Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Biotechnology Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

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
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
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
ESBT 101	Basic Biology	Theory	3	0	0	3	50	50	100
ESBT 151	Basic Biology (P)	Practical	0	0	2	1	50	0	50
Total			**13**	**1**	**11**	**19.5**	**400**	**200**	**600**

Year: First **Semester: Second**

Course Code	Course Name	Option	Hours per week			Credits			
			L	T	P		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
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
ESBT 201	Basic Biotechnology	Theory	3	0	0	3	50	50	100
ESBT 202	Fundamentals of Biotechnology and Bioengineering	Theory	3	0	0	3	50	50	100
ESBT 252	Fundamentals of Biotechnology and Bioengineering (P)	Practical	0	0	2	1	50	0	50
Total			**17**	**1**	**9**	**22.5**	**400**	**250**	**650**

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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Computer Science and Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

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
ESC X06	Digital Electronics	Theory	3	0	0	3	50	50	100
ESC X56	Digital Electronics (P)	Practical	0	0	2	1	50	0	50
Total			**14**	**1**	**13**	**21.5**	**400**	**200**	**600**

Year: First **Semester: Second**

Course Code	Course Name	Option	Hours per week			Credits			
			L	T	P		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
CSC 201	Object Oriented Programming	Theory	3	0	0	3	50	50	100
CSC 251	Object Oriented Programming (P)	Practical	0	0	2	1	50	0	50
CSC 202	Introduction to Computer Science	Theory	3	0	0	3	50	50	100
Total			**16**	**1**	**7**	**20.5**	**400**	**250**	**650**

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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Information Technology)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

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**

Year: First **Semester: Second**

Course Code	Course Name	Option	Hours per week			Credits			
			L	T	P		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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Electrical and Electronics Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

Course Code	Course Name	Option	Hours per week			Credits	Internal Assessment	University Exam	Total
			L	T	P				
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 101	Calculus	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
EEEC 101	Electrical Measurement and Instrumentation	Theory	3	1	0	4	50	50	100
EEEC 151	Electrical Measurement and Instrumentation (P)	Practical	0	0	3	1.5	50	0	50
Total			**13**	**2**	**8**	**19**	**350**	**200**	**550**

Year: First **Semester: Second**

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 201	Differential Equations and Transforms	Theory	4	1	0	5	50	50	100
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
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
EEEC 201	Basic Electrical Engineering	Theory	3	1	0	4	50	50	100
EEEC 251	Basic Electrical Engineering (P)	Practical	0	0	3	1.5	50	0	50
Total			**14**	**2**	**14**	**23**	**400**	**200**	**600**

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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Electronics and Communications Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

Course Code	Course Name	Option	Hours per week			Credits	Internal Assessment	University Exam	Total
			L	T	P				
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 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
EC 103	Introduction to Electronics	Theory	3	0	0	3	50	50	100
EC 153	Introduction to Electronics (P)	Practical	0	0	2	1	50	0	50
Total			**14**	**1**	**9**	**19.5**	**350**	**200**	**550**

Year: First **Semester: Second**

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 201	Differential Equations and Transforms	Theory	4	1	0	5	50	50	100
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
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
EC 203	Digital Design	Theory	3	0	0	3	50	50	100
EC 253	Digital Design (P)	Practical	0	0	2	1	50	0	50
EC 204	Electrical Science	Theory	3	0	0	3	50	50	100
Total			**16**	**1**	**11**	**22.5**	**450**	**250**	**700**

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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Mechanical Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

Course Code	Course Name	Option	Hours per week			Credits	Internal Assessment	University Exam	Total
			L	T	P				
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 101	Calculus	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
ESC X02	Computer Programming (Matlab)	Theory	2	0	0	2	50	50	100
ESC X52	Computer Programming (Matlab) (P)	Practical	0	0	2	1	50	0	50
MEC 101	Statics	Theory	3	0	0	3	50	50	100
Total			**15**	**1**	**7**	**19.5**	**400**	**250**	**650**

