

COURSE INFORMATION SHEET

Course Code	ITC 251
Course Title	**Object Oriented Programming using C++ (Practical)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	**50**
Course Objectives	To enable students to understand the concepts of object oriented programming using C++ by designing and implementing moderately complex problems. Students should master modern tools for computer aided software engineering along with good program documentation.
List of Experiments **To write and implement program on:** 1. Functions, Classes and Objects 2. Constructors and Destructors 3. Operator Overloading and Type Conversion 4. Inheritance and Virtual Functions 5. File Handling 6. Exception Handling and Generic Programming	

COURSE INFORMATION SHEET

Course Code	**ESC X08**
Course Title	**Basic Information Theory and Communication**
Type of Course	**ES**
L T P	**2 0 2**
Credits	**3**
Total Lectures	**30**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Objectives (CO)	1. To have knowledge of Information theory, entropy and coding. 2. To understand about the analog and digital modulation techniques used for signal transmission.
Course Outcome.	After completion of this course, the students are able to: 1. Learn concepts of Information Theory and coding. 2. Acquire knowledge about AM, FM and PM transmission and reception. 3. Understand and analyze various pulse modulation techniques. 4. Understand and apply the principles of digital transmission.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Probability and Random Signal theory Set theory, Introduction to probability, Conditional probability, Bayes' Theorem, random variable, Binomial, Poisson and Normal distribution	**(3)**
Information Theory: Unit of Information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Mutual Information, Channel capacity, Shannon's Theorem, Bandwidth and SNR trade-off	**(5)**
Coding Coding Efficiency, Shannon Fano Coding, Huffman Coding, Error Control Coding, Block Codes, Convolution Codes	**(6)**

SECTION-B	
Analog Modulation Techniques Concept of Modulation its merits & demerits, Amplitude Modulation: Principle, generation, receiver stages. Frequency Modulation: Principle, generation, transmitter stages,	**(8)**

detection and receiver stages/ blocks and their operation. Phase Modulation: Principle, generation, transmitter stages, detection and receiver stages/ blocks and their operation. Comparison of Amplitude Modulation, Frequency Modulation, Phase Modulation	
Digital Modulation Techniques Principle of generation, detection applications, comparison: Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Differential PCM, Delta Modulation.	**(4)**
Digital Transmission Techniques Principle of: ASK, QASK, PSK, DPSK, BPSK, QPSK, FSK, BFSK and MSK.	**(4)**

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Communication Systems: Analog and Digital	R P Singh, S D Sapre	Tata McGraw Hill
2.	Electronic Communication Systems	George Kennedy	Tata McGraw Hill
3.	Principles of Communication Systems	Herbert Taub, Donald L. Schilling	Tata McGraw Hill
4.	Modern Digital and Analog Communication Systems	B.P. Lathi	Oxford University Press
5.	Communication Systems	Simon Haykin, Michael Moher	Wiley

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COURSE INFORMATION SHEET

Course Code	ESC X58
Course Title	**Basic Information Theory and Communication (Practical)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Objectives	To enable students to get practical knowledge about various analog, digital modulation and other communication systems available for information transfer.
List of Experiments (Practical work based on theory to cover the objectives) 1. Familiarize the student with the basic operation of various analog and digital communication systems. 2. To generate AM wave. 3. To detect AM wave. 4. To generate FM wave. 5. To detect FM wave. 6. To generate PM wave. 7. To detect PM wave. 8. To study various digital modulation techniques like PAM, PWM, PPM etc. 9. To study PCM, Differential PCM, Delta Modulation signals. 10. To study different digital transmission techniques like ASK, PSK, FSK etc	

<h1>COURSE INFORMATION SHEET</h1>

Course Code	ITC 252
Course Title	**Web and Open Source Technologies (Practical)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	**50**
Course Prerequisites	Programming for Problem Solving
Course Objectives	To enable students to get practical knowledge about various web and open source technologies like HTML, JavaScript, PHP, etc.

List of Practical

1. Introduction to HTML and its structure

2. To study various text formatting tags and attributes in HTML

3. To study various types of linking of documents in HTML

4. To study image maps in HTML

5. To study frames in HTML

6. To study various types of lists in HTML

7. To study table tag and its attributes in HTML

8. To study HTML Form element and its methods and attributes

9. Introduction about stylesheets and its types along with implementation

10. To study dialog boxes in JavaScript

11. To study and implementation of cookies in JavaScript

12. Introduction to browser objects in JavaScript

13. Building of web forms using HTML elements, JavaScript and CSS

14. Introduction to PHP, its installation and configuration

15. To study data types, variables and operators in PHP

16. To study loops and control structures in PHP

17. To study arrays, its types and array sorting in PHP

18. To study file handling in PHP

19. To study working of cookies and sessions in PHP

20. To design and build web forms using HTML elements, JavaScript and CSS in PHP.

COURSE INFORMATION SHEET

Course Code	ASM 301
Course Title	**Linear Algebra and Probability Theory**
Type of Course	**BS**
L T P	**3 1 0**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	**Nil**
Course Objectives	I. To introduce the concept of Linear Equations and vector spaces. II. To introduces the use of Eigen vectors and linear transformations. III. To introduce random variables and Probability theory. IV. To introduce the use of 2-D random Variables.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the use of Linear algebra and linear transformations. II. Design solutions using matrices and Eigen Vectors. III. Apply probability theory in different Engineering problems. IV. Understand the use of random variables.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Systems of Linear equations Introduction, Linear equations, solutions, Linear equations in two unknowns, Systems of linear equations, equivalent systems, Elementary operations, Systems in Triangular and echelon form, Reduction Algorithm, Matrices, Row equivalence and elementary row operations, Systems of Linear equations and matrices, Homogeneous systems of Linear equations. (Scope as in Chapter 1, Sections 1.1-1.10 of Reference 1).	**(5)**
Vector Spaces Introduction, Vector spaces, examples of vector spaces, subspaces, Linear combinations, Linear spans, Linear dependence and Independence, Basis and Dimension, Linear equations and vector spaces. (Scope as in Chapter 5, Sections 5.1-5.8 of Reference1).	**(5)**

Eigen values and Eigenvectors, Diagonalization Introduction, Polynomials in matrices, Characteristic polynomial, Cayley-Hamilton theorem,Eigen-values and Eigen-vectors, computing Eigen-values and Eigen-vectors, Diagonalizing matrices. (Scope as in Chapter 8, Sections 8.1-8.5 of Reference 1).	**(4)**
Linear Transformations Introduction, Mappings, Linear mappings, Kernel and image of a linear mapping, Rank-Nullity theorem (without proof), singular and non-singular linear mappings, isomorphisms.(Scope as in Chapter 9, Sections 9.1-9.5 of Reference 1).	**(5)**
Matrices and Linear transformations Introduction, Matrix representation of a linear operator, Change of basis and Linear operators. (Scope as in Chapter 10, Sections 10.1-10.3 of Reference 1).	**(5)**
SECTION-B	
Probability Sample Space and Events, the Axioms of probability, some elementary theorems,Conditional probability, Baye's Theorem, Random Variables-Discrete and Continuous,Independent random variables, Expectation, Variance and Covariance, Means and variances of linear combinations of random variables, Chebyshev's inequality.	**(7)**
Probability Distributions Joint Probability distributions, Marginal and Conditional distributions, Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.	**(7)**
Two Dimensional Random Variables Joint distributions – Marginal and conditional distributions – Covariance – Correlation andRegression – function of a random variable-Transformation of random variables - Central limit theorem.	**(7)**

RECOMMENDED BOOKS

S. No	NAME	AUTHOR(S)	PUBLISHER
1	Shaum's Outline of Theory and Problems of Linear Algebra.	Seymour Lipschutz	McGraw- Hill
2	Linear Algebra.	VivekSahai, VikasBist	Narosa Publishing House
3	Introductory Probability and Statistical Applications.	P.L.Meyer	Addison-WesleyPublishing Company
4	Schaum's Outline Series of Theory And Problems Of Probability And Statistics.	Murray R. Spiegel	McGraw- Hill
5	Introduction to Probability and Statistics.	J. S. Milton and J.C. Arnold.	McGraw Hill
6	Probability and Statistics for Engineers.	R.A. Johnson and C.B. Gupta	Pearson Education
7	Fundamentals of Mathematical Statistics.	S. C. Gupta and V.K. Kapoor	Sultan Chand and Sons

COURSE INFORMATION SHEET

Course Code	PCIT 301
Course Title	Data Structures (Theory)
Type of Course	PC
L T P	3 1 3
Credits	4
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	I. To provide a knowledge regarding an efficient storage of data for an easy access. II. How to represent the inherent relationship of the data in the real world for efficient processing of data and management. III. To teach students various data structures and to explain the algorithms for performing various operations on these data structures. IV. To introduce the fundamentals of Data Structures, abstract concepts and how these concepts are useful in problem solving.
Course Outcomes	After completion of this course, the students will be able to: I. Understand and apply the concept of Dynamic memory management, data types, Big O notation. II. Determine the impact of data structures on the performance of program. III. Use appropriate data structures like arrays, linked list, stacks and queues to construct programs and solve real world problems efficiently. IV. Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications. V. Compare and contrast the benefits of dynamic and static data structures implementations. VI. Evaluate the computational efficiency of the principal algorithms for sorting, searching, and hashing.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction Introduction to data structures; Introduction to Algorithms Complexity. (01)	1,2,5
Arrays, Stacks & Queues Concepts; Basic operations & their algorithms: Transverse, Insert, Delete, Sorting of data in these data structures; Prefix, Infix, Postfix Notations. (08)	2,3
Lists Concepts of Link List and their representation; Two way lists; Circular link list; Basic operations & their algorithms: Transverse, Insert, Delete, Searching and Sorting of data in List; Storage Allocation & Garbage Collection; Linked stack and queues; Generalized List; sparse matrix representation using generalized list structure. (08)	2,3
SECTION-B	
Trees Binary Trees and their representation using arrays and linked lists; Trees and their applications; Binary tree transversal; Inserting, deleting and searching in binary trees; Heap & Heap Sort; General Trees; Thread binary tree; Height balance Tree (AVL); B-Tree. (08)	2,4
Graphs and their applications Graphs; Linked Representation of Graphs; Graph Traversal and spanning forests; Depth first search; Breadth first search. (08)	2,4
Sorting & Searching Insertion sort; Selection sort; Merging; Merge sort; Radix sort; Sequential & Binary Search; Indexed Search; Hashing schemes; Binary search Tree. (10)	2,6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT301.CO1	2	2	2	2	-	-	-	-	-	-	-	-	3	-
PCIT301.CO2	-	3	2	2	-	-	-	-	-	-	-	-	2	-
PCIT301.CO3	1	-	3	-	-	-	-	-	-	-	-	-	-	3
PCIT301.CO4	2	-	3	2	-	-	-	-	-	-	-	-	-	3
PCIT301.CO5	-	2	-	2	-	-	-	-	-	-	-	-	2	-
PCIT301.CO6	1	-	2	3	-	-	-	-	-	-	-	-	3	-

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Data Structure Using C and C++.	A. Tanenbaum, Y. Langsam, M. J. Augenstein.	Prentice Hall of India.
2	Theory and problems of Data Structures.	Seymour Lipschutz.	McGraw Hill.
3	Data Structures & Program Design.	Robert L. Kruse.	Prentice Hall of India.

<p style="text-align:center"><u>COURSE INFORMATION SHEET</u></p>

Course Code	PCIT 351
Course Title	Data Structures (Practical)
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	I. To provide knowledge about developing recursive as well as non-recursive algorithms and to gain the knowledge of different data structures. II. To be able to Choose the appropriate data structure and algorithm design method for a specified application and to develop skills to design and analyze simple linear and non linear data structures, III. To strengthen the ability to identify and apply the suitable data structure for the given real world problem and to gain knowledge in practical applications of data structures.

<p style="text-align:center">SYLLABUS</p>

List of Programs:

1. **Implementation of Array Operation:** Traversal, Insertion & Deletion at and from a given location; Sparse Matrices; Multiplication, addition.
2. **Stacks**: Implementation of Push, Pop; Conversion of Infix expression to Postfix, Evaluation of Postfix Expressions.
3. **Queues**: Adding, Deleting Elements; Circular Queue: Adding and deleting elements.
4. **Implementation of Linked Lists**: Inserting, deleting, and inverting a linked list. Implementation of stacks and queues using linked lists; Polynomial addition, Polynomial multiplication.
5. **Trees**: Implementation of Binary & Binary Search Trees, Recursive and Non-Recursive traversal of Tress.
6. **Graphs:** BFS & DFS
7. Implementation of sorting and searching algorithms.
8. **Hash Tables Implementation:** Searching, inserting and deleting, searching & sorting techniques.

COURSE INFORMATION SHEET

Course Code	ESC 301
Course Title	Digital Electronics (Theory)
Type of Course	ES
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Basic Information Theory and Communication.
Course Objectives	The objective of this course is that students are able to understand, analyze and design combinational and sequential circuits by applying the concepts of digital electronics.
Course Outcomes	After completion of this course, the students will be able to: I. Recall the basic concepts of logic variables, boolean algebra, logic gates, K-maps. II. Demonstrate the understanding of Number systems, logic gates, flip flops, multiplexers, counters. III. Apply the acquired knowledge to design combinational and sequential circuits. IV. Analyze and examine the data converters, digital logic families, memories employed in the digital circuits. V. Synthesis and construct digital circuits by employing logic gates, flip flops, data coverters, memories. VI. Evaluate and assess the digital circuits designed; and interpret the output.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction Representation of Logic, Logic Variables, Boolean Algebra, Boolean Expressions and minimization of Boolean expression using K-Map, Review of Logic Gates & Flip-flops, design & Implementation of Adder, Subtractor, Multiplexer, DeMultiplexer, Encoder, Decoder, ROM, Digital Comparators, Code Converters. **(10)**	1,2
Number Systems and Codes Decimal, Binary, Hexadecimal, Octal's complement, 2's complement, addition and subtraction, weighted binary codes, Error detecting codes, Error correcting codes, Alphanumeric codes. **(07)**	2
Counters & Shift Registers Ripple Counters, Design of Modulo-N ripple counter, Up-Down counter, design of synchronous counters with and without lockout conditions, design of shift registers with shift-left, shift-right & parallel load facilities, Universal shift Registers. **(07)**	3

SECTION-B	
Data Converters Sample & Hold switch, D/A converters: weighted type, R-2R Ladder type; A/D Converters: Counter-Ramp type, Dual Slope Type, Successive approximation type, flash type; Specifications of ADC & DAC. **(07**)	**5**
Digital Logic families Characteristics of digital circuits: fan in, fan-out, power dissipation, propagation delay, noise margin; Transistor-transistor Logic(TTL), TTL NAND Gate with active pull up, its input and output Characteristics, MOS and CMOS. Comparison of Characteristics of TTL, ECL, MOS & CMOS logic circuits. **(06)**	**4**
Semiconductor Memories & Programmable Logic ROM, PROM, EPROM, EEPROM; RAM: Static RAM, Memory Organization, Reading, & Writing Operation in RAM, PLA, PAL & FPGA. **(04)**	**4,5**
Synchronous sequential logic Sequential circuits, State Reduction and Assignment, Design Procedure. **(04)**	**3,6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ESC 301.CO1	3	1											1	
ESC 301.CO2		1											1	
ESC 301.CO3			3										3	
ESC 301.CO4				1										3
ESC 301.CO5			3											3
ESC 301.CO6				2										2

RECOMMENDED BOOKS

S. No	NAME	AUTHOR(S)	PUBLISHER
1	Digital Electronics – An introduction to theory and practice, 2nd Edition.	William H. Gothmann	Prentice Hall of India
2	Modern Digital Electronics.	R.P.Jain	Tata McGraw-Hill
3	Digital Integrated Electronics.	Herbert Taub& Donald Schilling	Tata McGraw-Hill
4	Integrated Electronics.	Millman&Halkias	Tata McGraw-Hill
5	Digital System Principles & Applications.	R J Tocci	Prentice Hall of India
6	Digital Logic Design.	Morris Mano	Pearson Education

COURSE INFORMATION SHEET

Course Code	ESC 351
Course Title	Digital Electronics (Practical)
Type of Course	ES
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Basic Information Theory and Communication.
Course Objectives	The aim of this course is to provide an understanding of the fundamentals of digital logic design to the students through practical training. The student is given hands-on-experience on the usage of ICs and design of circuits using gates, flip-flops, multiplexers so as to enhance the theoretical study of the subject.

SYLLABUS

List of Experiments:

- To verify truth tables of various gates: AND, OR, NOR, NAND, NOT and XOR using their respective ICs.
- To design and implement various gates using NAND as Universal Gate
- To design and implement various gates using NOR as Universal Gate
- To design and test the truth table of Half adder and Full adder.
- To design and test the truth table of Half Subtractor and Full Subtractor
- To design and test circuit which converts binary number to its gray code (and vice versa).
- To Verify the truth tables of various flip flops: RS, D, JK and T Flip Flops
- Design & implement circuits using Multiplexers.
- To verify the truth table of Multiplexers/ Demultiplexers using ICs.
- To Design & implementation of Asynchronous counter.
- To Design & implementation of synchronous counter.
- To Design and implement shift register.
- To design and implement circuit for given state diagram using various flip flops

Course Code	PCIT 302
Course Title	Computer Architecture & Organization (Theory)
Type of Course	PC
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Introduction to Information Technology, Basic Information Theory and Communication.
Course Objectives	I. Course Objectives: To understand and analyze the hardware design of various functional units in a computer system along with analysis of their interaction for data processing. II. To understand instruction set design, pipelining, architecture as well as different mechanisms used for read/ write operations in the memory design.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the basics of major components of a computer including accumulator, CPU, control unit. II. Analyze the concepts of instruction set and addressing modes. III. Understand & analyze the design methodology of computer system. IV. Understand and explain the organization of input output components of computer system. V. Explain and analyze the memory organization of computer system. VI. Understand the interconnection structure of multiprocessors.

SYLLABUS
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Design Methodology System design, Design levels- Gate level, Register level, Processor level. **(04)**	3
Basic Computer Organization & Design Instruction codes, common bus system, computer instruction, Design of basic computer, Design of accumulator logic. **(08)**	1,3
Control Design	1,3

Basic concepts, Hardwired control, Micro programmed control, Design of control unit. **(08)**	
Central Processing Unit Introduction, General reg. Organization, Inst. Formats Addressing modes, Data transfer & manipulation, RISC & CISC Characteristics. **(08)**	**2**
SECTION-B	
Input-Output Organization I/O interface, Modes of transfer, Priority interrupts, DMA, I/O processor. **(06)**	**4**
Memory Organization Memory hierarchy, Main memory, Auxiliary memory, Associative memory. Cache memory, virtual memory, Memory management H/W. **(06)**	**5**
Parallel Processing Introduction, Multiprocessors, Interconnection structure. **(05)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT302.CO1	2	2	-	-	-	2	2	-	2	-	1	2	2	1
PCIT302.CO2	2	2	-	-	-	2	2	-	2	-	1	2	2	1
PCIT302.CO3	2	2	-	-	-	2	2	-	1	-	1	2	3	2
PCIT302.CO4	2	2	-	-	-	2	1	-	1	-	1	2	2	2
PCIT302.CO5	2	2	-	-	-	2	2	-	1	-	1	2	2	1
PCIT302.CO6	2	2	-	-	-	2	2	-	2	-	1	2	2	1

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Architecture & Organization.	J.P Hayes	Tata McGraw Hill
2	Computer System Architecture.	Morris Mano	PHI
3	Advanced Computer Architecture.	Kai Hwang	Tata McGraw Hill
4	Computer Organization and. Architecture.	William Stallings	PHI

Course Code	PCIT 303
Course Title	Database Management Systems (Theory)
Type of Course	PC
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Introduction to Information Technology
Course Objectives	This course offers a good understanding of database systems concepts and prepares the student to be in a position to use and design databases for different applications. I. The objective of this course is to provide students with the background to design manipulate and manage databases. II. The students are exposed to the various forms, types and models of database systems to enable them to make suitable choices from alternatives. III. The concepts of managing data are thoroughly examined and students are taught implementation using SQL and PL/SQL.
Course Outcomes	After completion of this course, the students will be able to: I. Describe the basic concepts of a database management system and its components. II. Demonstrate understanding of the relational data model, entity-relationship model and process of relational database design. III. Design entity-relationship diagrams to represent simple database application scenarios IV. Apply the principles of good relational database design to design databases for real world applications. V. Explain the concept of a transaction and classify different techniques for concurrency control. VI. Construct simple and moderately advanced database queries using Structured Query Language (SQL) and Procedural SQL (PL/SQL).

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt

at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to Database Systems File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence. **(06)**	1
Physical Data Organization File Organization and Indexing, Index Data Structures, Hashing, B-trees, Clustered Index, Sparse Index, Dense Index, Fixed length and Variable Length Records. **(07)**	1
Data Models Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models. **(05)**	2,3
The Relational Model Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data. **(05)**	2,3
SECTION-B	
SQL Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Cursors, Dynamic SQL, Integrity Constraints in SQL, Triggers and Active Database, Relational Completeness, Basic Query Optimization Strategies, Algebraic Manipulation and Equivalences. **(07)**	4
Database Design Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms, Domain Key Normal Forms, Decompositions. **(08)**	5
Transaction Management ACID Properties, Serializability, Two-phase Commit Protocol, Concurrency Control, Lock Management, Lost Update Problem, Inconsistent Read Problem, Read-Write Locks, Deadlocks Handling, 2PL protocol. **(07)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT 303.CO1	2	-	-	1	2	1	1	1	-	-	-	1	3	1
PCIT 303.CO2	2	-	-	2	2	-	-	1	-	1	-	1	3	1
PCIT 303.CO3	3	3	3	1	2	1	-	-	1	3	1	1	1	3
PCIT 303.CO4	3	3	3	1	2	1	-	-	1	3	1	1	1	3
PCIT 303.CO5	2	-	-	2	1	1	-	-	-	1	-	1	3	1
PCIT 303.CO6	2	2	2	-	3	-	-	-	-	-	2	1	1	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	An Introduction to Database Systems, 8th Edition	C.J. Date	Pearson
2	Schaum's Outlines Fundamentals of Relational Databases, 3rd Edition	Toledo	Tata McGraw Hill
3	Database Management Systems, 2nd Edition	James Martin	PHI
4	Data Base Management Systems, 3rd Edition	Raghu Ramakrishnan and Johannes Gehrke	McGraw Hill
5	Introduction to Data Base Systems, 3rd Edition	Bipin C Desai	Galgotia Publications

COURSE INFORMATION SHEET

Course Code	PCIT 353
Course Title	Database Management Systems (Practical)
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	00 50
Course Prerequisites	Introduction to Information Technology
Course Objectives	1. To use the Oracle and SQL database systems along with hands on experience on DDL, DML as well as DCL Commands. 2. To make students able to implement nested queries and various functions based on programming assignments.