Year: First **Semester: Second**

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 201	Differential Equations and Transforms	Theory	4	1	0	5	50	50	100
ESC X04	Engineering Graphics	Theory	1	0	0	1	50	50	100
ESC X54	Engineering Graphics (P)	Practical	0	0	4	2	50	0	50
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
MEC 201	Rigid Body Dynamics	Theory	3	0	0	3	50	50	100
MEC 251	Rigid Body Dynamics (P)	Practical	0	0	2	1	50	0	50
ESC X05	Basics of Electrical and Electronics Engineering	Theory	3	0	0	3	50	50	100
Total			**15**	**1**	**13**	**22.5**	**450**	**250**	**700**

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.

Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Civil Engineering)
1st and 2nd Semesters for Academic Year 2020-2021

Year: First **Semester: First**

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
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
ESC X53	Workshop (P)	Practical	0	0	4	2	50	0	50
ESC X04	Engineering Graphics	Theory	1	0	0	1	50	50	100
ESC X54	Engineering Graphics (P)	Practical	0	0	4	2	50	0	50
Total			**11**	**1**	**13**	**18.5**	**400**	**200**	**600**

Year: First **Semester: Second**

Course Code	Course Name	Option	Hours per week			Credits			
			L	T	P		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
CIV 201	Building Materials and Construction	Theory	3	0	0	3	50	50	100
CIV 202	Fluid mechanics	Theory	4	0	0	4	50	50	100
CIV 252	Fluid mechanics (P)	Practical	0	0	2	1	50	0	50
ESC X07	Engineering Mechanics	Theory	3	1	0	4	50	50	100
ESC X57	Engineering Mechanics (P)	Practical	0	0	2	1	50	0	50
Total			**18**	**2**	**7**	**23.5**	**400**	**250**	**650**

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.

Course Code	**ASP X01**
Course Title	**Applied Physics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION A

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 hours)

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 hours)

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 hours)

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 hours)

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 hours)
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. (6 hours)
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 fibre in communication systems, medical sciences, defence, mechanical applications . (7 hours)

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

List of Experiments

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 Code	**ASP X02**
Course Title	Quantum Physics
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Section A

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 (8)

(Section 1.1 to 1.5, 1.7 to 1.9 of Book 1)

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)

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)

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 (12)

(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)

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 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 Code	**ASP X03**
Course Title	**Physics of Materials**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

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 hours)

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 hours)

Elastic, Anelastic and Viscoelastic Behaviour Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour
(3 hours)

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 (5hours)

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 hours)

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 of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, the Iron-Carbon system.
(6 hours)

Phase Transformations: Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement
(4 hours)

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

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 Code	**ASC X01**
Course Title	**Applied Chemistry**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
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.

Note for the examiner: The end semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SYLLABUS

SECTION - A

Chemical Bonding (6 hrs)

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.

***S*tereochemistry of Organic Compounds (8 hrs)**

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.

Spectroscopy (9 hrs)

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.

SECTION - B

Thermodynamics (10 hrs)

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.

Catalysis (6 hrs)

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.

Polymers (6 hrs)

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.

Books suggested:

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	4^{th} 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 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

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	A textbook of Quantitative Inorganic Analysis	A. I. Vogel	Longman Gp. Ltd, 4th editon
2	Essentials of Experimental Engineering Chemistry	Shashi Chawla	Dhanpat Rai and Co. Delhi (2001)
3	Vogel's text book of quantitative chemical analysis	J. Mendham, R. C. Denny, J. D. Barnes and M. J. K. Thomas	Pearson Education

Course Code	**ASM 101**
Course Title	**Calculus**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
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 for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

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 Code	**ASM 201**
Course Title	Differential Equations and Transforms
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To learn the methods to formulate and solve linear differential equations and their applications to engineering problems 2. To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform 3. To apply Laplace transforms to solve ordinary differential equations 4. To learn the concept of Fourier series, integrals and transforms. 5. 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 for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

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)

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).

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 Code	**ESC X01**
Course Title	Programming for Problem Solving
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Outcome	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 for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

PART- A

Unit–1: Introduction to Programming **[06]**

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.

Unit –2: Expressions and Statements **[10]**

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.

Unit– 3: Arrays & Basic Algorithms **[07]**

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.

PART – B

Unit–4: Functions **[09]**

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.

Unit – 5: Structures , Union, Enums and Bit-fields [06]

Defining, declaring and usage of structures, unions and their arrays, passing structures and unions to functions, introduction to enums and bit-fields.

Unit – 6: Pointers and File handling [07]

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.

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

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 Code	**HSMC X01**
Course Title	Professional Communication
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Outcome	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

PART-A

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 ,7 Cs of Communication , Barriers to Communication (3)

PART-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 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 Code	**ESC X53**
Course Title	**Workshop (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Prerequisites	Basic Workshop Practices
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	Rajender Singh	New Age International Publication

	Workshop Technology		
2	Manufacturing Processes	Chapman	Viva Books Private Limited

Course Code	**ESBT 101**
Course Title	Basic Biology
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	To build on the foundation of biological aspects with emphasis on origin and propagation of various life forms and their constituent molecules.

Note: The semester question paper will be of 50 Marks having 7 questions of equal marks. Candidates are required to attempt 5 questions in all. 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.

SECTION A

Introduction to Biotechnology: definition, scope and future prospects 2

Origin of Life: theories of evolution, chemical evolution, organic evolution, Oparin-Haldane hypothesis, Miller's experiment 4

Cell structure and function: prokaryotic and eukaryotic cell (plant and animal cell), various cell organelles, their structure and functions 9

Cell Division: stages of mitosis and meiosis 3

Micro-organisms in Biotechnology: introduction to microorganisms, historical concept, beneficial and harmful micro-organisms and their applications 5

SECTION B

Introduction to Bio-molecules: role of water in biological systems, types of bonds and interactive forces in bio-molecules, carbohydrates, proteins, lipids, nucleic acids, porphyrins and vitamins 13

Introduction to enzymes: their classification and applications 3

Applications of biotechnology: In agriculture, medical, food industry and bioremediation 6

Books Recommended:

1. Campbell, NA, Reece, JB, Urry, LA, Cain, ML, Wasserman, SA, Minorsky, PV and Jackson, RB: Biology, Pearson/Benjamin Cummings, 8th edition, 2008
2. Pelczar MJ and Chan ECS (Jr): Microbiology, Tata McGraw Hill Pub. Co., 5th edition, 2003
3. Nelson DL and Cox MM: Lehninger Principles of Biochemistry, W.H. Freeman and Company, USA. 6th edition, 2013
4. Singh BD: Biotechnology: Expanding Horizons, Kalyani Publishers, 4th edition, 2012

Course Code	**ESBT 151**
Course Title	Basic Biology (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of experiments

1. To measure the pH of a solution
2. To prepare phosphate buffer solution
3. To test the presence of carbohydrates in a given sample by Molisch's test/Anthrone test
4. To test the presence of proteins in a given sample by Ninhydrin test/Biuret test
5. Estimation of DNA in a given sample by diphenylamine reaction
6. Estimation of RNA in a given sample by orcinol method
7. Preparation and study of wet mounts of different microorganisms

Course Code	**ESBT 201**
Course Title	Basic Biotechnology
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	To make students understand the basic morphological and physiological aspects of biological systems. To introduce the students with the biotechnological aspects for product development for societal benefit.

Note: The semester question paper will be of 50 Marks having 7 questions of equal marks. Candidates are required to attempt 5 questions in all. 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.