SYLLABUS

List of Practicals:

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
4. Set Operators, Nested Queries, Joins, Sequences.
5. Views, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
7. Stored Procedures and Exception Handling.
8. Triggers and Cursor Management in PL/S.

Course Code	**HSMC-401a**
Course Title	**Economics (Theory)**
Type of Course	HS
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	**Nil**
Course Objectives	I. To make students understand how society manages its scarce resources for achieving maximum satisfaction. II. To make students learn about economic aspects related to a consumer, firm, market and economy.
Course Outcomes	After completion of this course, the students will be able to: I. Apply engineering knowledge to maximize profit, satisfaction and welfare. II. Identify the forces that affect the economy. III. Learn entrepreneurial skills and analyze the concepts of demand and supply. IV. Develop analytical skills in students to understand different markets.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section t B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Introduction to Economics Nature of Economics, Economic Thoughts, Economic Activities, Relationship of Economics with other Social Sciences and Engineering.	**(06)**
Theory of Consumer Behaviour Demand: Types, Law of Demand, Determinants of Demand and Change in Demand Elasticity of Demand: Nature, Degrees, Types, Measurement and Factors Affecting Elasticity of Demand and its Application. Laws of Consumption: Concept and Applicability of Law of Diminishing Marginal Utility and Law of Equi-Marginal Utility.	**(12)**
Theory of Production and Cost	**(06)**

Cost: Types of Costs, Production: Law of Variable Proportion, Returns to Factor and Returns to Scale, Economies and Diseconomies of Scale.	

SECTION-B

Theory of Market Nature and Relevance of Perfect Competition, Monopoly and Monopolistic Competition.	**(08)**
Basic Concepts of Macro Economics National Income: Concept and Measurement, Determination of Equilibrium of Income Inflation: Concept, Causes and Effect of Inflation, Measures to Control Inflation.	**(09)**
Project Presentations	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Modern Economics	H. L. Ahuja	S. Chand & Co. Ltd
2	Economics For Engineers	M.L. Gupta. & S.P. Gupta	ESS PEE Publications
3	Business Economics	H.L. Ahuja	S. Chand & Co. Ltd
4	Macro Economic Theory	M.L. Jhingan	Konark Publisher Pvt. Ltd
5	Principles of Microeconomics	J. Stiglitz& Carl E Walsh	W.W. Norton & Company
6	Principles of Economics	Mankiw N Gregory	Cengage Learning
7	Course in Micro Economics Theory	A. Kreps	Prentice Hall
8	Economics	Samuelson A. Paul &Nordhaus D William	Tata McGraw Hill
9	Microeconomics	H. Gravelle& R. Reiss	Pearson Education
10	Macro Economics: Theory and Practice	H. L. Ahuja	S. Chand & Co. Ltd.
11	Economics for engineers	T.R Jain, M.L Grover & V.K Ohei	V.K Publications

COURSE INFORMATION SHEET

Course Code	**HSMC-401b**
Course Title	**Introduction to Psychology (Theory)**
Type of Course	**HS**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	**Nil**
Course Objectives	I. To provide knowledge and understanding about important concepts in Psychology. II. To make students learn the application of principles of psychology in working life.
Course Outcomes	After completion of this course, the students will be able to: I. Learn the causes and dynamics of human behavior. II. Apply psychological principles to enhance their personal and professional life. III. Develop leadership and managerial qualities into the students. IV. Understand the importance of work life balance and workplace spirituality.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	**Hours**
Understanding Human Behaviour: Definition, methods, branches and application of psychology for engineers	**(05)**
Measuring Human abilities Intelligence, theories and assessment	**(06)**
The individual working life Personality, approaches and trait theories	**(06)**

Psychological problems of everyday life Stress and coping	**(06)**
SECTION-B	
Work and mental health, workplace spirituality	**(05)**
Motivation the concept and theoretical framework, motivating people at work	**(05)**
Group dynamics, Intergroup relations, conflict and negotiation	**(07)**
Leadership and Management	**(05)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	G.E. Psychology 2007 Edition	Ciccarelli, S.K., & Meyer	Pearson
2	OrganisationalBehaviour 2010 Edition	M. Parikh & R. Gupta	Tata McGraw Hill Education
3	Introduction to Psychology 1986 Edition	C.T. Morgan, R.A. King, J.R.Weiss& J. Schopler	McGraw-Hill
4	Organizational Behavior 2003 Edition	S.P. Robbins	Prentice Hall of India
5	Organizational Behavior 2010 Edition	F. Luthans	McGraw Hill

COURSE INFORMATION SHEET

Course Code	HSMC-401c
Course Title	Sociology (Theory)
Type of Course	HS
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Nil
Course Objectives	I. To make the students understand the role of theory in social sciences. II. To explain students how social problems interact and react with the larger society. III. To make students learn whether the problem is evaluated on the macro or micro perspective and their cause and effect patterns.
Course Outcomes	After completion of this course, the students will be able to: I. Identify the function and application of sociology theory in social sciences. II. Understand how social class affects III. individual life chances. IV. Learn about social structure and how it shapes and influences social interactions. V. Appraise about social problems and how to deal with the same.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Sociology – The Discipline Sociology as a Science, Impact of Industrial and French Revolution on the Emergence of Sociology, Relevance of Sociology for Engineering	(03)
Basic Concepts Society, Association, Institution, Culture Relativism, Social Structure, Social System, Socialisation, Competition, Conflict, Accommodation, Social Mobility	(04)
Pioneering Contributions to Sociology Seminal Views of Karl Marx, Emile Durkheim, Max Weber, AlwinToeffler	(04)
Evolution of Society	(05)

Primitive, Agrarian, Industrial and Post-Industrial, Features of Industrial and Post-Industrial Society, Impact of Automation and Industrialization on Society.	
Economy and Society Economic Systems of Simple and Complex Societies, Sociological Dimensions of Economic Life, Market (free) Economy and Controlled (planned) Economy.	**(05)**

SECTION-B

Industrial Sociology Nature and Scope of Industrial Sociology, Pre-Conditions and Consequences of Industrialization.	**(04)**
Science and Technology Ethos of Science and Social Responsibility of Science.	**(04)**
Social Change Theories of Change, Factors of Change, Directed Social Change, Social Policy and Social Development, Social Cost Benefit Analysis, Role of Engineers in Development.	**(05)**
Understanding Indian Society Traditional Hindu Social Organization, Caste System, Agrarian Society in India, Social Consequences of Land Reforms and Green Revolution, Working of the Democratic Political System in a Traditional Society, Problem of Education in India, Gender Discrimination, Economic Reforms: Liberalization, Privatization and Globalization, Strategies for Development in India.	**(07)**
Social Problems AIDS, Alcoholism, Drug Addiction, Corruption.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Sociology	RanjayVardhan and s. Kapila	New Academic Publishing
2	Sociology: Themes and Perspective	M. Haralambos	Collins Educational Publications
3	Sociology of Indian Society	C.N. Rao Shankar	Sultan Chand and Co.
4	Introduction to Sociology	VidyaBhushan and D.R. Sachdeva	KitabMahal Publications
5	Sociological Thought	Francis Abraham and J.H. Morgan	Macmillan India Ltd.
6	Social Problems	EtzioniAmitai	Prentice Hall
7	Industrial Sociology	Scheneider	Tata McGraw Hill
8	Society in India	David Mandilbaum	Popular Publications
9	Sociology	L. Broom , P. Selznick and D. Dorrock	Harper International Publishing House

COURSE INFORMATION SHEET

Course Code	**HSMC-401d**
Course Title	**Russian Language**
Type of Course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional, Assignments, Quiz)	**50**
Course Prerequisites	**Nil**
Course Objectives	The main objective of the course is to create and develop the students' practical Russian language skills (speaking, listening, reading and writing).
Course Outcome	After completion of this course, the students will be able to: 1. Read Russian Language. 2. Speak in Russian language. 3. Write in Russian Language.

SYLLABUS

Note: The Semester question paper of a subject be of 50 Marks having 7 questions of equal marks. First question, covering the whole syllabus and having questions of conceptual nature, be compulsory. Rest of the paper will be divided into two sections having three questions each and the candidate is required to attempt at least two questions from each section.

Section-A	Hours
The Russian Alphabet, consonants, vowel, words, stress, sentence patterns.	**(04)**
Grammar: Noun, gender, personal pronoun, the conjunction conjugation of verbs, number (singular-plural), possessive pronoun, adverbs, translation (Russian to English & vice-versa)	**(05)**
Section-B	
Irregular plurals, Imperative mood, demonstrative pronoun, declaration of noun (nominative case, prepositioned case, the past tense, reflexive verbs, adjectives. Translation (Russian in to English & Vice-versa.)	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	"Russian"	Wagner (Section-A-Lesson 1 to n10 and Section-B Lesson 11 to 15)	

Course Code	ASM-401
Course Title	Discrete Structures (Theory)
Type of Course	BS
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Nil
Course Objectives	I. To get familiar and understand the fundamental notions in discrete mathematics. II. To introduce the knowledge of core mathematical foundation of computer science. III. Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups. IV. Be aware of the counting principles. V. To introduce the basic properties of graphs and trees and model simple applications.
Course Outcomes	After completion of this course, the students will be able to: I. Get familiar and understand the fundamental notions in discrete mathematics. II. Acquire the knowledge of core mathematical foundation of computer science. III. Aware of the counting principles, basic properties of graph, trees and model simple applications. IV. Exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Sets, Relations and Functions Definition of sets, product sets and sectionitions, Relations and digraphs, matrix of a relation, paths in relations and digraphs, equivalence relations and sectionitions, operations on relations, transitive closure and warshall's algorithm.(Scope as in	**(14)**

Chapter 4, Sections 4.1 – 4.7 of Reference 2). Functions, One-to-one and onto functions, Special functions. The pigeon hole principle. Function composition and inverse functions (Scope as in Chapter 5, Sections 5.1 – 5.6 of Reference 1). Sectionially ordered sets; Extremal elements of Sectionially ordered sets, Lattices, Linearly ordered sets. (Scope as in Chapter 6, Sections 6.1 – 6.3 of Reference 1).	
Fundamentals of Logic Basic connectives and truth tables, Logical equivalence, The laws of logic, Logical implication, Rules of Inference, Use of Quantifiers, Definitions and Proofs of Theorems (Scope as in Chapter 2, Sections 2.1 – 2.5 of Reference 1).	**(8)**
SECTION-B	
Principles of Counting Rule of Sum and Product, Permutations, Combinations, Combinations with repetition (Scope as in Chapter 1, Sections 1.1 – 1.4 of Reference 1). The principle of Inclusion and Exclusion, Generalizations, Derangements (Scope as in Chapter 8, Sections 8.1 – 8.3 of Reference 1). Generating Functions: Definitions and Examples: Calculation Techniques, Sectionitions of Integers, The exponential generating function, The summation operator (Scope as in Chapter 9, Sections 9.1 – 9.5 of Reference 1). Recurrence relations: The first order linear recurrence relation, The second order linear homogeneous recurrence relation with constant coefficients, The non homogeneous recurrence relation, The method of generating functions (Scope as in Chapter 10, Sections 10.1 – 10.4 of Reference 1).	**(9)**
Graph Theory Definitions and examples, Subgraphs, Complements and Graph Isomorphism, Vertex degree: Euler trails and circuits, Planar Graphs, Hamilton Paths and Cycles, Graph colouring and Chromatic polynomials (Scope as in Chapter 11, Sections 11.1 – 11.6 of Reference 1).	**(5)**
Groups Theory Definition and elementary properties of groups, subgroups, Homomorphism, Isomorphism and Cyclic groups, Cosets and Lagrange's Theorem (Scope as in Chapter 16, Sections 16.1 – 16.3 of Reference 1). Introduction to Rings and Fields (definitions, examples and basic properties) (Scope as in Chapter 14, Sections 14.1-14.2 of Reference 1).	**(9)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Discrete and Combinatorial Mathematics	Ralph P. Grimaldi	Pearson Education, 4th Edition
2	Discrete Mathematical Structures	B. Kolman, R. C. Busby and S. C. Ross	Pearson Education, 5th Edition
3	Elements of Discrete Mathematics	C.L.Liu, D P Mohapatra	Tata McGraw Hill
4	Discrete Mathematics for Computer Scientists and Mathematicians	J. L. Mott, A. Kandel, T. P. Baker.	Prentice-Hall of India, 2nd Edition
5	Discrete Mathematics and applications	K.H.Rosen	Tata McGraw Hill
6	Discrete Mathematics	S. Lipschutz, M. Lipson	Schaum's Outlines, Tata McGraw-Hill, 2nd Edition

COURSE INFORMATION SHEET

Course Code	PCIT 401
Course Title	Microprocessor & Assembly Language Programming (Theory)
Type of Course	PC
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Basic Information Theory and Communication, Computer Architecture and Organization.
Course Objectives	To understand and apply the concepts of 8085 Microprocessor so as to prepare the graduates to write assembly language programs for solving various problems.
Course Outcomes	After completion of this course, the students will be able to: I. Recall the concepts of number system, digital circuits, data buses, memory, registers, ports. II. Understand the architecture of 8085 and its interfacing with Memory and peripheral I/O devices. III. Apply the concepts of microprocessor to write assembly language programs using 8085 programming instructions. IV. Analyze the problems, time delays caused and breakdown the problem into subroutines. V. Synthesis and develop solution in assembly language by employing the concepts of stacks, subroutines, interrupts and various Programmable Peripheral devices. VI. Evaluate and assess the output of assembly language program.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Microprocessor Architecture and Microcomputer Systems Microprocessor Architecture, The 8085 MPU: Block Diagram, Pin Diagram, Address/Data Buses, Concept of de-multiplexing of Buses, Control and status signals, Registers, Ports, Flags, Instruction Decoding and Execution, memory Interfacing. **(06)**	**1,2**

Interfacing I/O Devices Basic Interfacing Concepts, Interfacing Output Displays, Interfacing Input Devices, Memory-Mapped I/O. **(06)**	**2**
Programming the 8085 Introduction to 8085 Assembly Language Programming, The 8085 Programming Model, Instruction Classification, Instruction Format. Data Transfer (Copy) Operations, Arithmetic Operations, Logic Operations, Branch Operations, Writing Assembly Language Programs. **(07)**	**3,6**
Programming Techniques with Additional Instructions Programming Techniques Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations. **(6)**	**3,6**
SECTION-B	
Counters and Time Delays Counters and Time Delays, Hexadecimal Counter, Modulo Ten, Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs. **(06)**	**4,6**
Stack and Subroutines Stack, Subroutine, Conditional Call and Return Instructions. **(04)**	**5**
Interrupts The 8085 Interrupt, 8085 Vectored interrupts. **(03)**	**5**
General –Purpose Programmable Peripheral Devices Block Diagram, Working and Control word of: The 8255A Programmable Peripheral Interface, The 8259 A Programmable Interrupt Controller, Programmable communications interface 8251. **(07)**	**5**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT401.CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	-
PCIT401.CO2	-	2	-	-	-	-	-	-	-	-	-	-	2	-
PCIT401.CO3	-	3	-	-	-	-	-	-	-	-	-	-	2	-
PCIT401.CO4	-	3	-	-	-	-	-	-	-	-	-	-	2	-
PCIT401.CO5	-	-	3	-	-	-	-	-	-	-	-	-	-	3
PCIT401.CO6	-	-	-	2	2	-	-	-	-	-	-	-	-	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S.Gaonkar	PHI
2	Advanced Microprocessors & Interfacing	Badri Ram	Tata McGraw Hill
3	Microprocessor Principles and Applications	Charles M.Gilmore	Tata McGraw Hill
4	Microprocessors and Interfacing programming and Hardware	Douglas V. Hall	Tata McGraw Hill

<p style="text-align: center;">**COURSE INFORMATION SHEET**</p>

Course Code	**PCIT 451**
Course Title	**Microprocessor & Assembly Language Programming (Practical)**
Type of Course	Core
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Basic Information Theory and Communication, Computer Architecture and Organization.
Course Objectives	To develop, key-in, test and troubleshoot the assembly language program and machine level program on 8085 kits.

<p style="text-align: center;">**SYLLABUS**</p>

- Familiarization of 8085 kits.

- Application of assembly language using 8085 instructions set to develop various programs.

Course Code	PCIT 402
Course Title	Computer Networks (Theory)
Type of Course	PC
L T P	3 1 2
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Introduction to Information Technology, Basic Information Theory and Communication**.**
Course Objectives	This course is to provide students with an overview of the concepts of data communication and computer networks. The main course objectives are: I. To Familiarize with the basic taxonomy,terminology and functioning of computer networks. II. Building an understanding of various existing protocols and functions of layer
Course Outcomes	After completion of this course, the students will be able to: I. To understand the basic concepts of computer network including various reference models and protocols. II. To familiarize with various transmission media used in computer networks. III. To recognize the concept of different techniques of flow control and error control during data transmission and illustrate various protocols of data link layer and MAC sub-layer. IV. To learn the basic functions of network layer and apply the concepts of routing and IP addressing to solve problems. V. To recognize the various functions of transport layer compare and contrast the data link layer and transport layer. VI. To understand the concepts of various protocols of application layer

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Introduction Basic concepts of computer networks,; Network Hardware: LAN, MAN, WAN, Wireless networks, Internet; Network Software: Layer, Protocols, interfaces and services; Reference Model: OSI/TCP/IP and their comparison. **(08)**	1
Physical Layer Multiplexing, Line coding techniques, Transmission media: Magnetic, Twisted pair, coaxial cable, fiber optics, wireless transmission (radio, microwave, infrared, light wave). Switching: Circuit Switching & Packet Switching. Cellular radio and communication satellites. **(08)**	2
Data Link Layer Framing, Error control: Error correction & Detection, sliding window protocols (one bit, Go back n, selective repeat), Medium Access Sub layer: Channel Allocation, MAC protocols -ALOHA, CSMA protocols, Collision free protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison. **(09)**	3
SECTION-B	
Network Layer Design issues, routing algorithms (shortest path, flooding, flow based, distance vector, hierarchical, broadcast, multicast).Congestion control algorithms (Leaky bucket, Token bucket, Choke, Packet, Load shedding), IPV4, IP addressing, IPV6. **(09)**	4
Transport Layer Addressing, establishing and releasing connection, flow control & buffering, multiplexing, crash recovery, Internet Transport protocol (TCP and UDP). **(06)**	5
Application Layer Network Security; Domain Name System; Simple Network Management Protocol; Electronic Mail. **(05)**	6

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
PCIT 402 .CO1	-	-	-	1	1	-	-	-	2	-	-	2	-	-
PCIT 402.CO2	1	-	-	1	-	2	-	1	2	-	2	3	-	-
PCIT 402.CO3	1	2	1	-	1	-	-	-	-	-	2	2	-	2
PCIT 402.CO4	1	2	1	-	3	2	-	2	3	-	2	2	3	-
PCIT 402.CO5	-	1	-	-	1	-	-	2	-	-	2	2	-	-
PCIT 402.CO.6	-		1	-	2	3	1	2	3	-	2	3	-	-

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Networks, 4th Edition	Andrew S. Tanenbaum	Prentice Hall of India
2	Data and Computer Communications	William Stallings	Prentice Hall of India
3	Data Communication and Networking	Behrouz A Forouzan	Tata McGraw Hill
4	Design & Analysis of Computer Communication Networks	Vijay Ahuja	McGraw Hill
5	Data Communications and Networks	Douglas E. Coomer	Prentice Hall of India

COURSE INFORMATION SHEET

Course Code	**PCIT 452**
Course Title	**Computer Networks(Practical)**
Type of Course	**PC**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Introduction to Information Technology, Basic Information Theory and Communication.
Course Objectives	This course is to provide students with an overview of the concepts of data communication and computer networks. The main course objectives are: 1. Familiarize the student with the basic taxonomy, terminology and functioning of computer networks. 2. Building an understanding of various existing protocols for data communication in computer networks.

SYLLABUS

1.To Study different type of network cables.
2.To implement the cross-wired cable and straigt cable using clamping tool.
3.To study various network devices in detail.
4.To study IP address subnetting.
5.To connect the computers in LAN.
6.To Study basic network command and networks communication commands.
7.To configure a network topology.
8.Cisco packet tracer can be used to configure networks.

Course Code	PCIT 403
Course Title	Operating System (Theory)
Type of Course	PC
L T P	3 1 3
Credits	04
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Introduction to Information Technology
Course Objectives	I. To study and understand main components of operating system, their working, and operations performed by operating system. II. To provide students knowledge on: resource management provided by operating systems, concepts and theories of operating systems, implementation issues of operating systems. III. To be able to understand description of multiprocessor and distributed operating system and different operating system and compare their features.
Course Outcomes	After completion of this course, the students will be able to: I. Describe the important computer system resources and role of operating system in their management policies and algorithms. II. Understand the process management policies and scheduling of processes by CPU and Evaluate the requirement for process synchronization and coordination handled by operating system. III. Describe and analyse the memory management and its allocation policies. IV. Identify use and evaluate the storage management policies with respect to different storage management technologies. V. Analyse and Identify the need to create the special purpose operating system and services provided by Distributed operating system. VI. Compare and contrast the services provided by UNIX operating system.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by

the question paper.

SECTION-A	CO(s)
Basic Functions and Concepts of Operating Systems Concept of an operating systems, batch system, Multi-programmed, Time sharing, Personal Computer System, Parallel system, Real time system, General system Architecture. **(05)**	1
Features and Objectives of Operating Systems System components, operating system services, System calls, System Programs, System Structure, System design and implementation. Concept of process, process states, process state transition, process control block, operations of processes, concurrent processes, deadlocks, scheduling algorithms, scheduling criteria, Process Synchronization. **(11)**	2
Memory Management Logical and physical address space, storage allocation and management techniques, swapping, concepts of multi programming, paging, segmentation, virtual storage management strategies, Demand Paging, Page Replacement Algorithms, and Thrashing. **(06)**	3
SECTION-B	
Information Management File concept, Access method, Directory structure, Protection File system structure, Allocation methods, Free space management, Directory implementation, Disk structure, Disk Scheduling, Disk management, Swap space management. **(06)**	4
Distributed-System Structures Network operating system, Distributed operating systems, Remote services, Robustness, Design Issues. **(06)**	5
Distributed file systems and Distributed Coordination Naming and Transparency, Remote file Access, Stateful versus stateless service, File replication, Event ordering, Mutual Exclusion, Atomicity, Concurrency control, Deadlock Handling, Election Algorithms, Reaching Agreement. **(06)**	5
Case Studies: Unix O.S. Architecture, Operating system services, user perspective, representation of files in Unix system processes and their structure, Input-output system, Memory management, Unix shell, history and evolution of Unix system. **(05)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
IT403.CO1	1	3	2	-	-	-	-	-	-	-	-	2	2	3
IT403.CO2	1	3	-	-	-	-	2	-	-	-	-	2	2	3
IT403.CO3	1	3	3	-	-	-	-	-	-	-	-	2	2	3
IT403.CO4	1	-	-	-	2	-	-	-	-	-	-	2	2	3
IT403.CO5	1	3	3	-	2	-	-	-	-	-	-	2	2	3
IT403.CO6	-	-	-	3	-	-	-	-	-	-	-	2	2	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Operating Systems, 5th Edition	Galvin & Silberschatz	Addison Wesley Publishing Ltd
2	An Introduction to Operating System, 3rd Edition	Harvey M. Deitel	Narosa Publishing House
3	Operating Systems: Design and implementation, 3rd Edition	Andrew S. Tanenbaum	PHI
4	Operating system, 5th Edition	Millan Milankovic	McGraw Hill

COURSE INFORMATION SHEET

Course Code	**PCIT 453**
Course Title	**Operating System (Practical)**
Type of Course	**PC**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Programming Fundamental. Object Oriented Programming using C++
Course Objectives	I. To teach students about various operating systems including Windows, and UNIX. II. To be able to students learn about systems configuration and administration. Students learn, explore and practice technologies related to UNIX.