SECTION A

Types of Animal Tissues: Basic structure and function of epithelial tissue, connective tissue, muscular tissue and nervous tissue 6

Biological Systems: outlines of the major biological systems – digestive, circulatory, nervous, endocrine, and reproductive system 12

Basic Genetics: Concept of gene and allele, Mendelian and non Mendelian inheritance 5

SECTION B

Introduction to biopolymers and synthetic polymers and their applications: Types of biopolymers and synthetic polymers, their application as implant material and in tissue engineering. 7

Introduction to Genetic Engineering: basic concepts, tools and applications 7

Introduction to biosafety, bioethics and IPR in biotechnology: concept of biosafety, need and application of biosafety in laboratories and industries, international and national norms regarding biosafety, GLP, GMP, bio-medical wastes, transportation of biological materials 8

Books Recommended:

1. Campbell, NA, Reece, JB, Urry, LA, Cain, ML, Wasserman, SA, Minorsky, PV and Jackson, RB: Biology, Pearson/Benjamin Cummings, 8th edition, 2008
2. Singh BD: Biotechnology: Expanding Horizons, Kalyani Publishers, 4th edition, 2012
3. Tortora GJ and Derrickson BH: Principles of Anatomy and Physiology, John Wiley & Sons, 13th edition, 2011
4. Ratner, BD (Ed.), Hoffman, AS (Ed.), Schoen, FJ (Ed.) and Lemons, JE (Ed.). Biomaterials Science: An Introduction to Materials in Medicine, Academic Press, 3rd edition, 2013

Course Code	**ESBT 202**
Course Title	Fundamentals of Biotechnology and Bioengineering
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	To introduce students to the engineering aspect applicable to biological systems for their efficient utilization for product development and make them aware of tools available to achieve the same.

Note: The semester question paper will be of 50 Marks having 7 questions of equal marks. Candidates are required to attempt 5 questions in all. 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.

SECTION A

Introduction to Engineering Calculations: System of units, conversion of units, dimensional consistency, scientific notations, mole concept, mixtures and solutions 4

Basic Tools in Biotechnology: types and principles of spectrophotometer, pH meter, autoclave, incubator, lyophilizer, microscope 10

Introduction to separation techniques in Biotechnology: Centrifugation, electrophoresis, chromatography 7

Introduction to radioactivity: types of radionuclides and their applications 2

SECTION B

Concepts in Bioengineering and Bioinstrumentation: biosensors-concept and construction, bioreactors-design and operation, biomedical instruments-construction and applications of ECG, EEG, MRI, ultrasound 12

Application of Computers to Biology: concepts of bioinformatics, types of databases, biochips 6

Introduction of nano-bioengineering: Introduction of nano-biotechnology and biological systems at nanoscale, applications of nano-biotechnology in medicine and healthcare 4

Books Recommended:

1. Himmelblau, DM and Riggs, JB: Basic Principles and Calculations in Chemical Engineering, PHI Learning Private Limited, 8th edition, 2013
2. Wilson K and Walker J: Principles and Techniques of Practical Biochemistry, Cambridge University Press, 5th edition, 2000
3. Khandpur RS: Handbook of Biomedical Instrumentation, Tata McGraw Hill, 2nd edition, 2003
4. Attwood, TK, Parry-Smith, DJ and Phukan, S: Introduction to Bioinformatics, Pearson Education Ltd, 1st edition, 2007
5. Vo-Dinh, T (Ed.): Nanotechnology in Biology and Medicine: Methods, Devices, and Applications, CRC Press, Taylor & Francis Group, 2007

Course Code	**ESBT 252**
Course Title	Fundamentals of Biotechnology and Bioengineering (P)
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of experiments

1. To verify the validity of Beer Lambert law using a spectrophotometer
2. To prepare the standard curve of Bovine Serum Albumin (BSA)
3. To observe epithelial tissue under a microscope
4. To study the working and components of a CO_2 incubator
5. To study the working and components of an autoclave
6. Acquaintance to NCBI database
7. To learn the preparation of glycerol stocks
8. Case study of *Bt* cotton

Course Code	**ESC X06**
Course Title	**Digital Electronics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To apply minimization techniques for reducing the functions up to six variables. 2. To design various combinational circuits 3. To write the truth table, excitation table, characteristic equations of various flip flops and to design the sequential circuits using Flip flops. 4. To familiarize the various A/D, D/A Converters, Logic families and their characteristics.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Introduction (5 hours)

Digital logic, Number Systems and Conversions for Binary, Octal, Decimal, Hexadecimal, Binary Arithmetic, Basic and Universal gates, Boolean Alegbra, Binary addition and subtraction.