SYLLABUS

List of Practicals:

1. Implement various CPU scheduling algorithms.
2. Write program to implement banker's algorithm for deadlock prevention.
3. Write programs to implement Page replacement algorithms.
4. Write an algorithm and program to implement Disc scheduling.
5. Installation of the Linux operating system
6. Using basic commands-man, who, more, pipe, finger, cat, redirect, ls, cp, mv, rm.Working with directory and plain files-pwd, cd, mkdir, rmdir, lp, wc, date, cal, sort, diff, uniq and grep commands.
7. Using miscellaneous commands-head, tail, cut, copy, paste, spell, find and bc.
8. Working with shell scripts under Korn Shell and using shell variables, print, chmod and calendar commands.
9. Using quotes, relational operators, command substitution, arithmetic functions, shell control statements such as for-in, if-then-elseif-else, while,case,date and script.
10. Working under the Bourne shell-shell scripts, control statements such as test, for, for in, if-then-else-fi, -if-then-elif-fi, while,until, case, relational operators and expressions.

SYLLABUS FOR B.E. (I.T.) FIFTH SEMESTER

COURSE INFORMATION SHEET

Course Code	PCIT501
Course Title	**Network Security and Cryptography (Theory)**
Type of Course	PC
L T P	3 1 2
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Computer Networks.
Course Objectives	I. To understand and apply the principles of encryption algorithms, conventional and public key cryptography. II. To gain knowledge about authentication, hash functions and application level security mechanisms.
Course Outcomes	After completion of this course, the students will be able to: I. To perform analysis of real time systems for identifying security threats. II. To understand and compare public and private cryptographic algorithms and make use of the same for encryption and decryption of messages. III. To describe key management protocols and design confidential systems with minimum possible threats. IV. To understand hash algorithms and apply both cryptography and hashing to create digital signatures and certificates for achieving integrity. V. To understand application of cryptosystems in design of Kerberos, IPSec, AH, and ESP protocols. VI. To understand and compare https vs SET protocols and Firewall Vs Virtual Private Network .

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Basic Encryption and Decryption Threats and Types of attacks, Challenges for Information Security, Classical Cryptographic Algorithms: Monoalphabetic Substitutions such as Caesar Cipher, Cryptanalysis of Monoalphabetic ciphers; Polyalphabetic Ciphers such as Vigenere, Vernam Cipher; Transposition Cipher. **(06)**	**1,2**
Stream and Block Ciphers Rotor Based System and Shift Register Based System. Block cipher: principles, modes of operations. Data Encryption Standard (DES), Analyzing and Strengthening of DES, Introduction to Advance Encryption Standard (AES). **(07)**	**2**
Number Theory and Basic Algebra Modular Arithmetic, Euclidean algorithm, Random number generation. **(04)**	**2**
Key Management Protocols: Solving Key Distribution Problem, Diffie-Hellman Algorithm, Key Exchange with Public Key Cryptography. **(05)**	**3**
SECTION-B	
Public Key Encryption Systems Concept and Characteristics of Public Key Encryption system, Rivets-Shamir-Adleman (RSA) Encryption, Digital Signature Algorithms and authentication protocols, Digital Signature Standard (DSA). **(06)**	**2,4**
Hash Algorithms Hash concept, description of Hash Algorithms, Message Digest Algorithms such as MD4 and MD5, Secure Hash Algorithms such as SH1 and SHA2. **(05)**	**4**
Network Security Kerberos, IP security: Architecture, Authentication Header, Encapsulating Security Payload. **(04)**	**2,5**
Web Security Web security consideration, Secure Socket Layer Protocol, Transport Layer Security, Secure Electronic Transaction Protocol. **(04)**	**6**
Firewalls Firewall Design principles, Trusted Systems, Virtual Private Networks. **(04)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
IT501.CO1	2	3	-	-	-	2	-	-	-	-	-	-	2	-
IT501.CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	1
IT501.CO3	-	-	3	-	-	-	-	-	-	-	-	-	2	2
IT501.CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	1
IT501.CO5	-	-	3	-	-	1	1	-	-	-	-	-	3	3
IT601.CO6	-	-	3	-	-	1	1	-	-	-	-	-	3	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Principles of Cryptography, 4th Edition	William Stallings	Pearson Education
2	Security in Computing, 2nd Edition	Charles P.Pfleeger	Prentice Hall International
3	Cryptography & Network Security, 2nd Edition	Atul Kahate	TMH
4	Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition	Bruce Schneier	John Wiley and Sons
5	Firewalls and Internet Security, 2nd Edition	Bill Cheswick and Steve Bellovin	Addison-Wesley
6	Security Technologies for the world wide web, 2nd Edition	Rolf Oppliger	Artech House, Inc

COURSE INFORMATION SHEET

Course Code	**PCIT551**
Course Title	**Network Security and Cryptography (Practical)**
Type of Course	**PC**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Computer Networks
Course Objectives	
SYLLABUS **Practical based on theory**	

COURSE INFORMATION SHEET

Course Code	**PCIT 502**
Course Title	**Design and Analysis of Algorithms(Theory)**
Type of Course	**PC**
L T P	**3 1 2**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Prerequisites	Programming for problem solving, Data Structures.
Course Objectives	The objective of the course is to develop an understanding about basic algorithms and different problem solving strategies. It aims to improve creativeness and the confidence to solve non-conventional problems and expertise for analyzing existing solutions. The course covers asymptotic analysis and algorithm design strategies that can be applied on different problem domains.
Course Outcomes	After completion of this course, the students will be able to: I. Analyze a given algorithm and express its time and space complexities in asymptotic notations. II. Learn to solve recurrence relations and apply it to determine the computational complexity of recursive algorithms. III. Understand and compare various algorithm design strategies in order to learn their application in problem solving for developing efficient algorithms. IV. Illustrate the working of various sorting & searching methods and compare their computational complexities. V. To examine advanced tree & graph based computational problems and learn algorithm design strategies to solve them. VI. Learn P and NP class of problems .

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	**CO(s)**
Analysis of algorithm Role of Algorithms in Computing; Growth of functions: Asymptotic Notation, Performance measurements Introduction to Recurrences: substitution method, recursion-tree method, master method; Randomized Algorithms. **(09)**	**1,2**
Divide and Conquer Method	**2,4**

General Method, Binary Search, Matrix Multiplication, Merge Sort, Quick Sort and their performance analysis. **(07)**	
Greedy Approach Elements of Greedy strategy, Knapsack problem, Single source Shortest paths problem, Minimum Spanning tree problem and analysis of these problems. **(07)**	3,5

SECTION-B	
Dynamic Programming General Method, Multistage Graph , All Pairs Shortest Path Algorithm , 0/1 Knapsack Problem, Traveling Salesman Problem. **(09)**	3,5
Backtracking The General Method , 8-Queens Problem- Sum of Subsets ,Knapsack. **(07)**	3
P and NP Problems Nondeterministic Algorithms, NP Hard and NP complete problems, Reducibility and NP completeness. **(06)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT 502.CO1	2	2	2	2	2	1	2	-	-	-	-	3	3	2
PCIT 502.CO2	2	2	3	2	2	2	2	-	-	-	-	1	3	3
PCIT 502.CO3	2	2	3	1	1	2	2	1	-	-	-	2	2	3
PCIT 502.CO4	2	2	2	2	2	2	2	-	-	-	-	1	3	3
PCIT 502.CO5	2	2	2	2	2	2	3	-	-	-	-	2	3	3
PCIT 502.CO6	2	2	3	1	1	1	2	-	-	-	-	3	3	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Fundamentals of Computer Algorithms	Ellis Horowitz, SartajSahni	Galgotia
2	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest	Prentice Hall
3	The Design and Analysis of Computer Algorithms	Aho A.V., Hopcroft J.E., Ullman J.D.	Pearson Education
4	Fundamentals of Algorithms	Gilles Brassard & Paul Bratley	Prentice Hall

COURSE INFORMATION SHEET

Course Code	PCIT 552
Course Title	Design and Analysis of Algorithms (Practical)
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming for problem solving, Data Structures.
Course Objectives	I. To understand and implement different algorithm design techniques. II. To design algorithms based on the strategies learned and apply the same to solve different problems.

SYLLABUS

Practical based on theory

COURSE INFORMATION SHEET

Course Code	PCIT 503
Course Title	Artificial Intelligence (Theory)
Type of Course	PC
L T P	4 0 3
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Data Structures, Discrete Structures
Course Objectives	To introduce the essential principles, ideas and techniques of Artificial Intelligence (AI), so that it can be used to solve real world problems.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the history of artificial intelligence (AI) and its foundations. II. Apply basic techniques of AI in applications that involves problem solving, reasoning, planning and learning. III. Explain the role of agents and how agents can act by establishing goals. IV. Acquire the knowledge of real world Knowledge representation. V. Analyze and design a real world problem and understand the dynamic behavior of a system. VI. Apply the knowledge representation for creating different applications which requires intelligent decision making.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction Artificial Intelligence and its applications, Foundations and history of Artificial Intelligence, Intelligent Agents, Nature and structure of Agents, Computer vision & NLP. **(06)**	**1,3,6**
Problem solving techniques State space search, control strategies, Types of problem, Problem characteristics, Uninformed search strategies: BFS, DFS and Iterative deepening DFS, Heuristic	**2**

Search strategies: Hill climbing, best first search, A* search, genetic algorithm, AO*Search, Game playing: Minimax algorithm & alpha-beta pruning. **(09)**	
Knowledge representation Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Propositional logic, First order logic, Inferences in FOL, Forward vs. Backward chaining, Weak and Strong slot-and-filler structures: semantic nets, frames, conceptual dependency, scripts. **(09)**	4,6
SECTION-B	
Probabilistic Reasoning Non-Monotonic Reasoning, Default Reasoning, Statistical Reasoning: Probability and Bayes' theorem, Certainty factors and Rule- based systems, Bayesian networks, Dempster-Shafer theory & Fuzzy logic. **(08)**	2
Planning The Planning problem, planning with state space search, sectionial order planning, planning graphs, planning with propositional logic, Hierarchical planning, conditional planning, Continuous and Multi Agent planning. **(08)**	2
Learning and Expert System Introduction of learning, Forms of learning, inductive learning, Learning Decision trees, Introduction of Expert System & its examples, Expert system Architecture and its shells. **(05)**	2,5

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT503.CO1	1	-	-	-	-	1	-	-	-	-	-	-	2	-
PCIT503.CO2	3	2	3	1	3	3	1	-	-	-	1	-	3	3
PCIT503.CO3	1	-	-	-	1	1	-	-	-	-	-	-	2	1
PCIT503.CO4	2	1	2	1	2	2	1	-	-	-	1	-	1	2
PCIT503.CO5	3	3	3	1	3	3	1	-	-	-	2	-	3	3
PCIT503.CO6	3	3	2	1	3	3	1	-	-	-	2	-	3	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	AI: A Modern Approach	Stuart J.Russel, Peter Norvig	Pearson Education, Latest Edition
2	Artificial Intelligence	Elaine Rich, Knight	McGraw Hill, 1993
3	Artificial Intelligence	Sectionick Henry Winston	Addison Wesley, Latest Edition
4	Artificial Intelligence	George Luger	Pearson Education, Latest Edition
5	Introduction to AI and Expert Systems	DAN, W. Patterson	PHI, latest Edition
6	Principles of AI	A.J. Nillson	Narosa publications, latest Edition

Course Code	PCIT 553
Course Title	Artificial Intelligence(Practical)
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Data Structures, Discrete Structures
Course Objectives	This course provides an introduction to the fundamentals of artificial intelligence. It contains a theory component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation.
SYLLABUS	

List of Practicals

1. WAP to implement water jug problem using breadth first search algorithm.
2. WAP to implement missionaries and cannibals problem using depth first search algorithm.
3. WAP to implement Tic-Tac-Toe game for two players, x(odd turn) and o(even turn) who take turn making the spaces in 3x3 grid(having numbers 1 to 9) but with fixed first position(1) for the first player-The player who succeeds in placing three respective marks in horizontal or vertical or diagonal wins the game and by storing 2 for blank, 3 for x and 5 for 0.
4. WAP to implement 8-queen problem by using A* as best first search algorithm.
5. WAP to implement 8-puzzle problem by using A* algorithm.
6. WAP to implement Tic-Tac-Toe game by using min-max algorithm.
7. WAP to implement block-world problem using steepest ascent hill climbing algorithm.
8. WAP to implement 8-puzzle problem by using iterative deepening Depth First Search algorithm.
9. WAP that demonstrate the working of alpha-beta pruning by taking an input array of elements

Professional Elective-I

COURSE INFORMATION SHEET

Course Code	**PEIT 501a**
Course Title	**Java programming/Technologies (Theory)**
Type of Course	**PE-I**
L T P	**3 0 3**
Credits	**3**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Programming for problem solving, Object Oriented Programming using C++.
Course Objectives	The objective of the course is to learn the object oriented concepts from the perspective of Java programming language and UML so as to apply the same to solve various engineering problems. This course covers a practical approach to object-oriented analysis, design and programming using UML and Java.

Course Outcomes	After completion of the course, students will be able to
	  I. To understand the use of OOPS concepts.
	  II. To solve real world problem using OOP techniques.
	  III. To understand the use of packages and interface in JAVA.
	  IV. To design graphical user interface using standard JAVA libraries for implementing event driven application.
	  V. To analyze enterprise components including enterprise Java beans (EJB) technology, servlets and JAVA Server pages (JSP) technology, JDBC.
	  VI. To design GUI based applications and develop applets for web applications.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Java Methods, Classes and Inheritance Introduction; classes; methods; constructors; overloading methods; arrays; recursion; passing arrays and objects to methods; Inheritance; method overriding; abstract classes; using final; packages; interfaces. **(8)**	1
Exceptional Handling and Multithreaded Programming Exception handling fundamentals; exception types; uncaught exceptions; try and catch; creating exception classes; throwing exceptions; Java thread model; thread priorities; creating a thread; interthread communication; thread synchronization; suspending, resuming and stopping threads. **(8)**	1,2
I/O, Applets and Graphics I/O basics; stream classes; byte and character streams; reading and writing files; Applet fundamentals; Applet class; Applet initialization and termination; event handling; keyboard and mouse events; AWT class; Layout managers; panels; canvases; Frame windows; drawing lines, rectangles, ellipses. **(8)**	6
SECTION-B	
Overview of J2EE and working with JDBC What is J2EE, component based architecture of J2EE: Web, Business and Application component, commonly used classes and interfaces of java.sql package, connecting java application to a database, prepared statements. **(7)**	3,4
Servlets and JSP Java Servlets, compilation, deployment, and testing a servlet, session management, request dispatching, Java Server Pages, deploying and testing a JSP, using java beans in JSP. **(7)**	3
Enterprise Java Beans(EJB) Architecture of EJB, creating a stateless-session EJB, statefull-session bean, Life Cycle of session beans, Entity beans, life cycle of entity beans. **(7)**	5

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 501a.CO1	1	1	-	-	-	-	-	-	-	-	3	-	-	1
PEIT 501a.CO2	3	1	2	-	1	1	-	-	-	-	-	-	-	2
PEIT 501a.CO3	1	3	1	-	-	-	-	-	-	-	-	-	2	1
PEIT 501a CO4	2	-	3	1	-	1	-	-	1	-	1	-	1	3
PEIT 501a.CO5	2	3	-	-	-	3	-	1	-	-	-	-	1	-
PEIT 501a CO6	1	1	3	-	-	-	-	-	-	-	-	1	1	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Java: How to Program, 6th Edition	Deitel and Deitel	Pearson Education
2	The Complete Reference Java2	Herbert Schildt	TMH
3	J2EE: The Complete Reference	James Edward Keogh, Jim Keogh	McGraw-Hill

COURSE INFORMATION SHEET

Course Code	**PEIT 551a**
Course Title	**Java Programming/Technologies (Practical)**
Type of Course	**PE-I**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Object Oriented Programming using C++
Course Objectives	To be able to learn the concepts of and practical approaches to object-oriented analysis, design and programming using UML and Java.
SYLLABUS **Practical based on theory.**	

Course Code	**PEIT 501b**
Course Title	**Unix Networking Programming (Theory)**
Type of Course	**PE-I**
L T P	**3 0 3**
Credits	**3**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Programming for problem solving, Object Oriented Programming using C++.
Course Objectives	To teach the students how to write programs that communicates with other programs across a computer network. I. The student shall be able to write their own network programs in UNIX. II. To provide an opportunity to do network programming using TCP sockets. III. To provide an opportunity to do network programming using UDP sockets. IV. To provide to do IPC programs. V. know The importance of platform independent networks.

Course Outcomes	After completion of this course, the students will be able to:
	  I. To provide an overview of OSI, TCP/IP reference models and TCP/IP protocol stack including connection establishment with parameters.
	  II. To understand and test the variety of interfaces & frameworks for writing network applications.
	  III. To implement interfaces, streams sockets, and remote procedure call libraries.
	  IV. To illustrate concept of I/O Multiplexing, UDP and construct programs for client manage I/O stream & implement Unix socket system calls.
	  V. To design and develop programs based on Client-server model and multithreaded servers.
	  VI. To understand network management using SNMP protocol and develop projects for network usage and availability.

SYLLABUS	

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
INTRODUCTION TO NETWORK PROGRAMMING: OSI model, Unix standards, TCP and UDP,TCP connection establishment and termination, Buffer sizes and limitations,Standard Internet services, Protocol usage by common internet applications. **(7)**	1
SOCKETS AND APPLICATION DEVELOPMENT Introduction To Socket Programming – System Calls – Address Conversion Functions – OSIX-Signal Handling – Server With Multiple Clients – Boundary Conditions – Server Process C Rashes Server Host Crashes, Server Cashes And Reboots,Server Shutdown – I/O,Multiplexing– I/ Models - TCP Echo Client/Server with I/O Multiplexing. **(7)**	2,3,4
SOCKET OPTIONS socket Options – Getsockopt And Setsockopt Functions – Generic Socket Options – IP Socket Option ICMP Socket Options – TCP Socket Options – Multiplexing TCP And UDP Sockets – SCTP Sockets CTP Client/Server – Streaming Example – Domain Name System – Gethostbyname, Gethostbyaddr, Getservbyname And Getservbyport Functions – Protocol Independent Functions In CP Client/Server Scenario **.** **(8)**	2,3,4

SECTION-B	
ADVANCED SOCKETS IPv4 And IPv6 Interoperability – Threaded Servers – Thread Creation And Termination – TCP Echo Server Using Threads – Mutex – Condition Variables – Raw Sockets – Raw Socket Creation – Raw Socket Output – Raw Socket Input – Ping Program – Traceroute Program. **(8)**	5
SIMPLE NETWORK MANAGEMENT SNMP Network Management Concepts – SNMPv1 – Management Information – MIB Structure – Object Syntax – Standard MIB"S – MIB-II Groups – SNMPv1 Protocol And Practical Issues. **(8)**	6
SNMP V2, V3 AND RMO Introduction To SNMPv2 – SMI For SNMPV2 – Protocol – SNMPv3 – Architecture And Applications – Security And Access Control Model – Overview Of RMON. **(7)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 501a.CO1	2	-	-	-	-	2	-	-	-	-	-	2	1	-
PEIT 501a.CO2	-	-	2	3	3	-	-	-	-	-	-	2	3	1
PEIT 501a.CO3	-	-	-	2	3	-	-	-	-	-	-	2	2	1
PEIT 501a.CO4	-	-	-	2	2	-	-	-	-	-	-	2	2	1
PEIT 501a.CO5	-	2	3	3	-	-	-	-	-	-	-	-	3	3
PEIT 501a.CO6	-	-	-	3	3	-	-	-	-	-	-	2	3	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	UNIX Network Programming, Sockets API, Volume I, 3rd Edition, PHI, 2010.	W.Richard Stevens,	PHI
2	SNMP, SNMPv2, SNMPv3 And RMON 1 And 2", Third Edition, Pearson Edition, 2009	William Stallings	PHI
3	UNIX Systems Programming using C++ 1st Edition, PHI, 2010	T. Chan	PHI

COURSE INFORMATION SHEET

Course Code	**PEIT 551b**
Course Title	**Unix Networking Programming (Practical)**
Type of Course	**Professional Elective -I**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Programming for problem solving, Object Oriented Programming using C++.
Course Objectives	To teach the students how to write programs that communicates with other programs across a computer network.

SYLLABUS

Practical based on theory.

Course Code	PEIT 501c
Course Title	Python Programming
Type of Course	PE-I
L T P	3 0 3
Credits	3
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Programming for Problem Solving.
Course Objectives	The course is designed to provide the knowledge of basic concepts of Python programming language.
Course Outcomes	After completion of this course, the students will be able to: I. Explain the basic features of Python programming language like data types, iterations, functions, data structures. II. Design and develop small python programs that meet the requirements. III. Understand the process of reading and writing data in a text file. IV. Apply the concept of exception handling and database connectivity for creating real world applications. V. Implement the concepts of object oriented programming VI. Define the applications of regular expressions.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to Python Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks, Basic data types of Python, Conditional blocks using if, else and elif ,Simple for loops in python, For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else. **(8)**	**1,2**
Python Functions and Data Structures Function Specifications, Global Variables, Modules, Passing parameters to Functions, Recursive functions, System functions and Parameters, importing modules, Lambda function in python, Python String, List, Tuple, Set, And Dictionary Manipulations, Programming using string, list, tuple, set and dictionary in built functions. **(9)**	**1,2**
File Handling Opening a file, Understanding read functions: read(), readline() and readlines(), Understanding write functions: write() and writelines(), appending data to a file, closing	**2,3**

files, Manipulating file pointer using seek, Programming using file operations. **(6)**

SECTION-B	
Python Object Oriented Programming Oops Concept of class, object and instances, Constructor, class attributes and destructors, Method overloading in python, Operator overloading, Inheritance. **(8)**	**2,5**
Python Regular Expression and Exception Handling Special symbols and characters for Regular expressions, Pattern matching and searching, Pattern searching using regex, Validation using regular expressions, What is exception, Handling an exception, try…except…else, try-finally clause, Argument of an exception, Python standard exception, Raising an exception, User-defined exceptions. **(8)**	**2,4,6**
Python Database Connectivity Introduction, SQL Database connection using python, Creating and searching tables, Reading and storing config information on database, Programming using database connections. **(6)**	**2,4**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT501c.CO1	-	-	1	-	1	-	-	-	-	-	2	-	2	3
PEIT501c.CO2	3	1	3	1	3	-	-	-	-	-	3	-	3	3
PEIT501c.CO3	-	-	1	-	1	-	-	-	-	-	1	-	2	2
PEIT501c.CO4	2	1	2	1	3	-	-	-	-	-	2	-	3	3
PEIT501c.CO5	1	-	2	-	2	-	-	-	-	-	2	-	3	3
PEIT501c.CO6	-	-	1	-	2	-	-	-	-	-	2	-	1	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Core Python Applications Programming, Third Edition.	Wesley J Chun	Pearson Publication
2.	Beginning Python: Using Python 2.6 and Python 3.1	James Payne	Wrox Publication
3	Core Python Programming .	R. Nageswara Rao	Dreamtech
4	Core Python Programming.	Wesley J Chun	Prentice Hall
5	Programming and Problem Solving with Python.	Ashok Namdev Kamthane, Amit Ashok Kamthane	Mcgraw Hill Education

Course Code	IT551c
Course Title	**Python Programming (Practical)**
Type of Course	**PE-I**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Programming for problem solving
Course Objectives	 I. Understand and comprehend the basics of Python programming. II. Develop real-world applications using OOPs, files, exception handling and database connectivity provided by python.
SYLLABUS **Practical based on theory**	

COURSE INFORMATION SHEET

Course Code	IT-501d
Course Title	**Mobile Application Development**
Type of Course	**PE-I**
L T P	**3 0 3**
Credits	**3**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Introduction to Information Technology.
Course Objectives	To learn the basics of mobile application development using Android and their testing and deployment in different user environments.
Course Outcomes	After completion of this course, the students will be able to: I. Understand basic requirements to develop mobile applications. II. Demonstrate the components and structure of a mobile development framework. III. Apply essential Android Programming concepts. IV. Develop different mobile applications using Android platform. V. Test their application in different conditions. VI. Deploy the mobile applications in different environments.

SYLLABUS
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to Java and Android: Basic programming introduction to Java, Java Foundation Classes, Developing applications in Java, Overview of Android platform. **(9)**	**1**
Getting started with Mobility: landscape, Mobile platforms, Mobile apps development, , setting up the mobile app development environment along with an emulator, a case study on Mobile app development. **(6)**	**1,2**
Building Blocks of Mobile Apps: App user interface designing – mobile UI resources (Layout, UI elements, Drawable, Menu), Activitystates and life cycle, interaction amongst activities. **(6)**	**2,3**
SECTION-B	
Sprucing Up Mobile Apps: App functionality beyond user interface - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs Native data handling – on-device file I/O, shared preferences, mobile databases such as	**3,4**

SQLite, and enterprise data access (via Internet/Intranet). Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback andrecord, location awareness, and native hardware access (sensors such as accelerometer and gyroscope) . **(16)**	
Testing Mobile Apps: Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk. **(5)**	**4,5**
Deployment of Apps: Versioning, signing and packaging mobile apps, distributing apps on mobile market place. **(3)**	**4,5**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT501d .CO1	-	2	-	-	-	-	-	-	-	-	-	-	2	1
PEIT501d. CO2	-	1	-	-	-	-	-	-	-	-	-	-	1	1
PEIT501d .CO3	-	-	-	-	3	-	-	-	-	-	-	-	1	1
PEIT501d. CO4	-	-	2	-	-	-	-	-	-	-	-	-	1	2
PEIT501d. CO5	-	-	-	1	-	-	-	-	-	-	-	-	1	1
PEIT501d. CO6	-	-	1	-	-	-	-	-	-	-	-	-	1	1

RECOMMENDED BOOKS

S.NO	NAME	AUTHOR(S)	PUBLISHER
1	Android Application Development All in one for Dummies	Barry Burd	1st edition
2	Android Application Development Rick Rogers, JohnLombardo ,	Meike Blake	1st edition, O'Reilly, 2010
3	Professional Android 2 Application Development	Reto Meier	1st edition,Wrox, 2010
4	Teach Yourself Android Application Development In 24Hours.		1st edition, SAMS

Course Code	PEIT 551d
Course Title	Mobile Application Development (Practical)
Type of Course	PE-I
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Introduction to Information Technology.
Course Objectives	1. Understand and comprehend the basics of mobile application programming. 2. Develop real-world applications using android programming.

SYLLABUS

Practical should be covered based on the following directions:

Students should implement (and learn to use the tools to accomplish this task) the following during Practical hours: (illustrative only)

1. Understand the app idea and design user interface/wireframes of mobile app
2. Set up the mobile app development environment
3. Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components
4. Using emulator to deploy and run mobile apps
5. Testing mobile app - unit testing, black box testing and test automation

COURSE INFORMATION SHEET

Course Code	**PEIT 501e**
Course Title	**Data Acquisition and Hardware Interfacing (theory)**
Type of Course	**PE-I**
L T P	**3 0 3**
Total Lectures	**45**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	**50** **50**
Course Prerequisites	Computer architecture and organization, Microprocessor & Assembly Language Programming
Course Objectives (CO)	This course will introduce various data acquisition systems and techniques and their application using different hardware interfacing mechanisms.
Course Outcome	After completion of this course, the students will be able to: I. Recall different interface mechanism of devices for data transfer. II. Understand the principles of operation and limitations of the data acquisition system (single and multiple channels). III. Apply acquired knowledge to design a system of acquisition and control. IV. Analyze the designed system and various acquired signals using Labview software. V. Design system for data acquisition. VI. Evaluate designed system for data acquisition and interfacing to various external circuits.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Signal conditioning and data acquisition: Analog-to-digital and digital-to-analog converters; sampling rate, multiplexing, resolution, range, and code width; grounding, isolation and noise; single-ended and differential measurements; attenuation, amplification, and filtering; excitation and linearization; impedance mismatch and loading; digital signal conditioning; signal transmission (voltage vs. current loop); and hardware architecture of a modern multi-function data acquisition card. Various DAS Configurations, Single Channel DAS, Multi-Channel DAS, IC Based DAS, Data Acquisition, Data Acquisition in PLC. **(10)**	**1,2**

Fundamentals of programming logic: Labview: Virtual instruments; indicators and controls; front panel and block diagram; data types and data flow programming; case and sequence structures; arrays, loops, and clusters; graphs and charts; sub VIs; and file I/O. **(9)**	3,4

SECTION-B

Instrument control: Components of an instrument control system (GPIB and RS-232); detecting and configuring instruments; and instrument drivers. **(6)**	2
Instrumentation system design: Design specifications; functional block representation; design, debugging, and testing; interpretation and presentation of data; user interface; temperature control system design; motor speed control system design; and instrumentation project incorporating multiple sensors, signal interfacing electronics, data-acquisition hardware, instrument control. **(6)**	4,5
Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Instrumentation Buses: Serial (RS232C, USB) and Parallel (GPIB) Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture. **(6)**	2
Project work using Labview – Generation of signal (different function generators) on PC and acquiring the signal from sensor at PC again with different sampling rate and quantization level. Representations of different characteristics of acquired signals and their analysis and reporting. **(8)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT501e.CO1	-	-	3	-	-	-	-	-	-	-	-	-	-	3
PEIT501e.CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	1
PEIT501e.CO3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
PEIT501e.CO4	-	-	-	-	3	-	-	-	-	-	-	-	-	3
PEIT501e.CO5	-	-	3	-	-	-	-	-	-	-	-	-	-	3
PEIT501e.CO6	-	-	1	-	-	-	-	-	-	-	-	-	-	1

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Instrumentation Devices And Systems	Rangan C. S., Sarma G. R. and Mani V. S. V	Tata McGraw-Hill.
2.	"Modern Electronic Instrumentation and Measurement Techniques"	Helfrick Albert D. and Cooper W. D	Prentice Hall India.
3.	Digital Instrumentation	A. J. Bouvens	McGraw-Hill.
4.	Process Control Instrumentation Technology	Johnson Curtis D	Prentice Hall India.
5.	A Course In Electrical And Electronics Measurements And Instrumentation	Shawhney A. K	Dhanpat Rai & Sons.
6.	Data acquisition technique using personal computers	Howard Austurlitz	

Course Code	PEIT 551e
Course Title	Data Acquisition and Hardware Interfacing (Practical).
Type of Course	PE-I
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Computer architecture and Organization, Microprocessor & Assembly Language Programming
Course Objectives	1.Understand and comprehend the basics of Labview programming. 2. Develop applications using Labview software 3. To learn interfacing the real world signals to PC using RTOS hardware. .

SYLLABUS
Practical based on theory *Practical should be covered based on the following directions:* 1. Labview Programming. 2. Data acquisition on PXI system through sensing unit. 3. Data acquisition on RTOS system through sensing unit 4. Data control on PXI system through actuation unit. 5. Data control on RTOS system through actuation unit

Course Code	PEIT 501f
Course Title	**Wireless Communication Technologies (Theory)**
Type of Course	PE-I
L T P	3 0 3
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Basic Information Theory and Communication.
Course Objectives	To understand the terminology, fundamental concepts, issues and design approaches of wireless communication systems.
Course Outcomes	After completion of this course, the students will be able to: I. Appreciate the evolution of wireless communication systems. II. Familiarize with the design concepts of cellular systems. III. Analyze and design GSM and CDMA wireless cellular systems. IV. Comprehend the principles of wireless propagation models. V. Understand the working of Bluetooth, WiFi, WLAN, ZigBee, RFID, WiMax technologies. VI. Learn about the emerging wireless technologies.

SYLLABUS

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B Sections having three questions each. Candidate is required to attempt at least two questions from each section.

SECTION-A	CO(s)
Introduction to Wireless Communication Wireless Communication-Features, Issues and Applications. Types of Wireless Communication Systems, Evolution of communication systems 1G, 2G, 2.5G, 3G, 4G, Comparison of common wireless communication systems. **(6)**	**1**
The Cellular Concept-System Design Fundamentals Frequency reuse, Channel assignment strategies, Handoff strategies, Interference, Improving Coverage and Capacity in cellular systems: Cell splitting, Cell sectoring and Microcell zone concept. **(8)**	**2**
GSM and CDMA Wireless Cellular Systems GSM-Architecture, Identifiers, Authentication and Security, Control Channels, Services. IS-95 Architecture, Forward and Reverse channels, Soft handoff, Near-Far	**3**

Effect, Cell Breathing, Mobile data over CDMA, CDMA-2000, Comparison of CDMA and GSM. **(8)**	

SECTION-B

The Propagation Models Propagation criteria, Free space propagation model, Mobile point to point propagation model, Outdoor propagation path loss models, Indoor propagation path loss models, Signal attenuation due to Foliage, Long distance propagation. **(9)**	**4**
Wireless Technologies Bluetooth, WiFi networks and WLAN IEEE 802.11 standards, ZigBee Radios and IEEE 802.15.4, RFID systems and EPC Global UHF Class 1 Generation 2,WiMax, LTE, LTE-A. **(8)**	**5**
Emerging Wireless Systems Ad-hoc/Mesh wireless networks, Sensor networks, Ultra wideband systems, Distributed control networks, Cognitive radios, Biomedical networks and In-body networks, Internet of Things. **(6)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT501f.CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
PEIT501f.CO2	2	1	-	-	1	-	-	-	-	-	-	-	-	2
PEIT501f.CO3	3	2	2	-	1	-	-	-	-	-	-	-	-	3
PEIT501f.CO4	2	2	1	-	1	-	-	-	-	-	-	-	1	2
PEIT501f.CO5	2	2	1	-	1	-	-	-	-	-	-	-	1	3
PEIT501f.CO6	2	2	-	-	1	-	-	-	-	-	-	-	1	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Wireless Communications: Principles and Practice, Latest Edition	Theodore S. Rappaport	Prentice Hall India
2	Wireless and Cellular Communication, Latest Edition	Sanjay Sharma	S. K. Kataria & Sons
3	Wireless Communications, Latest Edition	T. L. Singal	McGraw Hill Education

COURSE INFORMATION SHEET

Course Code	PEIT 551f
Course Title	Wireless Communication Technologies (Practical)
Type of Course	PE-I
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Basic Information Theory and Communication.
Course Objectives	To familiarize students with the Wireless Communication Technology (Satellite, Cellular and Bluetooth etc.)
SYLLABUS **Practical based on theory.**	

COURSE INFORMATION SHEET

Course Code	**PEIT 501g**
Course Title	**Software as a Medicine**
Type of Course	**PE-I**
L T P	**3 0 3**
Total Lectures	**45**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	**50** **50**
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.	
Contents will be decided later on.	

COURSE INFORMATION SHEET

Course Code	PEIT 551
Course Title	Industrial Training (After 4th Semester)
Type of Course	PW
L T P	0 0 0
Credits	1
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 00 50
Course Prerequisites	Nil
Course Objectives	1.To enable students to integrate theory with practice. 2.To provide opportunity to students to hands on current problems industrial practitioners are dealing with. 3.To introduce students to work culture and industrial practices.
Course Outcomes	After completion of this course, the students will be able to: I. Analyse practical aspects of a problem and apply engineering methods to design its solution. II. Apply skills and knowledge of modern technologies to develop solution for a real life problem. III.Demonstrate technical, interpersonal and communication skills, both oral and written.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BEIT551.CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3
BEIT551.CO2	-	-	3	-	3	-	--	-	-	-	-	-	-	3
BEIT551.CO3	-	-	-	-	-	-	-	3	3	3	2	-	-	-

Course Code	HSMC 501
Course Title	Cyber Laws & IPR (Theory)
Type of Course	HS
L T P	3 0 0
Credits	03
Course Assessment Methods	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Nil
Course Objectives	I. To familiarize students with the dynamics of Cyber Law with a focus on new forms of cybercrime. II. To establish a basic knowledge on the technical side of Cyber Law. III. To give an update of recent Cyber Laws developments and case law make students conversant with the social and intellectual property issues emerging from 'Cyberspace. IV. Explore the legal and policy developments in various countries to regulate Cyberspace. V. Develop the understanding of relationship between commerce and cyberspace; and give students in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.

Course Outcomes	After completion of this course, the students will be able to:
	   I. Describe the need for cyber law. Get familiarize with the dynamics of cyber Law with a focus on new forms of cybercrime.
	  II. Get established a basic knowledge on the technical side of Cyber Law.
	 III. Have an update of recent Cyber laws. Developments and case law.
	 IV. Get engaged with today's Cyber Laws reality and debates.
	  V. Work on tools for further study of Cyber Law.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by

the question paper.

SECTION-A	Hours
Basics of Computer & Internet Technology Internet, ISP & domain name; Network Security; Encryption Techniques and Algorithms; Digital Signatures.	**(08)**
Introduction to Cyber World Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens.	**(03)**
E-Commerce Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.	**(08)**
SECTION-B	
Intellectual Property Rights IPR, Copyright and Patents, International Treaties and Conventions, Business Software Patents, Domain Name Disputes and Resolution.	**(11)**
IT Act, 2000 Reasons, Aims, Objectives and Applications, Regulators under IT Act, Role of Certifying Authority, Digital Signature Certificates, Duties of the Subscribers, Cyber Crimes-Offences and Contraventions, Grey Areas of IT Act.	**(11)**
Project Work Candidates will be required to work on a project. At the end of the course, students will make a presentation and submit the project report.	**(04)**

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	A Guide to Cyber Laws & IT Act 2000 with Rules & Notification	NandanKamath	Universal Law Publishing
2	Cyber Cops, Cyber Criminals & Internet	Keith Merill&Deepti Chopra	IK International
3	Handbook of Cyber Laws	Vakul Sharma	McMillian

COURSE INFORMATION SHEET

Course Code	**PWIT 552**
Course Title	**Project-1**
Type of Course	**PW**
L T P	**0 0 2**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	**Nil**
Course Objectives	1. Students learning skills to tackle realistic problems as they would be solved in the real world. 2. To work as team to deliver project that matches the required specification.
Course Outcomes	After completion of this course, the students will be able to: I. Plan, Analyze, design and implement gathered skills and knowledge over the field of research and to solve real life problem. II. Apply software development lifecycle to plan & manage the projects. III. Demonstrate the ability to communicate effectively in orally and in writing. IV. Learn to work in team and focus on getting work done on time.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT 552 .CO1	3	3	2	3	3	1	-	2	2	-	-	3	3	3
PWIT 552 .CO2	1	2	2	2	3	-	1	2	2	-	-	-	3	3
PWIT 552 .CO3	-	2	-	-	3	-	-	3	2	3	1	-	-	-
PWIT 552 .CO4	-	-	-	1	3	-	-	-	3	2	3	-	1	1

COURSE INFORMATION SHEET

Course Code	**PCIT 601**
Course Title	**Theory of Computation (Theory)**
Type of Course	**PC**
L T P	**3 1 0**
Credits	**4**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Discrete Structures.
Course Objectives	The objective of the course is to construct and prove the equivalence of languages described by finite state machines and regular expressions, pushdown automata and Turing machines.
Course Outcomes	After completion of the course, students will be able to: I. Understand the basic concepts of theory of computation like deterministic/non-deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages, Turing machines II. Explain the strength and the limitations of regular languages and context-free languages. III. Recognize to which class in the Chomsky hierarchy the language described (by a grammar or automata) belongs IV. Design automata, regular expressions and context-free grammars accepting or generating a certain language V. Apply the basic knowledge of Theory of Computation to solve computational problems VI. Design a Turing machine that performs a specific task.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to the Theory of Computation	**1,3**

Basic concepts – Languages, Grammars, Automata, Strings, Alphabet, Chomsky Classification of Grammars and Languages. **(2)**	
Finite Automata Finite automation model, Acceptance of strings and language, Deterministic Finite Automaton, Non Deterministic Finite Automaton (NDFA), Equivalence of NDFA and DFA, Conversion of NFA into DFA, Minimization of Number of States in Finite Automata, equivalence between two FSMs, Moore and Mealy machines. Conversion of Mealy to Moore machine, Conversion of Moore to Mealy machine. **(10)**	**1,4,5**
Regular expressions and regular languages Regular Expressions, Identities for Regular Expressions, Finite Automata and Regular Expressions, Transition System Containing null moves, NDFAs with null moves and Regular Expressions, Eliminating epsilon-Transitions, Algebraic Method Using Arden's Theorem, Construction of Finite Automata Equivalent to a Regular Expression, Equivalence of Two Finite Automata, Equivalence of Two Regular Expressions , Closure Properties of Regular Languages under Simple Set Operations ((proofs omitted) , Identifying Non regular Languages using Pumping Lemma. **(10)**	**1,2,3,4,5**
SECTION-B	
Context free grammar and Pushdown Automata Context-free Languages and Derivation Trees, Ambiguity in Context-free Grammars, Simplification of Context-free Grammars, Construction of Reduced Grammars, Elimination of Null Productions, Elimination of Unit Productions, Normal Forms for Context-free Grammars, Chomsky Normal Form, Greibach Normal Form, Pumping Lemma for Context-free Languages, Pushdown Automata - Basic Definitions, Acceptance by pushdown automata, Pushdown Automata and Context-free Languages, Parsing and pushdown automata, Top-down Parsing Using Deterministic pushdown automata, Bottom-up Parsing . **(10)**	**1,2,3,4,5**
Turing Machines Linear Bounded Automata Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of Turing Machines, Techniques for TM Construction -Turing Machine with Stationary Head, Storage in the State, Multiple Track Turing Machine, Subroutines, Variants of Turing Machines (proofs omitted) – Multi tape Turing Machines, Nondeterministic Turing Machines, The Model of Linear Bounded Automaton (LBA), Relation Between LBA and Context-sensitive Languages, Turing Machines and Type 0 Grammars . **(11)**	**1,3,5,6**
Undecidability Undecidability, Introduction to recursive & non-recursive enumerable languages, Universal Turing machine. **(2)**	**1,3,6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT601.CO1	1	2	1	-	1	-	-	-	-	-	-	-	2	-
PCIT601.CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCIT601.CO3	-	1	-	-	1	-	-	-	-	-	-	-	-	-
PCIT601.CO4	2	1	2	-	2	1	-	-	-	-	-	-	2	2
PCIT601.CO5	2	2	3	1	2	2	-	-	-	-	-	-	3	3
PCIT601.CO6	2	2	2	-	1	-	-	-	-	-	-	-	2	3

S. No	NAME	AUTHOR(S)	PUBLISHER
1	Theory of computation	Mishra &Chandrashekharan	PHI Learning Pvt. Ltd.
2	Introduction to automata theory, languages and computation	Hopcroft H.E. & Ullman	Pearson/Addison Wesley
3	An introduction to formal languages and automata	Peter linz	Jones & Bartlett Learning
4	Introduction to languages and the theory of automata	John C Martin	McGraw-Hill
5	Elements of theory of computation	H.P. Lewis and C.H. papadimition	Prentice-Hall

COURSE INFORMATION SHEET

Course Code	**PCIT 602**
Course Title	**Machine Learning**
Type of Course	**PC**
L T P	**4 0 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Discrete Structures.
Course Objectives	The objective is to familiarize the students with some basic learning algorithms and techniques and their applications, as well as general issues related to analyzing and handling data.
Course Outcomes	<u>After completion of this course, the students will be able to</u>: I. Recall the concepts of supervised learning, unsupervised learning and neural networks. II. Understand the fundamental issues and challenges of machine learning: data, model selection, model complexity. III. Apply various learning algorithms to data. IV. Analyze the underlying mathematical relationships within Machine Learning algorithms and the paradigms of supervised and un-supervised learning. V. Implement regression, classification and clustering techniques to various problems. VI. Evaluate the designed models of machine learning.

SYLLABUS	
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.	