Minimization Techniques (6 hours)

Sum of Products and Products of Sum forms, Minterms & Maxterms, Karnaugh Map for two, three, four five and six variables, Quine-McCluskey method.

Combinational Circuit Design (6 hours)

Half adder, full adder, subtractor, BCD adder, comparator, code converter, encoder decoder, multiplexer, demultiplexer, parity detector and generator, PLA, PAL and ROM

Flip Flops (5 hours)

1-bit memory cell, clocked and unclocked flip flops, S-R Flip flop, D flip flop, JK Flip flop, T flip flop, edge triggered flip flop, race around condition , Master slave flip flop, conversion of flip flops using excitation table.

SECTION - B

Counters (5 hours)

Ripple counter, design of Mod-N ripple counter, design of synchronous counter with and without lockout condition, decade counter, ring counter, Johnson counter

Shift Registers (5 hours)

Serial in serial out shift register, serial in parallel out shift register, parallel in serial out shift register and parallel in parallel out shift register, bidirectional shift register, universal shift register.

A/D and D/A Converters (6 hours)

Weighted resistor D/A converter, Binary ladder D/A converter. A/D Converters- flash type, successive approximation, counter ramp type, dual slope type, characteristics of ADC and DAC.

Logic Families (7 hours)

Characteristics of logic families: fan-out, noise margin, propagation delay, power dissipation. Circuit diagrams and working of DTL, DCTL, I^2L, HTL, TTL, Totem pole TTL, ECL, CMOS logic families.

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Digital Design	Morris Mano	PHI, 4th edition
2.	Digital principles and Applications	Malvino Leach	Tata-McGraw Hill
3.	Digital System Principles and Applications	R J Tocci	PHI
4.	Modern Digital Electronics	R P Jain	Tata-McGraw Hill
5.	Digital Integrated Electronics	Taub Schilling	Tata-McGraw Hill

Course Code	**ESC X56**
Course Title	**Digital Electronics (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	 50
Course Prerequisites	10+2

List of Experiments

1. To Study the data sheets of TTL and ECL gates
2. Implementation of Adder and Subtractor using Logic Gates.
3. Implementation of Binary Adder/Subtractor.
4. Implementation of BCD Adder.
5. Design & implementation of Combinational circuits using Multiplexers
6. Design and implement a Universal shift register having shift-right, shift-left, SISO, PIPO capabilities.
7. Implementation of Flip-flops using Logic Gates.
8. Implementations of Ripple counter.
9. Implementation of Modulo-N Synchronous Counter.
10. Implementation of Synchronous counters with unused states and/or avoiding Lock Out condition.
11. To convert 8 bit Digital data to Analog value using DAC
12. To convert Analog value into 8 bit Digital data using ADC.

Course Code	**CSC 201**
Course Title	**Object Oriented Programming**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	Programming for Problem Solving
Course Objectives (CO)	To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

SYLLABUS

Note for the Examiner: 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 parts having three questions each and the candidate is required to attempt at least two questions from each part.