SECTION-A	**CO(s)**
Introduction Overview of machine learning, related areas, applications, software tools. **(2)**	**1,2**
Parametric regression Simple linear regression, multiple linear regression, polynomial regression, nonlinear regression, gradient descent in linear regression, gradient descent in multiple regression, normal equation. **(6)**	**2,3,4**
Generative learning Gaussian parameter estimation, maximum likelihood estimation, bias and variance of estimators. **(2)**	**4,5**

Classification Logistic regression, decision boundary, gradient descent in logistic regression, multiclass classification, overfitting problem, cost function regularization. **(6)**	4,5
Neural networks The perceptron algorithm, multilayer perceptrons, backpropagation, multiclass discrimination, training procedures, localized network structure, learning curves, regularization, Support vector machines. **(7)**	1,5

<div align="center">SECTION-B</div>

Unsupervised learning K-means clustering, hierarchical clustering, density based clustering, latent dirichlet allocation, dendrogram, hidden markov model. **(8)**	5
Dimensionality reduction Feature selection, principal component analysis, linear discriminant analysis, factor analysis, independent component analysis, multidimensional scaling. **(8)**	4,5
Evaluation methods Evaluating hypotheses, classification accuracy, confusion matrix, precision, recall, F1 score, log loss, Area under curve, regression metrics, elbow method, silhouette analysis. **(6)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT602.CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
PCIT602.CO2	-	-	-	-	3	-	-	-	-	-	-	-	-	2
PCIT602.CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	-
PCIT602.CO4	2	-	-	-	-	-	-	-	-	-	-	-	2	-
PCIT602.CO5	-	-	-	3	-	-	-	-	-	-	-	-	3	-
PCIT602.CO6	-	-	1	-	-	-	-	-	-	-	-	-	-	1

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Elements of Statistical Learning	T. Hastie, R. Tibshirani and J. Friedman	Springer, 2001
2	Machine Learning	E. Alpaydin	MIT Press, 2010
3	Pattern Recognition and Machine Learning	C. Bishop	Springer, 2006
4	Machine Learning: A Probabilistic Perspective	K. Murphy	MIT Press, 2012
5	Pattern Classification	R. Duda, E. Hart, and D. Stork,	Wiley-Interscience, 2000.
6	Machine Learning	T. Mitchell	McGraw-Hill, 1997

COURSE INFORMATION SHEET

Course Code	**PCIT 652**
Course Title	**Machine Learning Practical**
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	**Python Programming**
Course Objectives	1. To familiarize students with the various machine learning techniques:regression, classification, clustering. 2. To strengthen the ability to identify and apply the suitable machine learning algorithm for the real world problems.
SYLLABUS	

1. Installing applications and creating environment (anaconda).
2. Reading csv into memory.
3. Loading data from seaborn.
4. Implement classification based on the K-nearest neighbors method, using the scikit-learn library.
5. Implement methods for linear regression (least-squares), and logistic regression.
6. Implement methods for classification using a) support vector machines and b) decision trees, and investigate the use of cross-validation for model evaluation.
7. Implement methods for ensembles of trees (random forests, gradient boosted trees).
8. Implement neural networks (optional deep learning) based classifiers.
9. Implement methods for dimensionality reduction and unsupervised clustering.

Professional Elective-II

COURSE INFORMATION SHEET

Course Code	**PEIT 601a**
Course Title	**Internet of Things**
Type of Course	**PE-II**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Prerequisites	**Nil**
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Objectives	1. To understand the fundamentals of Internet of Things. 2. To learn about the basics of IOT protocols . 3. To build a small low cost embedded system using Raspberry Pi. 4. To apply the concept of Internet of Things in the real world scenario.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the concepts of Internet of Things and enabling technologies. II. Compare and contrast IoT architecture with M2M, SDN and NFV architectures III. Analyze basic protocols in wireless sensor network. IV. Design IoT applications in different domain and be able to analyze their performance using Rasperry Pi and Ardunio V. Evaluate the impact of IoT applications in the area of Data analytics, Software management. VI. Deploy basic IoT applications over the Cloud like Amazon.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to Internet of Things (IoT) Internet of Things, Characteristics of IoT, Physical Design, Logical Design, Functional blocks of IoT, Communication models & APIs, IoT	**1**

enabling Technologies, IoT Levels & Deployment Templates ,Challenges in IoT. **(10)**		
IoT & M2M Machine to Machine Architecture, Difference between IoT and M2M, SDN and NFV for IoT, SNMP protocol, IoT system management using NETCONF-YANG, IoT reference model, Domain model - information model, functional model, communication model. **(8)**	**2**	

SECTION-B

IoTProtocols Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Unified Data Standards ,IEEE 802.15.4, BACNet Protocol,Modbus, Zigbee Architecture. **(7)**	**3**	
Building IoT with RASPBERRY PI & Arduino Building IOT with RASPERRY PI,Logical Design using Python, IoT Physical Devices & Endpoints, IoT Device-Building blocks ,Raspberry Pi programming Interfaces with Python, Other IoT Platforms like Arduino. **(12)**	**4**	
Case Studies Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - sectionicipatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT. **(8)**	**5,6**	

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT601a.CO1	1	3	2	-	-	-	-	-	-	-	-	2	1	3
PEIT601a.CO2	1	3	2	-	-	-	2	-	-	-	-	2	1	3
PEIT601a.CO3	1	3	3	2	-	-	-	-	-	-	-	2	1	3
PEIT601a.CO4	1	-	-	-	2	-	1	-	1	-	1	2	2	3
PEIT601a.CO5	1	3	3	-	2	-	3	-	-	-	1	2	2	3
PEIT601a.CO6	-	-	-	3	-	-	-	-	2	-	-	2	3	3

RECOMMENDED BOOKS

S no	NAME	AUTHOR(S)	PUBLISHER
1.	Internet of Things: A Hands-On Approach	Vijay Madisetti, Arshdeep Bahga	Orient Blackswan Private Ltd,2015
2	The Internet of Things in the Cloud: A Middleware Perspective	Honbo Zhou	CRC Press, 2012
3	The Internet of Things – Key applications and Protocols‖	Olivier Hersent, David Boswarthick, Omar Elloumi	Wiley, 2012

COURSE INFORMATION SHEET

Course Code	**PEIT 601b**
Course Title	**Computer Graphics (Theory)**
Type of Course	**PE-II**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Prerequisites	Data Structures
Course Objectives	The objective of the course is to build the foundation of digital image generation concepts and techniques so as to use this knowledge for building graphics applications.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the basic principles of interactive graphics, and its applications. II. Learn and implement various algorithms for scan conversion and polygon filling. III. Apply geometric transformations on graphics objects and learn its application in composite form. IV. Define, analyze and perform the perspective and orthographic projections on points and scenes in three-dimensional space V. Analyze and implement clipping methods and its transformation to graphics display device. VI. Learn splines and curves formation in computer graphics and understand visible surface detection methods.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	**CO(s)**
Overview of Graphics System Applications of computer graphics, Picture representation, color table ,Video Display Devices: Direct View Storage Tubes, Flat Panel Displays: Emissive andNonEmissiveDisplays; Plasma Panel, Thin Film Electroluminescent and Liquid CrystalDisplays, Color Display Techniques: Shadow Mask and Beam-penetration Methods, ThreeDimensional Viewing Devices, Raster Scan Systems, Random ScanSystems, Display Processor, Co-ordinate Representations, Screen Coordinates Input	**1**

Devices. **(07)**		
Output primitives Scan conversion, Frame buffer, Point and Lines, Line Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Circle Generating Algorithm: Midpoint circle algorithm, Pixel Addressing and Object Geometry, Scan-Line Polygon Fill Algorithm, Inside-Outside Tests, Boundary-Fill Algorithm, Flood-Fill Algorithm, Antialiasing and Halftoning, Character Generation. **(07)**	**2**	
Two Dimensional Geometric Transformations and Viewing Basic Transformations: Translation, Rotation ,Scaling, Reflection and Shear, Inverse transform, Composite Transformation Matrix, Viewing Pipeline, Window to Viewport Coordinate Transformation, Clipping Operations: Line, Polygon, Segments: creation and storage. **(08)**	**3**	
SECTION-B		
Three Dimensional Concepts, Transformations and Viewing Three Dimensional Display Methods, Three Dimensional Transformations; ThreeDimensional Viewing Pipeline; Viewing Coordinates; Specifying the View Plane, Projections: Parallel Projections, Perspective Projections. **(09)**	**4,5**	
Splines and Curves Curved Lines and Surfaces, Spline Representations, Cubic Splines, Bezier Curves and theirproperties, B-Spline Curves. **(07)**	**6**	
Visible Surface Detection Methods Classification of Visible Surface Detection Methods, Back Face Detection, Depth Buffer,A-Buffer, Scan Line and Depth-Sorting Methods, Wireframe Methods. **(07)**	**6**	

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 601b.CO1	2	1	2	1	2	-	1	-	-	-	-	2	3	2
PEIT 601b.CO2	2	1	3	1	2	-	1	-	-	-	-	-	2	3
PEIT 601b.CO3	2	1	3	2	1	-	2	-	-	-	-	1	2	3
PEIT 601b.CO4	3	2	3	2	1	-	2	-	-	-	-	2	2	3
PEIT 601b.CO5	2	2	2	2	2	-	2	-	-	-	-	1	2	3
PEIT 601b.CO6	2	2	3	2	2	-	2	-	-	-	-	1	1	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Computer Graphics C Version	Donald Hearn, M.P. Baker	Pearson Education
2	Principle of interactive Computer Graphics, 2nd Edition	Newman and Sproul	McGraw Hill
3	Graphics, A programming Approach, 2nd Edition	Steven Harrington	Tata McGraw Hill
4	Mathematical Elemants of Computer Graphics, 2nd Edition	Rogar and Adams	McGraw Hill
5	Introduction to Computer Graphics, 1st Edition	N.Krishnamurthy	Tata McGraw Hill

Course Code	PEIT 601c
Course Title	Cyber Attacks
Type of Course	PE-II
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Computer Networks.
Course Objectives	The objective of the course is to understand terminology and mechanisms of launching attacks so as to devise effective defence stratigies. this course covers awareness of various attack artifacts and malwares.Open source attack tools are analysed and case studies are prepared to know the attack trends and their impacts.
Course Outcomes	After completion of the course, students will be able to: I. To define cyber attack terminology and present various reports and trends. II. To illustrate modus-operandi of well known attacks and analyze their impacts. III. To introduce ethical hacking and demonstrate assessment and testing practices. IV. To perform experimental analysis of various attack artifacts. V. To install various malwares, keyloggers and spying tools in experimental test bed environment and perform their analysis using penetration testing . VI. To perform case study of various attack tools.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction: Cyber Threat, Definition of Cyber Crime, Classification, Current Threats and Trends, Diversity of Cyber Crime, Cyber Hate Crimes, Cyber Terrorism. **(6)**	1
Types of Cyber Attacks: Denial-of-service (DoS) and distributed denial-of-service (DDoS)	**2**

attacks, Man-in-the-middle (MitM) attack, Phishing and spear phishing attacks, Drive-by attack, Password attack, SQL injection attack, Cross-site scripting (XSS) attack, Zero-day exploit, Eavesdropping attack, Malware attack, DNS Tunneling. **(8)**	
Ethical Hacking: Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modelling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing. **(5)**	**3**
SECTION-B	
Attack Artifacts : Virus, Worm, Trojan Horse, Rootkits, Botnet, Social Engineering: Types of Social Engineering, Social Engineering Targets and Defence Strategies., Logic Bomb, Time Bomb. **(5)**	**4**
Cyber Issues: Window Password Hacking and Cracking, Steganography, Hiding Secret Message, Anonymous Call, Message and Email Header Analysis, Access Darknet or Darkweb Using TOR : Anonymous Browsing - Access Darknet or Darkweb Using TOR : Anonymous Browsing. **(6)**	**1,2,3**
Malware and Keylogger Analysis: Malware Analysis and Investigation – Introduction to Malware – Static Malware Analysis - Mobile Phone Hacking & Penetration Testing - Introduction of Keylogger: Art of Spying. **(6)**	**5**
Tools and case study: Various open source attack tools may be explored, exposure of various government sites to have information of latest trends in attacks, each student may be required to prepare a report on various attack incidents . **(4)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT601C.CO1	-	-	-	-	-	-	-	-	-	2	1	3	1	1
PEIT601C.CO2	-	3	-	-	2	-	-	-	-	-	-	-	1	1
PEIT601C.CO3	-	-	-	-	2	-	-	-	-	-	1	3	1	1
PEIT601C.CO4	-	3	-	2	3	-	-	-	-	-	-	-	2	1
PEIT601C.CO5	-	-	-	2	3	-	-	-	-	-	-	-	3	3
PEIT601C.CO6	-	2	-	1	2	-	-	-	-	3	-	-	3	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Cybersecurity – Attack and. Defense Strategies	Erdal Ozkaya, Yuri Diogenes.	Packt Publishing2018
2	Cyber Attacks	Protecting National Infrastructure by Edward Amoroso. 2010, Elsevier	
3	Cyber Security: Analytics, Technology and Automation edited.	Martti Lehto, Pekka Neittaanmäki.	International Publishing Switzerland 2015
4	**Online Course:** 1. Cyber Threats and Attack Vectors by Greg Williams, Coursera 2. Introduction to Cyber Security Tools & Cyber Attacks by IBM, Coursera		

COURSE INFORMATION SHEET

Course Code	PEIT 601d

Course Title	Software Engineering (Theory)
Type of Course	PE -II
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional)	50
Course Prerequisites	Introduction to Information Technology
Course Objectives	This course aims to give students a theoretical foundation in software engineering. Students will learn about the principles and methods of software engineering, including current and emerging software engineering practices and support tools.
Course Outcomes	After completion of this course, the students will be able to: I. Understand basic ideas about software engineering. II. Compare various software development models. III. Analyze the importance of scheduling and estimation for project management. IV. Understand the concept of software designing. V. Differentiate between different testing techniques. VI. To gain the knowledge about the metrics measurements and CASE tools.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction Introduction to Software Engineering, System Engineering Vs Software Engineering, Software Evolution, Software Characteristics, Cost of Software Production, Software Components, Crisis – Problem and Causes, Challenges in Software Engineering. **(05)**	1,2
Software Process Model SDLC, Waterfall Model, Incremental Model, Prototyping Model, Evolutionary Model, Spiral Model, Rapid Application Development Model, Formal Methods, Open Source Development, Object Oriented Life Cycle Model, Methods. **(06)**	2
Project Management Concepts Management Activities, Project Planning, Project Scheduling, Size Estimation – LOC, FP; Cost Estimation Models –COCOMO, COCOMO-II. **(06)**	3

Software Requirements Analysis and Specification Concepts Requirement Engineering, Requirement Elicitation Techniques, Requirements Documentation, Characteristics and Organization of SRS, Analysis Principles, Analysis Modeling – Data Modeling, Functional Modeling and Behavioral Modeling; Structured vs. Object Oriented Analysis. **(05)**	2,3

SECTION-B

Software Design and Coding Concepts Design Principles, Data Design, Architectural design, Interface Design, Component Level Design, Object Oriented Design Concepts, Cohesion and Coupling and their classification, top-down, bottom-up and middle-out design, Coding, Coding Standards, Coding Conventions, Programming Style. **(06)**	5
Testing Verification and Validation, Testing Process, Design of Test Cases, Software Testing Strategies, Unit Testing, Integration Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, System Testing and Debugging. **(05)**	5
Technical Metrics for Software Software Measurements: What and Why, A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Software Quality, Metrics for Maintenance.**(06)**	4,5
CASE (Computer Aided Software Engineering) and Introduction to UML CASE and its Scope, Building blocks of CASE, CASE Tools, CASE Environment, UML Concepts, Use Case Diagrams, Sequence Diagrams, Collaboration Diagrams, Class Diagrams, State Transition Diagrams, Component and Deployment Diagrams. **(06)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 601d CO1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
PEIT 601d.CO2	-	2	-	2	-	-	-	-	-	-	-	-	-	-
PEIT 601d.CO3	-	-	-	-	-	-	-	-	-	-	3	-	1	-
PEIT 601d.CO4	-	-	1	-	-	-	-	-	-	-	-	-	-	-
PEIT 601d.CO5	-	-	-	-	-	-	1	-	-	-	-	-	-	-
PEIT 601d.CO6	-	-	-	-	-	-	1	-	-	-	-	-	-	1

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Software Engineering, 3rd Edition	Ian Somerville	Pearson Education
2	S/W Engineering-A Practitioner's Approach, 6th Edition	Roger S. Pressman	McGRAW-HILL
3	Software Engineering: Theory and Practice, Second Edition	S.L. Pfleeger, J.M. Atlee	Pearson Education
4	Software Engineering for Students, Fourth Edition	Douglas Bell	Pearson Education
5	Software Engineering	Pankaj Jalote	Narosa Publisher
6	Software Engineering, Second Edition	K.K. Aggarwal, Yogesh Singh	New Age International

Professional Elective-III

COURSE INFORMATION SHEET

Course Code	PEIT 602a
Course Title	Principles of Telecommunication and Information Theory (Theory)
Type of Course	PE-III
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Basics of information theory and Communication.
Course Objectives	I. To understand the terminology, fundamental concepts, issues and design approaches of various communication systems. II. To understand and apply the concepts of Information Theory .
Course Outcomes	After completion of this course, the students will be able to: I. Remember the basics of various communication systems. II. Understand the concepts of Wireless communication system. III. Apply the knowledge of random signals and random variables to Information theory. IV. Examine and analyse the density and distribution functions employed for continuous and discrete signals. V. Synthesis and estimate telecommunication systems by employing entropy, information rate, channel information, noise and coding techniques. VI. Evaluate and estimate the communication system for various parameters.

SYLLABUS

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B Sections having three questions each. Candidate is required to attempt at least two questions from each section.

SECTION-A	CO(s)
Introduction to Wireless Communication Evolution of communication systems 1G, 2G, 2.5G, 3G, 4G. GSM and CDMA Wireless Cellular Systems. **(10)**	1

Wireless Technologies Bluetooth, WiFi networks and WLAN IEEE 802.11 standards, ZigBee Radios and IEEE 802.15.4, RFID systems and EPC Global UHF Class 1 Generation 2,WiMax, LTE, LTE-A. **(12)**	**2**

SECTION-B

Random Signals and Random Process: Probability, Properties of probability, Conditional probability, Probability of Statistically Independent Events. Random Variables, Discrete random variables, Continuous random variable. Probability distribution of Discrete random variable, Cumulative distribution function (CDF) - Its properties, Probability density function (PDF), Joint cumulative distribution function, Joint probability density function, Marginal densities, Continuous probability density function, Statistical averages of random variables, Mean value of discrete random variable, Mean value of continuous random variable, Moments and variance, Uniform distribution, Gaussian function- its properties, Rayleigh distribution, random process, Ensemble and time averages, Time averages, Stationary and non-stationary random process, Wide sense stationary process, Ergodic process, Sum of random process, Correlation function, Autocorrelation function, cross-correlation function, Spectral densities. **(12)**	**3,4**
Information Theory: What is Information? Information sources. Information Content of a Discrete memoryless Source (DMS), Information content of a symbol. Entropy, Information rate, Discrete memoryless channels, Types of channels, Conditional and Joint entropy, Mutual Information, Channel capacity, Entropy relation of continuous channel, Capacity of Additive White Gaussian Noise (AWGN), Shannon-Hartley law, Transmission of Continuous signals, Uncertainty in transmission process, Exchange of bandwidth for Signal-to Noise Ratio.Source coding, classification of codes.Entropy Coding, Huffman Encodin. **(11)**	**5,6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT602a.CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
PEIT602a.CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	1
PEIT602a.CO3	2	-	-	-	-	--	-	-	-	-	--	-	-	1
PEIT602a.CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	2
PEIT602a.CO5	-	-	3	-	-	-	-	-	-	-	-	--	-	3
PEIT602a.CO6	-	-	-	3	-	-	-	-	-	-	-	-	-	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Wireless Communications: Principles and Practice, Latest Edition	Theodore S. Rappaport	Prentice Hall India
2	Modern Digital and Analog Communication Systems	B.P. Lathi	Oxford University Press
3	Communication Systems	Simon Haykin, Michael Moher	Wiley

COURSE INFORMATION SHEET

Course Code	PEIT 602b
Course Title	Multimedia System (Theory)
Type of Course	PE-III
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	**50** **50**
Course Prerequisites	Introduction to Information Technology, Computer Networks.
Course Objectives	The objective of the course is to learn the technical details of common multimedia data formats, protocols, and compression techniques of digital images, video and audio content. It enables to learn about the significance of quality of service in multimedia networking.
Course Outcomes	After completion of this course, the students will be able to: I. Learn the basics of multimedia systems such as design issues, storage requirements and interchange standards. II. Understand and compare various file formats for audio and video. III. Analyze and evaluate the standard compression techniques for multimedia data. IV. Learn and apply various networking protocols for multimedia communication and distributed multimedia systems. V. Apply different coding technique for solving real world problem VI. Design interactive multimedia software and evaluate multimedia application for its optimum performance.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction: Multimedia and its types, Introduction to Hypermedia, Hypertext, Multimedia Systems: Characteristics, Challenges, Desirable Features, Components and Applications, Trends in Multimedia . **(4)**	**1**
Multimedia Technology: Multimedia Authoring Paradigms, Design Issues in Multimedia Applications, Standardsfor Document	

Content	
Architecture: SGML (Standard Generalized Markup Language), ODA (Open Document Architecture); Multimedia Standards for Document Interchange: MHEG (Multimedia Hypermedia Expert Group). **(6)**	1
Storage Media : Magnetic and Optical Media, RAID and its levels, Compact Disc and its standards, DVD and its standards, Multimedia Servers. **(4)**	1
Audio: Basics of Digital Audio, Sample Rates, Bit Size, Nyquist's Sampling Theorem; Audio File Formats; Introduction to MIDI (Musical Instrument Digital Interface): Components of a MIDI System, Hardware Aspects of MIDI, MIDI Messages. **(5)**	2
SECTION-B	
Images, Graphics and Videos:Types of Color Models, Graphic/Image Data Structures, Graphic/Image File Formats, Types of Color Video Signals, TV Standards.. **(5)**	2
Image Compression: Types of Redundancies, Classifying Compression Algorithms, Basics of Information Theory, Entropy Encoding: Run-length Encoding, Pattern Substitution, Huffman Coding, Huffman Coding of Images, Adaptive Huffman Coding, Arithmetic Coding, Lempel-Ziv-Welch (LZW) Algorithm, Source Coding Techniques: Transform Coding, Frequency Domain Methods, Differential Encoding, Hybrid Coding: Vector Quantization, JPEG Compression. **(9)**	3,5
Audio Compression: Simple Audio Compression Methods, Psychoacoustics Model, MPEG Audio Compression. **(4)**	3,5
Video Compression: Intra Frame Coding (I-frame), Inter-frame (P-frame) Coding, H.261 Compression, MPEG Compression, MPEG Video, MPEG Video Bitstream, Decoding MPEG Video in Software. **(4)**	3,5
Multimedia Communication: Building Communication Network, Application Subsystem, Transport Subsystem, QOS, Resource Management, Distributed Multimedia Systems. **(4)**	4,6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 602b.CO1	2	2	3	1	2	-	1	-	-	-	-	-	2	2
PEIT 602b.CO2	2	2	2	1	1	-	-	-	-	-	-	2	2	-
PEIT 602b.CO3	2	2	3	1	2	-	-	-	-	-	-	-	3	1
PEIT 602b.CO4	2	1	3	1	2	-	2	-	-	-	-	2	2	3
PEIT 602b.CO5	2	2	3	2	3	-	1	-	-	-	-	2	2	3
PEIT 602b.CO6	1	2	2	2	3	-	2	-	-	-	-	2	2	3