SECTION - A

Principles of Objective Oriented Programming (2 hours)

Tokens, Expressions and control structures, various data types, and data structures, Variable declaration, Operators and scope of operators. (4 hours)

Pointers, Functions, Classes and Objects: Prototyping, referencing the variables in functions, memory allocation for classes and objects, Array of objects, pointers to member functions.
(8 hours)

Constructors and Destructors, Operator Overloading and type conversion. (4 hours)

Inheritance: Derived classes, types of inheritance, and various types of classes. (5 hours)

SECTION - B

Virtual functions and Polymorphism. (5 hours)

I/O operations on files: Classes for files, Operations on a file, file pointers. (8 hours)

Exception Handling and Generic programming with templates: Introduction to templates, overloading of template functions and Inheritance. Introduction to standard Template Library
(9 hours)

TEXT BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Turbo C++	Robert and Lafore	Galgotia Publications
Reference Books			
1	C++ Primer Plus	Stephan & PRAT	Galgotia Publications
2	Object oriented programming with C++	Bala Guruswamy	Tata McGraw Hill
3	Object oriented Programming with ANSI and Turbo C++	Ashok N. Kamthane	Pearson Education

Course Code	**CSC 251**
Course Title	**Object Oriented Programming (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	 50
Course Prerequisites	10+2

List of Experiments

Note: Practical should be covered based on the following directions:

1. Functions, Classes and Objects
2. Constructors and Destructors
3. Operator Overloading and Type Conversion
4. Inheritance and Virtual Functions
5. Files
6. Exception Handling and Generic Programming

Course Code	**CSC 202**
Course Title	**Introduction to Computer Science**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To appraise students about various disciplines in Computer Science and Engineering. 2. To make students aware of emerging trends of Computer Science and Engineering.
Course Outcome	The student will have knowledge about various fields of Computer Science and Engineering.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Introduction
What is computer science?, Differentiating computer science from engineering, Classification of computers, History, Types of Computers, Block Diagram of a Computer System, Introduction to various units, CPU, Memory, Input and Output devices, Auxiliary storage devices. Turing model, Von-Newmann model, social and ethical issues in computer science and engineering. (8 hours)

Computer Hardware and Software
Introduction to computer hardware, components of mother boards & its types-ports, slots, connectors, add on cards, Basics of Number System. Application software, system software, interpreter, compliers, editor, computer viruses, worms, trozen. (6 hours)

Computer Organization
Central processing unit, computer storage: memory hierarchy, basics of RAM ,ROM , PROM, EPROM, Floppy, CD Rom, CDRW, DVD, Virtual memory, Cache memory, Physical memory
(5 hours)

SECTION - B

Logic Development and Algorithm

Various techniques to solve a problem, Ways to specify an algorithm, Flow charts. (6 hours)

Area of Computer Science and Engineering

Theory of computation, algorithms and data structures, Database, Artificial Intelligence, Computer Networks, Software Engineering, Computer Vision, Web and Internet. (16 hours)

Trends in Computing
Social and ethical issues related to computing technology, Professional development opportunities.
(4 hours)

TEXT BOOK			
S.No.	**NAME**	**AUTHOR**	**PUBLISHER**
1.	Computing Fundamentals	Peter Nortan	Tata McGraw Hill
REFERENCE BOOK			
1.	Compter Science Handbook	Allen B. Tucker	CRC Press

Course Code	**ITC 101**
Course Title	**Introduction to Information Technology**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 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 for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Computer Basics **(7)**

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).

Processor **(8)**

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)

SECTION – B

Software Concepts **(4)**

Types of Software, Programming Languages, Software (Its Nature & Qualities), Programming Languages.

Operating Systems (**4**)

History and Evolution. Main functions of OS Multitasking, Multiprocessing, Time Sharing,

Real Time OS with Examples

Database Management System (**2**)

Purpose and Organization of Database, Introduction to Data Models

Computer Generation & Classifications **(3)**

First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of computers

Computers & Communications **(2)**

Introduction to Computer Networks, Types of Networks, OSI/TCP Model, LAN technologies (fast Ethernet & Gigabit Ethernet)

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	**ITC 201**
Course Title	**Object Oriented Programming using C++**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	Programming Fundamentals
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.

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SYLLABUS

SECTION A

Principles of Objected Oriented Programming **(3)**
Advantages of OOP, comparison of OOP with Procedural Paradigm

C++ Constructs **(3)**
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

Functions **(5)**
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.

Constructors and Destructors **(5)**
Characteristics and its various types, Dynamic Constructors, Applications, Order of Invocation, C++ garbage collection, dynamic memory allocation.

Polymorphism **(5)**

Using function and Operator overloading, overloading using friend Functions, type conversions from basic data types to user defined and vice versa.

SECTION B

Inheritance **(6)**

Derived classes, types of inheritance, various types of classes, Invocation of Constructors and Destructors in Inheritance, aggregation, composition, classification hierarchies, metaclass/abstract classes.

Pointers **(5)**

Constant pointers, Use of this Pointer, Pointer to derived and base classes, virtual functions, Bindings, Pure virtual Functions and polymorphism

I/O Operations and Files **(4)**

Classes for files, Operations on a file, file pointers

Generic Programming With Templates **(6)**

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

Introduction to object oriented Analysis and Design **(3)**

Object Oriented System, Analysis and Design

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 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 Code	**ESC X08**
Course Title	**Basic Information Theory and Communication**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 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 for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION A

Probability and Random Signal theory

Set theory, Introduction to probability, Conditional probability, Bayes' Theorem, random variable, Binomial, Poisson and Normal distribution. **(3)**

Information Theory **(5)**

Unit of Information, Entropy, Rate of Information, Joint Entropy and Conditional Entropy, Mutual Information, Channel capacity, Shannon's Theorem, Bandwidth and SNR trade-off.

Coding **(6)**

Coding Efficiency, Shannon Fano Coding, Huffman Coding, Error Control Coding, Block Codes, Convolution Codes

SECTION B

Analog Modulation Techniques **(8)**

Concept of Modulation its merits & demerits,

Amplitude Modulation: Principle, generation, receiver stages

Frequency Modulation: Principle, generation, transmitter stages, 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 **(4)**

Principle of generation, detection applications, comparison: Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Differential PCM, Delta Modulation.

Digital Transmission Techniques **(4)**

Principle of: ASK, QASK, PSK, DPSK, BPSK, QPSK, FSK, BFSK and MSK.

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

Course Code	**ESC X58**
Course Title	**Basic Information Theory and Communication (P)**
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.

Course Code	**ITC 252**
Course Title	**Web and Open Source Technologies (P)**
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 Code	**EEEC 101**
Course Title	Electrical Measurement and Instrumentation
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Units, Dimensions and Standards: Introduction to MKS & Rationalized MKSA System, SI Units, Standards of EMF, Resistance, Capacitance and Inductance, Systematic errors. (4 hours)

General Theory of Analog Measuring Instruments: Operating torque, damping & controlling torque, T/W ratio, Pointers & Scales. Principles of operation of various types of electro mechanical indicating / registering instruments viz. PMMC, dynamometer for DC & AC measurement of V, I, W, frequency, phase & power factor etc., energy meter, their sources of error & compensation, shunts & multipliers, multi- meter.
(8 hours)

Potentiometers: Basic Potentiometer circuit, multiple range potentiometers, constructional details of potentiometers, applications of d-c potentiometers; self balancing potentiometers. A-C potentiometers, polar and co-ordinate types.
(6 hours)

SECTION - B

Bridges: Sources and Detectors, General equation for bridge balance, Measurement of R,L,C,M, F etc by Wheatstone, Kelvin, Maxwell, Hay's, Anderson, Owen, Heaviside, Campbell, Schering, Wien bridges. Bridge sensitivity. Errors, Wagner Earthing Device. (9 hours)

Magnetic Measurements: Flux meter, B-H Curve, Hysteresis loop, Permeameters, AC Testing of Magnetic materials, Separation of iron losses, iron loss measurement by Wattmeter and Bridge methods.
(5 hours)

Instrument Transformers: Theory and construction of current and potential transformers, ratio and phase angle errors and their minimization, Characteristics of CTs. & PTs., Testing of CTS & PTS.
(3 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	A Course in Electrical & Electronics Measurement & Inst	A. K. Sawhney	Dhanpat Rai & sons.
2.	Electronic Inst. & Measurement techniques	W.D. Cooper	

Course Code	**EEEC 151**
Course Title	Electrical Measurement and Instrumentation **(P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

Instruction for Students: Perform at least eight experiments.