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Multimedia Computing, Communications and Applications	Ralf Steinmetz and KlaraNahrstedt	Pearson Education
2	Multimedia System Design	Prabhat K. Andleigh, KiranThakkar	PHI
3	Multimedia Computing	Li, Drew	Pearson Education
4	Multimedia Communications	Fred Halsall	Pearson Education
5	Multimedia Systems	ParagHavaldar, Gerard Medioni	Cengage Learning Publication

Course Code	PEIT 602c
Course Title	Cyber Forensics
Type of Course	PE-III
L T P	3-0-0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Computer Architecture and organization, Network Security & cryptography, Information Security.
Course Objectives	The objective of the course is to enable the student to identify, analyze and remediate computer security breaches; and to teach students about the various forms of cybercrimes and fundamentals of cyber forensic technologies.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the fundamentals of Cyber-crimes and analyze its impact on the society. II. Learn the techniques for investigating Cyber-crimes and procedures for collecting & preserving evidences. III. Examine the evidence collected and apply it for the reconstruction of past events. IV. Understand the legal and ethical aspects of Cyber-crimes. V. Design and develop a security architecture for an organization. VI. Design operational and strategic cyber security strategies and policies.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
UNIT – 1 Overview of Cyber Crime: Nature and Scope of Cyber Crime, Types of Cyber Crime, Introduction to Cyber forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific method in forensic analysis ,investigating large scale Data breach cases. Analyzing Malicious software. Computer Forensics Technologies: Types of	**1**

Military Computer Forensic Technology, Types of Law Enforcement Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems. **(8)**	
UNIT-2 Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems. **(7)**	**1**
UNIT-3 Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking. **(8)**	**1,2**
SECTION-B	
UNIT-4 Ethical Hacking: Essential Terminology, Windows Hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies. **(8)**	**2,3,5**
UNIT-5 Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks, Router Forensics. Cyber forensics tools and case studies. **(8)**	**2,3,5**
UNIT-6 Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies. **(6)**	**4,6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 602c.CO1	2	3	1	2	-	1	2	-	-	-	-	1	2	1
PEIT 602c.CO2	2	3	1	1	2	2	1	-	-	-	-	2	3	2
PEIT 602c.CO3	2	2	3	2	1	2	1	-	-	-	-	2	3	2
PEIT 602c.CO4	1	-	2	1	2	2	1	3	-	-	-	1	2	1
PEIT 602c.CO5	2	2	3	2	1	2	1	3	-	-	-	1	3	3
PEIT 602c.CO6	1	2	3	2	-	2	2	3	-	-	-	-	3	2

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Computer Forensics: Computer Crime Scene Investigation.	John R VACCA	Firewall Media , 2009 edition Reprint 2012.
2.	Guide To Computer Forensics And Investigations	Bill Nelson, Amelia Phillips,Christopher Stuart	Cengage Learning publications, latest edition.
3.	Cybercrime	Bernadette H Schell, Clemens Martin	ABC–CLIOInc, California,
4.	Understanding Cryptography: A Textbook for Students and Practitioners, Latest Edition, Springer's.	Christof Paar, Jan Pelzl	Latest Edition, Springer's
5.	Live Hacking: The Ultimate Guide to Hacking Techniques &Countermeasures for Ethical Hackers & IT Security Experts.	Ali Jahangiri	
6.	Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics		
7.	Matt Pepe, —Incident Response and Computer Forensics	Kevin Mandia, Chris Prosise,	Tata McGraw -Hill, New Delhi
8.	Software Forensics	Robert M Slade	Tata McGraw - Hill, New Delhi.

Course Code	PEIT 602d
Course Title	Software Project Management
Type of Course	PE-III
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	
Course Objectives	I. To study the Introduction of project management and its basic concepts and techniques. II. To understand how to calculate risk, manage people, and to do resource allocation.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the process of software project management and its application in delivering successful IT projects. II. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities using automated tools. III. Conduct project planning activities that accurately forecast project costs. IV. Identify and implement the resources management techniques required for a project to understand how different management and development practices affect software and process quality. V. Apply risk management analysis techniques to identify risks in project and effect of risk on project timescales. VI. Explore the skills required for managing. projects, project teams, and stakeholders.

SYLLABUS
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Introduction to project management: Introduction, Importance of software project management, Project and different types of project,Problems with software projects, Environmental Appraisal with Projects, Requirement Specification, Management Control, Steps in project planning. **(08)**	1
Programme management and project evaluation: Programme Management, Managing resources within programme, Strategic programme management, Aids to programme management, Evaluation / Assessment of projects, Cost-benefit Analysis, Cash flow forecasting, Cost-benefit evaluation techniques, Risk evaluation. **(08)**	1,2,5
Project approach and Software effort estimation: Selection of an appropriate project technology, Choice of process model, Data Structure, Delivery Model, Basis for software estimation, Problem with over and under estimates, Estimation Techniques, Expert judgment, Albrecht Function Point Analysis, Function points Mark II, COSMIC Function point, COCOMO Model. **(10)**	1,2
SECTION-B	
Activity Planning: Objective of Planning, Project Schedule, Activities – Sequencing and Scheduling, Development of Project Network, Time Estimation, Forward and backward Pass, Critical Path and Activities. **(03)**	3
Risk Management: Risk, Risk categories, identification, assessment, planning, management PERT and CPM Models, Monte Carlo Simulation. **(03)**	5
Resource Allocation, Monitoring and Control: Resources, Nature of Resources, Resource Requirement, Scheduling, Counting and Costing, Monitoring Framework, Cost Monitoring, Earned Value Analysis, Project targets, Change Control Management. **(08)**	4
Managing people and organizing teams: Management Spectrum, Associating human resource with job, Motivation, Oldham- job Characteristics Model, Decision Making, Leadership, Stress, Health and Safety. **(05)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT602D.CO1	1	1	2	-	-	-	-	-	-	-	2	-	3	-3
PEIT602D.CO2	2	-	-	2	2	-	-	-	-	-	2	-	2	-
PEIT602D.CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	2
PEIT602D.CO4	-	2	2	1	-	-	-	-	-	-	-	-	2	2
PEIT602D.CO5	-	3	2	-	-	-	-	-	-	-	-	-	3	-
PEIT602D.CO6	-	-	-	-	-	-	-	-	2	-	3	2	1	-

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Software Project Management	Bob Hughes & Mike Cotterell	Tata McGraw Hill Publication
2	Projects – Planning, Analysis, Selection, Financing, Implementation and Review	Prasanna Chandra	6th, Tata McGraw Hill Publication
3	Project Management	JeffreyPinto	Pearson Publications

COURSE INFORMATION SHEET

Course Code	HSMC601
Course Title	Environment Sciences
Type of Course	HSMC
L T P	0 0 0
Credits	Non-credit
Total lectures	-
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
General Introduction, components of the environment, environmental degradation.	**(4)**
Ecology Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.	**(3)**
Air pollution and control Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures.	**(6)**
SECTION-B	
Water pollution and control Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.	**(6)**
Land Pollution Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.	**(6)**
Noise Pollution Sources, effects, standards and control.	**(6)**

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Introduction to Environmental Engineering and Science	C. M. Masters	Prentice Hall of India Pvt. Ltd., 1991
2.	Environmental Science	B. J. Nebel	Prentice Hall Inc., 1987

COURSE INFORMATION SHEET

Course Code	PWIT651
Course Title	Project-II
Type of Course	Core
L T P	0 0 2
Credits	01
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	00 50
Course Prerequisites	Nil
Course Objectives	1. Students learning skills to tackle realistic problems as they would be solved in the real world. 2. To work as team to deliver project that matches the required specification.
Course Outcomes	After completion of this course, the students will be able to: I. Plan, Analyze, design and implement gathered skills and knowledge over the field of research and to solve real life problem. II. Apply software development lifecycle to plan & manage the projects. III. Demonstrate the ability to communicate effectively in orally and in writing. IV. Learn to work in team and focus on getting work done on time.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT 651 .CO1	3	3	2	3	3	1	-	2	2	-	-	3	3	3
PWIT 651 .CO2	1	2	2	2	3	-	1	2	2	-	-	-	3	3
PWIT 651 .CO3	-	2	-	-	3	-	-	3	2	3	1	-	-	-
PWIT 651 .CO4	-	-	-	1	3	-	-	-	3	2	3	-	1	1

SYLLABUS FOR B.E. (I.T.) SEVENTH SEMESTER
COURSE INFORMATION SHEET

Course Code	**PCIT 701**
Course Title	**Digital Signal Processing (Theory)**
Type of Course	**PC**
L T P	**3 1 3**
Credits	**04**
Total Lectures	**45**
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Prerequisites	Basic Information Theory and communication.
Course Objectives (CO)	I. To understand how to analyze and manipulate digital signals and have the fundamental MATLAB programming knowledge to do so. II. To provide the student with the necessary background for taking advanced level courses in signal and image processing.
Course Outcome	After the completion of this course, the students will be able to: I. Understand the concept of Digital Signal Processing, its advantages and applications II. Differentiate between types of Discrete signals/systems. III. Calculate Discrete Time Fourier Transform, Discrete Fourier Transform and Z-Transform of Discrete Signals, IV. Develop Fast Fourier Transform (FFT) algorithms for faster realization of signals and systems. V. Learn and Design the structures of digital filters. VI. Appreciate the architecture and features of Digital Signal Processors.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction to Digital Signal Processing Applications and advantages of DSP. Sampling theorem, concept of frequency in discrete time signals. **(4)**	**1**
Discrete Time Signals and Systems Classification of signals, standard signals and classification of discrete time systems. Linear Time Invariant systems and their representation by difference equations and structures. **(8)**	**2**

Z- Transform Definition of direct, inverse z-transform and its properties. System functions of a LTI system. Inverse z-transform by power series expansion and sectional fraction expansion. **(4)**	**3**
Frequency Analysis Fourier series and transform of discrete time signals and properties (DTFT). Discrete Fourier Transform and its properties. Fast Fourier Transform algorithms, decimation in time and decimation in frequency algorithms (radix 2). **(8)**	**3,4**
SECTION-B	
Realization of FIR & IIR Systems: Direct forms, cascade and parallel form IIR structures. Direct form, cascade and linear phase FIR structures. **(4)**	**5**
Design of Digital Filters: Comparison of Analog and Digital filters, Comparison of IIR and FIR filters.FIR Filters and linear phase requirement. FIR filters design using the window technique. IIR Filters and their design using the impulse invariance technique and bilinear transformation. Finite word length effects. **(12)**	**5**
DSP Processors Introduction to DSP Processors, architecture of TMS 320CXX and ADSP 21XX. **(5)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT 701.CO1	2						2							2
PCIT 701.CO2	2	1			2									1
PCIT 701.CO3	2	1			2								2	
PCIT 701.CO4	2	1	1		3								2	
PCIT 701.CO5	2	2	1		2								2	2
PCIT 701.CO6	2	1	1				1							3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Digital Signal Processing: Principles, Algorithms and Applications, 3rd Edition	Proakis&Manolakis	Pearson
2.	Digital Signal Processing	E C Ifeacher and B W Jervis	Prentice Hall
3.	Digital Signal Processing, 1st Edition	S Salivaharan, A Vallavraj, C Granapriya	TMH
4.	Digital Signal Processing	Sanjay Sharma	S.K. Kataria& Sons

Course Code	PCIT 751
Course Title	**Digital Signal Processing (Practical)**
Type of Course	PC
Credits	1.5
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Basic Information Theory and communication.
Course Objectives	To develop skills for analyzing and synthesizing systems that process discrete time signals, digital filters with emphasis on realization and simulation.

SYLLABUS

Practical based on theory.

COURSE INFORMATION SHEET

Course Code	PCIT 702
Course Title	Compiler Design (Theory)
Type of Course	PC
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Computer Architecture and Organization, Theory of Computation
Course Objectives	To provide the in-depth knowledge of different concepts involved while designing a compiler.
Course Outcomes	After the completion of this course, the students will be able to: I. Understand the major phases of a typical compiler, including front-end and back-end. II. Identify the basic data structures used in compiler construction such as symbol tables, syntax trees, three- address code, and stack. III. Develop scanner, parser, and semantic analyzer without automated tools. IV. Analyze the program and minimize the code by using optimization techniques. V. Explain the role of different types of runtime environments and memory organization for implementation of typical programming languages. VI. Design a compiler for a simple programming language.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction Compilers and Translators; The phases of the compiler – Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code generation, Bookkeeping, Error handling. **(5)**	**1,2**
Lexical Analysis The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata: Regular expressions, NFA, DFA.Design of a lexical analyzer generator. **(5)**	**1,3,6**
Syntax Analysis The role of a parser, Context free grammars, Writing a grammar, Top down Parsing: Recursive decent parser, Predictive parser, Bottom up Parsing: Handles, Viable prefixes,	**1,2,3,6**

Operator precedence parsing, LR parsers: SLR, LALR, CLR. Parser generator (YACC).Error Recovery techniques for different parsers. **(12)**	

SECTION-B	
Syntax directed translation Syntax directed definitions, Synthesized and inherited attributes, Construction of syntax trees. **(4)**	1,2,3,6
Run time environments Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Symbol tables: storage, data structures used. **(6)**	2,5,6
Intermediate code generation Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples). **(3)**	1,2,6
Code optimization and code generation Introduction, Basic blocks & flow graphs, DAG, principle sources of optimization: loop optimization, eliminating induction variable, eliminating common sub-expression, loop unrolling, loop jamming etc., Issues in the design of code generator, a simple code generator, Register allocation & assignment, Peephole optimization. **(10)**	1,4,6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT702.CO1	1	-	-	-	1	-	-	-	-	-	-	-	2	2
PCIT702.CO2	1	-	2	-	2	-	-	-	-	-	-	1	2	2
PCIT702.CO3	2	-	2	-	3	-	-	-	-	-	-	1	3	3
PCIT702.CO4	2	-	2	-	2	-	-	-	-	-	2	-	3	2
PCIT702.CO5	-	-	1	-	-	-	-	-	-	-	-	-	2	3
PCIT702.CO6	1	-	1	-	2	-	-	-	-	-	-	1	3	3

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Compilers: Principles, Techniques and Tools	Aho, Sethi and Ullman	Pearson Education
2.	Principles of Compiler Design	Aho, Ullman	Narosa Publication
3.	Compiler Construction- Principles and Practice	Dhamdhere	Macmillan, India
4.	Compiler Design in C	Holub	PHI

Professional Elective-IV

Course Code	PEIT 701a
Course Title	Software Defined Networks
Type of Course	PE-IV
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Computer networks or related courses., C, C++, Java, or Python programming skills,Basic Linux operating system skills.
Course Objectives	This course introduces software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network. Recently, SDN is being deployed in data center networks, campus networks, enterprise networks, operator networks, and is expected to play a very important role in Internet of Things (IoT) networks and 5G cellular networks. In this course, we will first introduce the concepts of SDN, its use cases and its applications to give the students an overall picture of this new technology.
Course Outcomes	I. To define and understand terminology involved in the field of software defined networking (SDN). II. To describe software defined architecture and open flow protocol for communication between controller and switches. III. To provide an overview and comparison of various SDN controllers. IV. To design topologies using Mininet and various APIs. V. To develop various applications and protocols for SDN architecture. VI. To identify and analyse various security threats in SDN based networks.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Overview of Software Defined Networking: History and Evaluation of SDN, Introduction to SDN, Advantages of SDN over Traditional Network Architecture, Separation of Control and Data Plane, Use Cases of SDN. **(6)**	**1**
SDN Components How SDN Works - SDN Architecture : Data plane, Control plane, Application Plane, Southbound Interface, Northbound Interface, Pure and Hybrid openflow switches, Software and Hardware based Openflow switches, Programmable Network Hardware. **(6)**	**2**
SDN Controllers: Overview, Centralized & Distributed Controllers, Open source SDN Controllers: POX , Ryu, Floodlight, OpenDaylight, Advantages and Disadvantages of each controller**.** **(5)**	**3**
OpenFlow Protocol OpenFlow Overview- OpenFlow 1.0 and OpenFlow Basics-, OpenFlow 1.1 Additions, OpenFlow 1.2 Additions, OpenFlow 1.3 Additions, Flow table components: matching rules, Actions, Counters, OpenFlow security, Proactive and reactive approach to insert flow table entries, Comparison of Openflow with other Southbound interfaces, OpenFlow Limitations. **(6)**	**2**
SECTION-B	
Mininet Emulation Tool Creating Default & Custom topologies in Mininet using low level API, mid-level API, high level API, Developing Switching and Firewall Applications in Mininet. **(6)**	**4**
Programming SDN: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs. **(5)**	**5**
SDN Security Challenges and Issues Characteristics of SDN, Security Analysis and Potential attacks in SDN, Solutions to the security issues in SDN. **(5)**	**6**
Software Defined Networks with Network Function Virtualization (NFV) Introduction to Network Function Virtualization, History and Evaluation of NFV, NFV Architecture and its relation with SDN, Similarities and differences in SDN and NFV, NFV use cases. **(6)**	**1**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT701a.CO1	-	-	-	-	-	-	-	-	-	-	-	3	1	1
PEIT701a.CO2	-	-	-	-	-	-	-	-	-	-	-	3	1	1
PEIT701a.CO3	-	-	-	-	3	-	-	-	-	-	-	3	1	1
PEIT701a.CO4	-	2	3	2	3	-	-	-	-	-	-	-	2	3
PEIT701a.CO5	1	2	3	-	3	-	-	-	-	-	-	-	3	3
PEIT701a.CO6	2	-	-	2	-	-	-	-	-	-	-	-	2	2

RECOMMENDED BOOKS

S.No.	NAME	AUTHOR(S)	PUBLISHER
1	SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies.	Thomas D. Nadeau	GrayPublisher:O'ReillyMedia, August 2013, ISBN: 97814493-4230-2, ISBN 10:1-4493-4230-2.
2	Software Defined Networks: A Comprehensive Approach	Paul Goransson and Chuck Black, Morgan Kaufmann, June 2014, Print Book ISBN: 9780124166752, eBook ISBN : 9780124166844	
	Suggested Books		
3	Software Defined Networking with OpenFlow.	SiamakAzodolmolky	Packt Publishing, 2013
4	Software Networks: Virtualization, SDN, 5G, Security.	Guy Pujolle, Wiley, 2015	
5	Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud	William Stallings Publisher: Addison-Wesley 2015 ISBN: 9780134175393	William Stallings Publisher

COURSE INFORMATION SHEET

Course Code	PEIT 701b
Course Title	Human Computer Interaction
Type of Course	PE-IV
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 50 50
Course Prerequisites	Introduction to Information Technology.
Course Objectives	The objective of this course is to familiarize the students with the key areas, approaches and developments in the field of Human Computer Interaction (HCI). It aims to get the students think constructively and analytically about how to design and evaluate interactive technologies.
Course Outcomes	After the completion of this course, the students will be able to: I. Understand the need and importance of designing interactive products and examine various interaction devices. II. Describe typical human–computer interaction (HCI) models, styles, and various HCI paradigms. III. Illustrate and analyze user needs and formulate user design specifications. IV. Learns various tools for graphics design and examine the interactive design process for developing HCI systems. V. Examine the Mobile ecosystem to enable the development of mobile applications and tools. VI. Learn and apply various Windows characteristics features for designing interactive applications.

SYLLABUS		
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.		
SECTION-A		CO(s)
Unit 1: Introduction to Human Computer Interface Importance of User Interface, History of Human Computer Interface, Importance of Good Design, Benefits of Good Design, Principles of User Interface Design. **(5)**		**1,2**

Unit 2: Interaction Devices Keyboard Keys, Function Keys, Pointing Devices, Speech Recognition, Handwriting Recognition, Speech Generation, Image Display, Video Display, Device Drivers. **(6)**	1,2
Unit 3: Color and Content	1,2
Why Colors, Color Uses, Choosing Colors, Possible Problems With Colors, Page Title,Headings, Text, Messages, Error Messages, Icons. **(6)**	
Unit 4: Design Process	2,3
Understanding How User Interact With Computers, User Interface Models, Design Methodologies, Designing an Interface, Process of Interaction Design. **(5)**	
SECTION-B	
Unit 5: Graphical User Interface	4
Popularity of Graphics, Characteristics of Graphical User Interface, Concepts of Direct Manipulation, Graphical System Advantages and Disadvantages, Web User Interface Characteristics and Popularity. **(6)**	
Unit 6: Device and Screen-Based Control	4
Device Based Controls, Operable Controls, Text Entry/Read-Only Controls, Selection Controls, Combining Entry/Selection Controls, Other Operable Controls, Presentation Controls and Selecting Proper Controls. **(5)**	
Unit 7: Mobile HCI	4,5
Mobile Ecosystem: Platforms, Application Frameworks- Types of Mobile Applications: Widgets, Applications, Games – Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. **(7)**	
Unit 8: Windows	4,6
Window characteristics, Components of Window, Window Presentation Styles, Types of Windows, Window Management. **(7)**	

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 701b.CO1	2	1	2	-	2	-	2	-	-	2	-	1	3	1
PEIT 701b.CO2	2	2	1	-	2	1	1	-	-	2	-	2	3	1
PEIT 701b.CO3	2	1	3	-	1	-	1	-	-	2	-	2	3	1
PEIT 701b.CO4	1	2	3	-	3	2	1	-	-	2	-	1	3	1
PEIT 701b.CO5	2	2	2	2	2	3	1	2	-	2	-	1	3	1
PEIT 701b.CO6	1	2	3	-	1	-	2	-	-	2	-	1	3	1

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Human-Computer Interaction.	Dix A. et al.	Harlow, England: Prentice Hall, 2004.
2.	Interaction Design: Beyond Human Computer Interaction.	Yvonne Rogers, Helen Sharp, Jenny Preece.	3rd Edition, Wiley, 2011.

COURSE INFORMATION SHEET

Course Code	**PEIT 701c**
Course Title	**Block Chain Technology**
Type of Course	**PE-IV**
L T P	**3 0 0**
Credits	**03**
Total Lectures	**45**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Data structures and Network Security & Cryptography
Course Objectives	After successful completion of this course, students will be familiar with blockchain and cryptocurrency concepts. Also they can build their own application using the learned concepts
Course Outcomes	After the completion of this course, the students will be able to: I. Describe emerging abstract models for Blockchain Technology, the structure of a blockchain and why/when it is better than a simple distributed database. II. Evaluate the setting where a blockchain based structure may be applied, its potential and its limitations. III. Analyze various cryptography mechanisms and evaluate their role in blockchain. IV. Familiarize the functional/operational aspects of cryptocurrency ecosystem. V. Identify challenges and technical gaps existing between theory and practice in cryptocurrency domain. VI. Evaluate security and privacy of a given blockchain system.

SYLLABUS		
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.		
SECTION-A		**CO(s)**
UNIT 1 Introduction to BlockChain: 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) . **(12)**		**1,2**
UNIT 2 – Overview of Cryptography: Symmetric-key cryptography, Public-key		

cryptography, Digital Signatures, Hash functions, Elliptic curve cryptography, Basics for crypto currency, Application of Cryptography to Blockchain- Using hash functions to chain blocks, Digital Signatures to sign transactions, Using hash functions for Proof-of-Work. **(10)**	3
SECTION-B	
UNIT 3 – Introduction to Bitcoin: Wallet, Blocks, Merkley Tree, Hardness of mining, Transaction verifiability, Anonymity, Forks, Double spending, P2P gateway, Mathematical analysis of properties of Bitcoin. **(8)**	4
UNIT 4 – Ethereum and Hyperledger: Ethereum networks, Ethereum Virtual Machine (EVM), Wallets for Ethereum, Solidity language, decentralized applications using Ethereum. Solidity- Smart Contracts, Attacks on smart contracts, Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain. **(8)**	4,5
UNIT 5 - Security issues in Blockchain : Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms . **(7)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT701c.CO1	2	-	-	-	-	1	-	1	-	-	-	1	1	1
PEIT701c.CO2	2	1	1	2	-	1	1	1	-	-	-	1	2	1
PEIT701c.CO3	3	2	1	2	-	1	1	-	-	-	-	1	3	2
PEIT701c.CO4	1	-	-	1	-	1	1	1	-	-	-	1	1	2
PEIT701c.CO5	2	1	1	1	-	2	1	1	-	-	-	1	2	3
PEIT701c.CO6	3	2	1	2	1	3	1	1	-	1	-	1	2	2

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	An Introduction to Bitcoin, Lecture Notes, Online: https://www.ee.iitb.ac.in/~sarva/bitcoin.html	Vijayakumaran, Saravanan	
2.	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Narayanan, Arvind.	Princeton University Press, 2016
3.	M. Mastering Bitcoin: Programming the Open Blockchain	Antonopoulos, Andreas	O'Reilly Media, Inc., 2017

Course Code	PEIT 701d
Course Title	Agile Software Development (Theory)
Type of Course	PE-IV
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Introduction of Information Technology
Course Objectives	To understand the basic concepts of agile software process. 1.To gain knowledge in the area of various Agile Methodologies. 2.To know the principles of Agile Testing.
Course Outcomes	After completion of this course, the students will be able to: I. Understand the practices and philosophies of agile methods. II. Analyze the tradeoffs in selecting a software engineering method. III. Understand the basic agile design principles. IV. Define and extend the usage of scrum and extreme programming in software product development. V. Familiarize with various tools for Agile project management VI. Understand about various testing methods used in Agile.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Overview of Agile Software development Introduction: What is Agile?, Goals/Manifesto and principles, Key Features, Challenges, Advantages and disadvantages, Agile usage, Agile Vs Traditional Software development (Waterfall), Agile Software Development lifecycle. **(08)**	1,2
Agile Design Agile Design Practices, Design smells and software rotting, SOLID Principles: SRP – The Single Responsibility Principle, OCP – the Open Closed Principle, LSP – The Liskov Substitution, DIP – The Dependency Inversion Principle, ISP – The Interface Segregation Principle. **(6)**	2,3
Agile Methodologies Scrum: Overview of scrum theory, Scrum Team, Scrum Roles, The Sprint, Sprint Planning, Daily Scrum, Sprint review, Sprint retrospective, Scrum artifacts, Product back log, sprint backlog, Progress Monitoring.Extreme Programming(XP): Overview of XP, Concept,	4

Values, Rules, Principles, Scalability, Practices, Issues. **(9)**		

SECTION-B	
Agile Project Management Overview of Agile project management, Agile project management model: Overview of agile enterprise framework and agile delivery framework, Scaling and governing agile projects. Tools for Agile project management. **(10)**	**5**
Agile Testing Introduction to agile testing, Principles for testers, Overview of organizational challenges, The Agile testing Quadrants, Test Automation, The Agile lifecycle and its impact on testing, Types of testing in agile : TDD, BDD, Acceptance tests Exploratory testing, Risk based testing, Regression tests, Unit testing, Integration testing, system testing, Tools to support the Agile Tester. **(12)**	**5,6**

PO/PSO CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT701d.CO1	-	2	-	-	-	-	-	-	-	-	-	-	2	1
PEIT701d.CO2	1	-	-	-	-	-	-	-	-	-	-	-	2	1
PEIT701d.CO3	-	-	1	-	-	-	-	-	-	-	-	-	2	1
PEIT701d.CO4	-	-	-	1	-	-	-	-	-	-	-	-	1	2
PEIT701d.CO5	-	-	-	-	1	-	-	-	-	-	-	-	1	2
PEIT701d.CO6	-	-	-	-	-	-	-	-	-	-	-	-	2	2

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Agile Principles, Patterns, and Practices in C#	Martin C. Robert, Martin Micah	Prentice Hall, 2006
2	Agile Project Management: Creating Innovative Products, 2nd Edition	Jim Highsmith	Addison-Wesley Professional, 2010
3	Agile Testing: A Practical Guide for Testers and Agile Teams	Janet Gregory, Lisa Crispin	Addison-Wesley .

Course Code	**PWIT 751**
Course Title	**Industrial Training (after 6th Semester)**
Type of Course	**PW**
L T P	**0 0 0**
Credits	**01**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	**Nil**
Course Objectives	**Course Objectives:** 1. To enable students to integrate theory with practice. 2. To provide opportunity to students to gain hands experience about current problems industrial practitioners are dealing with. 3. To introduce students to the industry work culture and related practices.
Course Outcomes	After completion of this course, the students will be able to: I. Analyse practical aspects of a problem and apply engineering methods to design its solution. II. Apply skills and knowledge of modern technologies to develop solution for a real life problem. III. Demonstrate technical, interpersonal and communication skills, both oral and written.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT751.CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3
PWIT751.CO2	-	-	3	-	3	-	-	-	-	-	-	-	-	3
PWIT751.CO3	-	-	-	-	-	-	-	3	3	3	2	-	-	-

COURSE INFORMATION SHEET

Course Code	PWIT 752
Course Title	Project-III
Type of Course	PW
L T P	0 0 4
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **100**
Course Prerequisites	Nil
Course Objectives	1. Students learning skills to tackle realistic problems as they would be solved in the real world. 2. To work as team to deliver project that matches the required specification.
Course Outcomes	After the completion of this course, the students will be able to: I. Plan, Analyze, design and implement gathered skills and knowledge over the field of research and to solve real life problem. II. Apply software development lifecycle to plan & manage the projects. III. Demonstrate the ability to communicate effectively in orally and in writing. IV. Learn to work in team and focus on getting work done on time.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT 552 .CO1	3	3	2	3	3	1	-	2	2	-	-	3	3	3
PWIT 552 .CO2	1	2	2	2	3	-	1	2	2	-	-	-	3	3
PWIT 552 .CO3	-	2	-	-	3	-	-	3	2	3	1	-	-	-
PWIT 552 .CO4	-	-	-	1	3	-	-	-	3	2	3	-	1	1

COURSE INFORMATION SHEET

Course Code	**PCIT 801**
Course Title	**Embedded System Design (Theory)**
Type of Course	**PC**
L T P	**3 1 3**
Credits	**04**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Microprocessor & Assembly Language Programming, Computer Architecture &Organization.
Course Objectives	I. To introduce students to the embedded systems, its hardware (micro-controllers) and software. II. To explain real time operating systems, inter-task communication.
Course Outcomes	After the completion of this course, the students will be able to: I. Comprehend the concept of Microprocessors and Microcontrollers, Embedded and external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures. II. Understand the architecture, addressing modes, instructions, interrupts, timers/counters, serial communication and applications of 8051 Microcontroller and PIC 16C6X/7X Microcontrollers. III. Apply and evaluate 8051 and PIC 16C6X/7X Microcontrollers based solutions to real problems IV. Appreciate the evolution of architectures used for Embedded Software Development. V. Understand the features of RTOS. VI. Design real-time embedded systems.

SYLLABUS	
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.	
SECTION-A	**CO(s)**
Introduction to Microcontrollers	

Comparison of Microprocessors and Microcontrollers. Embedded and external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures. **(04)**	1
Overview of 8 bit Microcontrollers Overview of 8051, Architecture, addressing modes and instructions. Interrupts, Timer/ Counters, Serial Communication and applications. Interfacing Overview of Atmel 89C51 microcontroller. **(19)**	2,3

<div align="center">SECTION-B</div>

PIC Microcontrollers Introduction and features, PIC 16C6X/7X: Architecture, Registers, Reset actions, Memory Organization, Instructions, Addressing Modes, I/O Ports, Interrupts, Timers, ADC. Input Capture, Output Compare, Frequency Measurement, Serial I/O Device**. (12)**	2,3
Software Development & Tools Embedded System Evolution Trends, Round Robin, Round Robin with Interrupts, Function Scheduling architecture, Real Time scheduling: their development, applications and examples. **(06)**	4
Real Time Operating Systems RTOS Architecture, Task and Task States, Tasks and Data, Semaphores and shared data, Operating System Services: message queues, timer function, events, memory management, interrupt Routines in an RTOS environment, Basic Design Using RTOS. **(04)**	5,6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PCIT801.CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
PCIT801.CO2	2	-	-	-	-	-	-	-	-	-	-	-	1	3
PCIT801.CO3	3	2	3	-	-	-	1	-	-	-	-	-	1	3
PCIT801.CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	2
PCIT801.CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	2
PCIT801.CO6	3	2	3	-	-	-	1	-	-	-	-	-	1	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	The 8051 Microcontroller and Embedded Systems	Muhammed Ali Mazidi, Janice GillispieMazidi and Robin D. Mckinlay	Pearson 2nd Edition
2.	The 8051 Microcontroller: Architecture, Programming & Applications	Kenneth J. Ayala	Pearson 2nd Edition
3.	Microcontrollers (Theory and Applications)	Ajay Deshmukh	TMH Publishers
4.	An Embedded Software Primer	David E. Simon	Addison Wesley
5.	*Specification and Design of Embedded Systems,* Latest Edition	D. D. Gajski, F. Vahid, S. Narayan, J. Gong	Prentice Hall

COURSE INFORMATION SHEET

Course Code	**PCIT 851**
Course Title	**Embedded System Design (Practical)**
Type of Course	**PC**
Credits	**1.5**
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	**00** **50**
Course Prerequisites	Microprocessor & Assembly Language Programming
Course Objectives	To design, implement, test and document the microprocessor-based systems.

SYLLABUS

Practical based on theory.

COURSE INFORMATION SHEET

Course Code	PCIT 802
Course Title	Cloud Computing (Theory)
Type of Course	PC
L T P	3 1 0
Credits	04
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	50 50
Course Prerequisites	Operating System , Computer Networks
Course Objectives	I. To understand the basics of Cloud Computing, different deployment models and service models of Cloud. II. To have an overview about the Public cloud and Private cloud, and the security issues related to Cloud computing.
Course Outcomes	After the completion of this course, the students will be able to: I. Define the concepts of Cloud Computing and the various deployment and service models of Cloud Computing. II. Compare and contrast the different virtualization techniques. III. Demonstrate the functioning of Private Cloud and Public cloud infrastructures IV. Analyze authentication, confidentiality and privacy issues in Cloud computing environment. V. Evaluate the different cloud infrastructures in solving problems related to life sciences and social networking. VI. Determine financial and technological implications for selecting cloud computing platforms .

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	
Overview of Cloud Computing: Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS& SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing. **(4)**	1
Understanding Virtualization Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing. **(4)**	2
Working with Private Cloud:	3

Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (**one out of** CloudStack, OpenStack, Eucalyptus, IBM or Microsoft). **(9)**	
Working with Public Clouds: What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings (IaaS),PaaS offerings, Software as a Service Offering (SaaS). Implementing public cloud (**one out of** AWS, Windows Azure, IBM or Rackspace) . **(8)**	3
SECTION-B	
Overview of Cloud Security: Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing. **(6)**	4
Overview of Multi-Cloud Management Systems & Business Cloud: Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Cloud Computing in Business, Clouds focused on industry domains (Life Sciences and Social networking) Introduction of Business Intelligence on cloud and Big Data Analytics on Cloud. **(10)**	5
Future directions in Cloud Computing Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security, Current issues in cloud computing leading to future research directions. **(4)**	6

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
IT802.CO1	1	3	2	-	-	-	-	-	-	-	-	2	1	3
IT802.CO2	1	3	2	-	-	-	2	-	-	-	-	2	1	3
IT802.CO3	1	3	3	2	-	-	-	-	-	-	-	2	1	3
IT802.CO4	1	-	-	-	2	-	1	-	1	-	-	2	2	3
IT802.CO5	1	3	3	-	2	-	3	-	-	-	-	2	2	3
IT802.CO6	-	-	-	3	-	-	-	-	2	-	-	2	3	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Cloud Computing: Principles and Paradigms	RajkumarBuyys, James Broberg, Andrzej Goscinski (Editors)	Wiley, 2011
2.	Cloud Computing	Michael Miller	Pearson Education 2009
3.	Cloud Computing for dummies,	Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper	Wiley, 2009
4.	Cloud Computing: A Practical Approach	Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter	McGraw Hill, 2010.
5.	Handbook of Cloud Computing	BorkoFurht, Armando Escalante	Springer, 2010

Professional Elective-V
COURSE INFORMATION SHEET

Course Code	PEIT 801a
Course Title	Optical Communication
Type of Course	PE-V
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Prerequisites	Basic Information Theory and communication.
Course Objectives	To explain the need, significance of Optical Communication System; and to imsection knowledge of transmission characteristics, losses, types of optical fibers cables.
Course Outcomes	After the completion of this course, the students will be able to: I. Recall the basic concepts of optical communication system. II. Understand the need and fundamentals of Optical Communication System. III. Apply knowledge of fiber optics to analyze the losses and causes of signal degradation in optical communication. IV. Understand various optical sources employed in optical communication. V. Understand the different optical detectors used in optical communication. VI. Understand and Analyse the losses caused by fiber joints, connectors and couplers.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	
	CO(s)

Overview of Optical Fiber Communication: Basic communication system, Block Diagram, Explanation of each block, Advantages of optical communication, applications of fiber optic communication. **(3)**	**1,2**
Optical Fiber Wave Guides: Ray Theory of Transmission: Total Internal reflection, Acceptance Angle, Numerical Aperture, Step-Index Fiber, Graded Index Fiber, Modes in SI and GRIN fiber. **(9)**	**2**
Signal Degradation in Optical Fibers: Attenuation, Material absorption losses, linear and non linear scattering losses, fiber bend loss, dispersion viz intermodal dispersion and intramodal dispersion, overall fiber dispersion and polarization mode dispersion, Introduction to nonlinear effects: Self phase modulation, cross phase modulation, Stimulated Brillion and Raman scattering, Four Wave Mixing. **(7)**	**3**
SECTION-B	
Optical Sources Lasers: Principles of Laser, absorption and emission of adiation,population inversion, optical feedback and laser oscillation. Optical emsission from semiconductore- pn junction,spontaneous emission.LED: basic concepts, advantages, power and efficiency. **(5)**	**4**
Optical detectors Principles of Photodetection, Photomultiplier, Semiconductor Photodiode, PIN photodiode, Avalanche photdiode. **(6)**	**5**
Optical fiber connections: joints and couplers: Fiber alignment and joint loss, Fiber splices, Fiber connectors principles, Fiber couplers. **(8)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT801a.CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	1
PEIT801a.CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	1
PEIT801a.CO3	-	1	2	-	-	-	-	-	-	-	-	-	1	1
PEIT801a.CO4	-	-	2	1	-	-	-	-	-	-	-	-	1	1
PEIT801a.CO5	-	-	2	1	-	-	-	-	-	-	-	-	1	1
PEIT801a.CO6	-	-	2	1	-	-	-	-	-	-	-	-	1	1

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Fiber Optic Communications, latest Edition	Joseph C. Palais	Pearson Education
2	Optical Fiber Communication	John M Senior	PHI
3.	Optical Fiber Communications Designs,3rd Edition	Gerd Keiser	Mc Graw Hill
4	Fiber optic communication systems,2E	Govind P. Agrawal	Wiley India
5.	Fiber optic communication technology	D. F. Mynbaev and L. Scheiner	Pearson Education

COURSE INFORMATION SHEET

Course Code	PEIT801b
Course Title	Digital Image Processing (Theory)
Type of Course	PE-V
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods:	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional)	**50**
Course Prerequisites	Computer Graphics, Digital Signal Processing
Course Objectives	The objective of the course is to present the fundamental concepts of digital image processing and its significance in developing various real world applications. The course appraises various image processing algorithms and techniques; and familiarizes with pattern recognition essentials for efficient application development.
Course Outcomes	After the completion of this course, the students will be able to: I. Learn and compare different methods for image acquisition, storage and representation in digital devices and computers. II. Interpret the mathematical principles in digital image enhancement and apply them in spatial domain and frequency domain. III. Appraise the role of image transforms in representing, highlighting, and modifying image features. IV. Learn image compression fundamentals and examine standard compression algorithms. V. Apply various methods for segmenting image and identifying image components; and understand their practical applications. VI. Learn image representation and recognition techniques and apply it to solve real world problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)

Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation, color models. **(7)**	**1**
Image Transformation and Filtering: Intensity transform functions, histogram processing, Spatial filtering, fourier transforms and its properties, frequency domain filters, Pseudo coloring, color transforms, Basics of Wavelet Transforms. **(12)**	**2,3**
Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphic Filtering. **(6)**	**2,3**
SECTION-B	
Image Compression: Coding redundancy, Interpixel redundancy, Psycho-visual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression. **(6)**	**4**
Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional Descriptors. **(12)**	**5**
Object Recognition: Patterns and Patterns classes, Recognition based on Decision Theoretic methods. **(2)**	**6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT801a.CO1	3	2	2	2	2	-	2	-	-	-	-	2	2	2
PEIT801a.CO2	3	-	2	2	2	1	2	-	-	-	-	2	2	3
PEIT801a.CO3	2	2	3	2	2	-	2	-	-	-	-	2	2	3
PEIT801a.CO4	2	2	3	2	2	-	2	-	-	-	-	2	2	3
PEIT801a.CO5	2	2	3	2	1	2	2	-	-	2	-	2	2	3
PEIT801a.CO6	2	2	3	2	2	2	2	-	-	2	-	2	2	3

RECOMMENDED BOOKS

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Digital Image Processing	Gonzalez and Woods	Addison Wesley 1992
2.	Computer Vision - A First Gurse 2nd Edition	Boyle and Thomas	Blackwell Science 1995
3.	Introductory Techniques for 3-D Computer Vision	Trucco&Verri	Prentice Hall, Latest Edition
4.	Introductory Computer Vision and Image Processing	Low	McGraw-Hill 1991
5.	Machine Vision	Jain, Kasturi and Schunk	McGraw-HiII. 1995
6.	Image -Processing, Analysis and Machine Vision 2nd edition	Sonka, Hlavac, Boyle	PWS Publishing,1999

COURSE INFORMATION SHEET

Course Code	PEIT 801c
Course Title	Intrusion Detection Systems.
Type of Course	PE-V
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Operating System, Computer Networks.
Course Objectives	I. Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise. II. Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems III. Analyze intrusion detection alerts and logs to distinguish attack types from false alarms
Course Outcomes	After the completion of course, students will be able to: I. Explain the fundamental concepts of Network Protocol Analysis. II. Describe the different techniques for Intrusion Prevention and Detection. III. Demonstrate the skill to capture and analyze network packets. IV. Analyze alerts and distinguish attacks from false alarms. V. Apply various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks. VI. Identify and apply the appropriate tools to troubleshoot network problems.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
UNIT-I History of Intrusion detection, Audit, Concept and definition, Internal and External threats to data, attacks, Need and types of IDs, Information sources, Host based information sources, Network based information sources. **(9)**	**1**
UNIT-II Intrusion Prevention Systems, Network IDs, protocol based IDs, Hybrid IDs, Analysis schemes.A model for intrusion analysis, Techniques, Responses, requirement of responses, types of responses, mapping responses to policy, Vulnerability analysis, credential analysis, non credential analysis. **(9)**	**1,2**

UNIT-III	**3**
Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple,Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes. **(9)**	

SECTION-B	
UNIT-IV	**3,4**
Working with Snort Rules, Rule Headers, Rule Options, Snort Configuration File etc., Plugins, Preprocessors and Output Modules, Using Snort with MySQL. **(9)**	
UNIT-V	**5,6**
Using ACID and Snort, Snarf with Snort, Agent development for intrusion detection, Architecture models of IDs and IPs. **(9)**	

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT 801c.CO1	2	-	-	-	-	1	-	1	-	-	-	1	3	1
PEIT 801c.CO2	2	-	1	2	1	1	-	1	-	-	-	1	3	1
PEIT 801c.CO3	3	1	2	1	1	-	-	-	1	2	-	1	2	2
PEIT 801c.CO4	3	3	2	2	1	-	-	-	1	1	-	1	2	2
PEIT 801c.CO5	2	-	1	2	1	1	-	1	-	-	-	1	3	1
PEIT 801c.CO6	3	3	2	1	3	-	-	-	1	1	1	1	3	3

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	" Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID,"	Rafeeq Rehman	1st Edition, Prentice Hall , 2003.
2.	"Intrusion Detection and Correlation Challenges and Solutions"	Christopher Kruegel, Fredrik Valeur, Giovanni Vigna	1st Edition, Springer, 2005
3.	" Intrusion Detection & Prevention"	. Carl Endorf, Eugene Schultz and Jim Mellander: " Intrusion Detection & Prevention".	1st Edition, Tata McGraw-Hill, 2004.
4.	"Network Intrusion Detection.	Stephen Northcutt, Judy Novak	3rd Edition, New Riders Publishing, 2002.
5.	"A Text book on Grid Application Development and Computing Environment".	T. Fahringer, R. Prodan	Khanna Publishers, 2012.

COURSE INFORMATION SHEET

Course Code	PEIT 801d
Course Title	Software Testing And Quality Assurance
Type of Course	PE-V
L T P	3 0 0
Credits	03
Total Lectures	45
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Sessional)	 **50** **50**
Course Prerequisites	Software Engineering
Course Objectives	1. To make students aware about the importance of the software testing during software development. 2. To prepare the student for software testing and debugging. It will further laid the foundation for advanced courses in Software quality assurances.
Course Outcome	After the completion of course, students will be able to: I. Define various software Process models and software metrics for developing high quality software. II. Understand the importance of software quality assurance and quality standards in improving the software development process. III. Manage risks within a project and analyze Software Configuration techniques. IV. Design and conduct various types of software testing for efficient software project. V. development and management.Create test strategies and plans, design test cases, prioritize and execute them. VI. Identify the needs of software test automation, and define and develop test tools to support test automation.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	CO(s)
Introduction: Software Process, Characteristics of a Software Process, Process Models, Project Management Process and its Phases, Software Measurements, Metrics, Scheduling, Estimation. **(7)**	**1**

Software Quality Assurance Concepts and Standards : Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics. **(8)**	**1,2**
Risk Management and Change Management: Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control, Configuration Audit, Configuration Management for Web Engineering. **(7)**	**3**
SECTION-B	
Software Testing: Testing, Verification and Validation, Test Strategies for Conventional and Object Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Metrics for Source Code, Metrics for Testing, Debugging Process, Debugging Strategies. **(7)**	**4**
Testing Techniques: Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Flow Graph Notation, Independent Program Paths, Graph Matrices, Control Structure Testing, Condition Testing, Data Flow Testing, Loop Testing, Graph Based Testing Methods, Equivalence Sectionitioning, Boundary Value Analysis, Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Fault-Based Testing, Scenario-Based Testing, Random Testing and Sectionition Testing for Classes, Inter Class Test Case Design. **(8)**	**5,6**
Testing Process: Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Client/Server Systems, Testing Web based Systems, Testing Off-the-Shelf Software, Testing in Multiplatform Environment, Testing for Real Time Systems, Testing Security. **(8)**	**5,6**

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PEIT801d.CO1	2	2	-	1	-	-	-	-	-	-	2	-	1	-
PEIT801d.CO2	-	-	-	1	-	1	1	-	-	-	-	-	1	-
PEIT801d.CO3	2	2	-	-	-	-	-	-	-	-	2	-	2	-
PEIT801d.CO4	-	2	3	3	-	-	-	-	-	-	-	-	2	-
PEIT801d.CO5	-	-	3	-	-	-	-	-	-	-	-	-	1	2
PEIT801d.CO6	-	1	-	1	3	-	-	-	-	-	-	-	-	3

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1.	Software Engineering, Seventh Edition	Ian Sommerville	Pearson Education
2.	Software Engineering: A Practitioner's Approach, Sixth Edition	R.S. Pressman	Tata McGraw-Hill
3.	Effective Methods for Software Testing, Second Edition	William E. Perry	John Wiley & Sons
4.	Software Engineering: Theory and Practice, Second Edition	S.L. Pfleeger, J.M. Atlee	Pearson Education
5.	Software Engineering, Second Edition	K.K. Aggarwal, Yogesh Singh	New Age International
6.	An Integrated Approach to Software Engineering, Second Edition	PankajJalote	Narosa
7.	Software Quality Assurance – Principles and Practice	Nina S Godbole	Narosa
8.	Software Testing Techniques, Second Edition	Boris Beizer	Dreamtech

Choice Based Management Elective
COURSE INFORMATION SHEET

Course Code	HSMC 801a
Course Title	Principles of Management
Type of Course	HS
L T P	3 0 0
Credits	3
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	50 50
Course Prerequisites	None
Course Objectives (CO)	1. The main aim of this course is to make students understand the management process and principles along with its application in practical life and to help them manage different jobs and situations with the help of management functions.
Course Outcome	I. The students will be able to apply management concepts and principles in daily life and thus, will be able to manage things efficiently and effectively. II. The students will learn how to get work done easily by using management knowledge and functions.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Management: Nature of Management: Art or Science, Principles and Functions of Management.	**(3)**
Evolution of Management Thought Classical Theories: Bureaucratic, Scientific and Administrative Approach Neo-Classical Theories: Human Relations and Human Behaviour Approach Modern Theories of Management Relevance of Management Thought in present scenario – Management Cases.	**(6)**
Planning: Nature of Planning, Planning Process, Application of Planning Process in a Hypothetical Situation, Types of Planning, Types of Plans, Management by Objective (MBO).	**(4)**
Organizing Concept of Organization, Desectionmentation, Forms of Organization Structure Analysis of Organization Structure – Case Studies Hypothetical Formation of an Organization New Methods of Managing Organizations.	**(4)**
SECTION-B	
Staffing Human Resource Planning: HRP Process, Job Analysis: Job Description, Job Specifications and Used of Job Analysis	**(6)**

Recruitment: Sources and Methods. Selection: Selection Process, Role Playing and Case Study on Selection Tests and Interviews Training and Development: Techniques, Performance Appraisal: Methods Case Study on Staffing Practices.		
Directing Concept, Leadership: Importance and Styles, Motivation: Theories and their relevance in present scenario, Communication: Process, Types and Barriers of Communication Management Game on Leadership, Motivation and Communication.	**(3)**	
Controlling Nature and Process of Controlling, Requirements for Effective Controlling.	**(2)**	

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Principles and Practices of Management	Rao V.S.P. and Narayana P.S.	Konark Publishers, 1987
2	Principles & Practice of Management	Prasad L.M.	8th Edition, Sultan Chand & Sons, 2012
3	Essentials of Management: International and Leadership Perspective	Weihrich H.and Koontz H.	Edition, McGraw Hill, 2012
4	The New Era of Management	Daft R.L	11th Edition, Cengage Learning, 2014
5	Management: Text and Cases	Rao V.S.P. and Krishna V.H	Excel Books, 2008
6	Fundamentals of Management: Essential Concepts and Applications	Robbins S.P, DeCenzo D.A., Bhattacharya S. and Agarwal M.N	6th Edition, Pearson India, 2009

COURSE INFORMATION SHEET

Course Code	HSMC 801b
Course Title	**Business Environment and Business laws**
Type of Course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	**50** **50**
Course Prerequisites	**None**
Course Objectives (CO)	1. The main aim of this course is to make students understand different types of environment influencing business decisions and to provide knowledge about different laws that needs to be followed for initiating and managing business.
Course Outcome	I. The students will be able to analyze the impact of environment on business and formulate appropriate business strategies to compete in the competitive world. II. The students will learn how companies follow corporate governance and social responsibility practices along with fulfilling economic objectives. III. The students will gain knowledge about application and implementation of various business laws in practice.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Business Scope and Characteristics of Business, Classification of Business Activities Forms of Ownership of Business: Sole Proprietorship, partnership and Company	**(5)**
Business Environment Internal Environment: Concept and Elements (Value System, Vision Mission Objectives, Management Structure, Human Resources, Company Image etc.) SWOT Analysis: Concept and Case Study External Environment: Micro Environment (Suppliers, Customers, Competitors, Market Intermediaries etc.) and Macro Environment – PESTEL Analysis (Political, Economic, Social, Technological, Ecological and Legal), Case Study on Impact of Environment on Business.	**(7)**
Globalization Concept, Pros and Cons of Globalization, Impact of Global Environment on Business Globalization of Company – Case Study.	**(4)**
SECTION-B	
Corporate Social Responsibility Concept, Social Responsibility towards different stakeholders, Rationale for CSR CSR –	**(2)**

Case Studies.	
Corporate Governance Concept, Elements and Essentials of Good Governance.	**(3)**
Contract Law Concept, Types and Essentials Elements of Contract.	**(3)**
Sectionnership Law Nature of Sectionnership, Provisions of Sectionnership Act, Issues Related to Sectionnership Firm, Hypothetical Formation of a Sectionnership Firm.	**(2)**
Company Law Nature of Company, Provisions of Company Act, Issues Related to Incorporation of Company, Hypothetical Formation of a Company.	**(2)**

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Business Environment: Text and Cases	Cherunilam F	22nd Edition, Himalaya Publications, 2013
2	Legal Aspects of Business	Pathak A	5th Edition, McGraw Hill Education, 2013
3	Essential of Business Environment: Text, Cases and Exercises	Aswathappa K.	11th Edition, Himalaya Publication, 2011
4	Business Law Including Company Law	Gulshan S.S. and Kapoor G.K	15th Edition, New Age International (p) Ltd, 2011
5	Business Law and Corporate Laws	Tulsian P.C	1st Edition, Sultan Chand Publishing, 2011
6	Fundamentals of Business Organization & Management	Bhushan Y.K	19th Edition, Sultan Chand & Sons, 2013
7	Corporate Governance: Principles, Policies and Practices	Fernando A.C	2nd Edition, Pearson India, 2011

COURSE INFORMATION SHEET

Course Code	**HSMC 801c**
Course Title	**Entrepreneurship and Project Management**
Type of Course	HS
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	**50** **50**
Course Prerequisites	**None**
Course Objectives (CO)	1. The main aim of this course is to make prospective engineers familiar with the concept of entrepreneurship and MSMEs and to provide knowledge about different aspects to be considered while formulating the business plan for a new entrepreneurial venture. This course also intends to create awareness among students about financial and marketing functions that is required for a new venture.
Course Outcome	I. The students will be able to apply engineering knowledge effectively in the field of entrepreneurship development. II. The students can make effective use of entrepreneurial knowledge to start and manage their venture. III.The students will learn to check the feasibility of a new project to maintain its long run sustainability.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Entrepreneurship Concept of Entrepreneurship, Characteristics and Functions of Entrepreneur Forms of Ownership of Business, Factors Affecting Entrepreneurship Case Studies of Entrepreneurs.	**(6)**
Women Entrepreneurship Nature of Women Entrepreneurship, Problems of Women Entrepreneurs, Institutional Initiatives for Promotion of Women Entrepreneurs.	**(2)**
Micro, Small and Medium Enterprises (MSMEs) Concept of MSMEs, Schemes of MSMEs Functions of Entrepreneurial Development Programmes (EDPs)	**(2)**
Project Identification	**(2)**

Idea Generation, Project Life Cycle, Concept of SWOT Analysis SWOT Analysis of Selected Project.	
SECTION-B	
Project Planning and Formulation Elements of Project Formulation: Product, Technical (Location, Scale, Technology, Production Process, Layout, Manpower, Resources), Market, Finance and Economic Aspects Feasibility Analysis: Financial Viability and Profitability, and Socio-Economic Desirability.	**(7)**
Project Report Formulation of Business Plan and Project Report, Hypothetical Example of a Real-Life Project.	**(2)**
Finance and Marketing Function Concept of Finance, Finance Related Terminologies, Sources of Finance, Cost Estimations Marketing Mix: Product, Place, Price, Promotion, People, Process and Physical Evidence Marketing Segmentation Targeting and Positioning.	**(5)**
Discussions on Additional Reading (any one of the following in the semester) - The New Age Entrepreneurs - The $100 Startup: Fire your Boss, Do what you Love and Work Better to Live More - A Guide to Entrepreneurship - Dhandha: How Gujaratis Do Business - Rokda: How Baniyas Do Business - Take Me Home - Business Families of Ludhiana	**(2)**

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Dynamics of Entrepreneurial Development & Management	Desai V.	5th Edition, Himalaya Publishing House.
2	Projects: Planning, Analysis, Selection, Financing, Implementation and Review	Chandra P	8th Edition, McGraw-Hill Education (India), 2014
3	Entrepreneur's Toolkit	Harvard Business School	Harvard University Press, 2004
4	Entrepreneurship	Hisrich R.D., Peters M.P. and Shepherd D.A	McGraw Hill Education, 2006
5	Essentials of Project Management	Ramakrishna K	PHI Learning
6	Entrepreneurship	Roy R	2nd Edition, Oxford University Press, 2011
7	Entrepreneurship Development in India	Gupta C.B. and Srinivasan N.P.	Sultan Chand and Sons, 2013

COURSE INFORMATION SHEET

Course Code	HSMC 801d
Course Title	Financial Management
Type of Course	HS
L T P	3 0 0
Credits	3
Course Assessment Methods	
End Semester Assessment (University Exam.)	50
Continuous Assessment (Sessional, Assignments, Quiz)	50
Course Prerequisites	None
Course Objectives (CO)	1. The main aim of this course is to make students learn different financial decisions i.e. investing, financing and dividend, required to be taken by a company and provide knowledge about the functioning of the financial system (financial markets, financial institutions, financial services and financial instruments) of the country.
Course Outcome	I. The students will learn to make best combination of financial decisions by considering risk and return trade-off. II. The students will identify how business can gain maximum through the financial system. III. The students will understand how to manage funds effectively so as to maximize returns.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Financial Management Concept of Finance, Terminology Related to Finance, Financial Decisions, Factors Affecting Financial Decisions, Risk-Return Trade-Off.	**(3)**
Financial System Concept and Role of Financial System in Indian Economy.	**(2)**
Financial Markets and Instruments Concept and Relevance of Money Market and Capital Market Money Market Instruments: Call Money, Treasury Bills, Commercial Papers, Certificate of Deposits Capital Market Instruments: Equity Shares, Preference Shares and Debentures Hypothetical Trading in Financial Markets.	**(5)**
Financial Services Nature and Functions of Financial Services: Merchant Banking, Mutual Funds, Factoring, Forfaiting, Credit Rating Case Study on Financial Services.	**(6)**
SECTION-B	

Financial Institutions Nature and Functions of Financial Institutions: Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Discount and Finance House of India (DFHI) .	**(2)**
Long Term Investment Decisions Capital Budgeting: Concept, Importance, Factors Techniques/Methods with Numerical Applications (Pay Back Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return and Profitability Index), Case Study.	**(3)**
Short Term Investment Decisions Working Capital: Nature, Type and Factors Affecting the Requirement of Working Capital, Case Study.	**(2)**
Financing Decisions Capital Structure: Essentials and Approaches of Capital Structure Sources of Finance (long-term and short-term), Financial Leverage: Concept and Numerical Application, Case Study.	**(3)**
Dividend Decisions Types of Dividend, Dividend Policy: Nature and Factors Affecting Dividend Policy, Case Study.	**(2)**

RECOMMENDED BOOKS:

S.No.	NAME	AUTHOR(S)	PUBLISHER
1	Financial Management	Shah P.	2nd Edition, Dreamtech Press, 2009
2	Financial Markets and Services	Gordon E. and Natarajan K.	3rd Edition,Himalaya Publishing House, 2006
3	Financial Management: Theory and Practice.	Chandra P.	8th Edition, McGraw Hill Education (India), 2012
4	Financial Management	Pandey I.M.	10th Edition, Vikas Publishing House Pvt. Ltd., Noida,2010
5	Cases in Financial Management	Pandey I.M. and Bhat R.	3rd Edition, McGraw Hill Education (India), 2012
6	Financial Institutions and Markets: Structure, Growth and Innovations	Bhole L.M. and Mahakud J.	5th Edition, McGraw Hill Education (India), 2009
7	The Indian Financial System: Markets, Institutions and Services	Pathak B.V.	3rd Edition, Pearson India, 2010
8	Financial Management and Policy	Horne J.C.V. and Dhamija S.	12th Edition, Pearson India, 2011

COURSE INFORMATION SHEET

Course Code	**HSMC 801e**
Course Title	**Marketing Management**
Type of Course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional, Assignments, Quiz)	**50**
Course Prerequisites	**None**
Course Objectives (CO)	1. The main aim of this course is to make students understand about the marketing concepts to be applied in real life and the marketing process for delivering value to customers.
Course Outcome	I. The students will learn how to market goods and services effectively to different segments so as to deliver value to customers. II. The students will be able to formulate marketing mix and marketing strategies for different products and different sets of customers.

SYLLABUS
Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Marketing Concepts, Role, Scope and Types of Marketing, Case Study on Marketing Management.	**(3)**
Marketing Research Scope and Process of Marketing Research, Hypothetical Marketing Research Analysis.	**(3)**
Consumer and Business Markets Types of Markets, Building Customer Value Consumer and Business Buying Behaviour: Factors Influencing Behaviour and Buying Decision Process.	**(4)**
Selection of Markets Segmentation: Factors and Bases, Targeting and Positioning Preparation of STP of Selected Product.	**(3)**
Marketing Mix 7 P's of Marketing Mix: Product, Price, Physical Distribution, Promotion, People, Process and Physical Evidence Formulation of Marketing Mix of Selected Product.	**(3)**
SECTION-B	
Product Decisions Product (Good or Service) Characteristics, Product Life-Cycle, Packaging and Branding, Product Development and Management	**(3)**
Pricing Decisions	**(3)**

Pricing Policies and Strategies, Factors Influencing Pricing		
Physical Distribution Decisions Marketing Channels, Channel Players, Physical Distribution, Managing Distribution, Analysis of Supply Chain Management – Case Studies		**(3)**
Promotion Decisions Nature of Promotion Decisions, Managing Mass Communication and Personal Communication Analysis of Promotional Strategies – Case Studies.		**(3)**

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Marketing Management: Concepts, Cases, Challenges and Trends	Govindarajan M	2nd Edition, PHI Learning, 2009
2	Marketing Management	Kotler P., Keller K.L., Koshy A. and Jha M.	14th Edition, Pearson India, 2012
3	Marketing Concepts and Strategies	Dibb S., Simkin L., Pride W.M. and Ferrell O.C.	Cengage Learning, 2012
4	Marketing Management	Kumar A. and Meenakshi N	2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, 2011
5	Marketing Management	Saxena R.	4th Edition, McGraw Hill Education (India), 2013
6	Marketing: Managerial Introduction	Gandhi J.C.	1st Edition, McGraw Hill Education, 1987
7	Marketing	Etzel M.J., Walker B.J., Stanton W.J. and Pandit A.	14th Edition, McGraw Hill Education (India), 2010
8	Super Marketwala: Secrets to Winning Consumer India	Mall D.	1st Edition, Random House India, 2014

COURSE INFORMATION SHEET

Course Code	**HSMC 801f**
Course Title	**Human Resource Management**
Type of Course	**HS**
L T P	**3 0 0**
Credits	**3**
Course Assessment Methods	
End Semester Assessment (University Exam.)	**50**
Continuous Assessment (Sessional, Assignments, Quiz)	**50**
Course Prerequisites	**None**
Course Objectives (CO)	1. The main aim of this course is to provide an overview of HRM, keeping the Indian business scenario in the background and to acquaint the students with the strategic role of HRM in managing an organization.
Course Outcome	I. The students will develop the ability to solve problems in area of HRM in organizations. II. The students will become aware of latest developments in HRM practices which are essential for effective management in organization.

SYLLABUS

Note: The examiner shall set seven questions of 10 marks each. First question has to be compulsory, having sections covering the whole syllabus. Three questions have to be set from Section A and three questions from Section B of the syllabus. Candidate is required to attempt at least two questions from each section. All the course outcomes must be covered by the question paper.

SECTION-A	Hours
Introduction to Human Resource Management HRM: Nature, Scope, Functions, HRM Practices and Problems in India with Case Studies	**(4)**
Human Resource Planning (HRP) Concept and Process of HRP, Factors Affecting HRP.	**(3)**
Job Analysis and Designing Uses and Process of Job Analysis, Job Description and Job Specification: Features and Hypothetical Formulation, Job Designing: Job Enrichment, Job Enlargement.	**(3)**
Recruitment and Selection Recruitment: Sources and Methods Selection: Selection Process, Selection Tests, Types and Nature of Interviews Role Playing and Case Study on Selection Process, Tests and Interview.	**(4)**
SECTION-B	
Induction and Internal Mobility Induction Programme, Need and Scope of Internal Mobility: Transfer, Promotion, Demotion.	**(3)**
Training and Development Training Need and Methods, Management Development: Need, Methods and Management Development Programme HRM Games for Development of Employees	**(4)**
Performance Appraisal and Compensation	**(4)**

Nature and Methods of Performance Appraisal, Hypothetical Performance Appraisal Compensation: Financial and Non-Financial Benefits.		
Employee Health and Safety Concept, Issues related to Health and Safety, Workplace Health Hazards	**(3)**	

RECOMMENDED BOOKS:

S. No.	NAME	AUTHOR(S)	PUBLISHER
1	Human Resource Management: Text and Cases	Rao V.S.P.	Excel Books, 2002
2	Human Resource Management	Dessler G. and Varkkey B.	12th Edition, Pearson India, 2011
3	Human Resource Management: Text and Cases	Aswathappa K.	7th Edition, McGraw Hill Education (India), 2013
4	Human Resource Management: Text and Cases	Gupta C.B.	14th Edition, Sultan Chand and Sons, 2012
5	Human Resource Management: Text and Cases	Bedi S.P.S. and Ghai R.K	Bharti Publications, 2012
6	Human Resource Management Applications: Cases, Exercises, Incidents and Skill Builders	Fottler M.D., McAfee R.B. and Nkomo S.M.	7th Edition, Cengage Learning, 2013

COURSE INFORMATION SHEET

Course Code	PWIT851
Course Title	Project-IV
Type of Course	PW
L T P	0 0 4
Credits	02
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **100**
Course Prerequisites	Nil
Course Objectives	1. Students learning skills to tackle realistic problems as they would be solved in the real world. 2. To work as team to deliver project that matches the required specification.
Course Outcomes	After the completion of this course, the students will be able to: I. Plan, Analyze, design and implement gathered skills and knowledge over the field of research and to solve real life problem. II. Apply software development lifecycle to plan & manage the projects. III. Demonstrate the ability to communicate effectively in orally and in writing. IV. Learn to work in team and focus on getting work done on time.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT 551 .CO1	3	3	2	3	3	1	-	2	2	-	-	3	3	3
PWIT 551 .CO2	1	2	2	2	3	-	1	2	2	-	-	-	3	3
PWIT 551 .CO3	-	2	-	-	3	-	-	3	2	3	1	-	-	-
PWIT 551 .CO4	-	-	-	1	3	-	-	-	3	2	3	-	1	1

COURSE INFORMATION SHEET

Course Code	PWIT 852
Course Title	Seminar
Type of Course	PW
L T P	0 0 2
Credits	01
Course Assessment Methods: End Semester Assessment (University Exam.) Continuous Assessment (Practical)	 **00** **50**
Course Prerequisites	Nil
Course Objectives	1. Investigate some of the current scientific issues facing society. 2. Students will examine and develop self-management skills necessary for academic success.
Course Outcomes	After completion of this course, the students will be able to: I. Understand current technology topics being studied. II. Extend a greater amount of interaction between teacher and students.

Course Code	PWIT 853
Course Title	Industrial Training
Type of Course	PW
Duration	6 months
Credits	21.5
Course Assessment Methods: Marks Internal Assessment	400 300
Course Prerequisites	Nil
Course Objectives	1. To enable students to integrate theory with practice. 2. To introduce students to work culture and industrial practices. 3. To provide opportunity to students to hands on current problems industrial practitioners are dealing with.
Course Outcomes	After the completion of this course, the students will be able to: I. Analyze practical aspects of a problem and designing its solution. II. Apply skills and knowledge of recent technologies to implement solution for a real life problem. III. Demonstrate interpersonal skills and ability of team work and documentation and reporting.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PWIT853.CO1	3	3	3	3	-	-	-	-	-	-	-	-	3	3
PWIT853.CO2	-	-	3	-	3	-	-	-	-	-	-	-	-	3
PWIT853.CO3	-	-	-	-	-	-	-	3	3	3	2	-	-	-