1. Study of principle of operation of various types of moving iron, PPMC and dynamo type measuring instruments.
2. Measurement of resistance using Wheatstone Bridge.
3. Measurement of resistance using Kelvin's Bridge.
4. Measurement of self inductance using Anderson's Bridge.
5. Measurement of capacitance using Schering Bridge.
6. Plotting of Hysteresis loop for a magnetic material using flux meter.
7. Measurement of frequency using Wein's Bridge.
8. To study the connections and use of Current and potential transformers and to find out ratio error.
9. Determination of frequency and phase angle using CRO.
10. Measurement of unknown voltage using potentiometer.
11. To find 'Q' of an inductance coil and verify its value using Q- meter.
12. To measure power factor using three voltmeters/ ammeters method.

Course Code	**EEEC 201**
Course Title	**Basic Electrical Engineering**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

DC circuits: Voltage and current sources, network analysis by mesh and node analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum-power transfer theorem (numerical based on these theorem). (6 hours)

Single Phase AC Fundamentals: Alternating current systems, average and RMS values of alternating, quantities, phasor notation, solution and phasor diagram of single phase ac circuits with sinusoidal source excitation. (6 hours)

Three Phase AC Fundamentals: Three phase voltages and currents generation, voltages and currents in star and delta connected systems, power in a three phase system, solution of three phase balanced circuits, power and power factor measurement by two watt-meters method. (6 hours)

SECTION-B

Magnetic Circuit: Introduction to magnetic circuit, comparison of electric and magnetic circuits, B/H curve, magnetic circuits calculations, self and mutual inductance. (5 hours)

Transformers: Introduction, Basic Principle, EMF equation, losses, efficiency and condition for maximum efficiency, voltage regulation, open circuit and short circuit tests. (6 hours)

Electric Machines: Operating principle and application of DC machine and three phase induction motors. (7 hours)

Electrical Generation and Transmission: Introduction to Resources of Electrical Power, Conventional and Non-Conventional, AC transmission voltage levels, Single Line Diagram of Power transmission network. Distribution network and Single Line Diagram of Distribution Network. (6 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Electrical & Electronic Technology	Edward Hughes	Pearson Education Publication Asia, 2003.
2.	Basic Electrical Engineering	T.K. Nagsarkar and M.S. Sukhija	OXFORD University Press, 2004.
3.	Basic Electrical Engineering	Fitzgerald, Higginbotham, & Gabriel	McGraw Hill, 4th edition.
4.	Principles of Electrical Engineering	Del Toro	PHI, New-Delhi, 2nd edition
5.	Basic Electrical Engineering	I.J.Nagrath and D.P. Kothari	TMH, New Delhi, 3rd

	TMH		edition.
6.	Experiments in Basic Electrical Engineering	S. K. Bhattacharya and K. M. Rastogi	New Age International Publishers Ltd., New Delhi

Course Code	**EEEC 251**
Course Title	**Basic Electrical Engineering (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

Instruction for Students: Perform at least eight experiments.

1. Measure resistance and inductive reactance of a choke coil make a series RLC circuit using the choke coil and obtain its phasor diagram.
2. To prove Superposition and Maximum Power Transfer theorem.
3. To prove Thevenin's and Norton's theorem.
4. Study the resonance in an RLC series and parallel circuits.
5. To find out the relationship between line current & phase current, between line voltage & phase voltage for star and delta connected loads supplied from balanced three phase supply.
6. To measure power and power factor using wattmeter in single phase circuit.
7. Perform Open circuit and short circuit tests on a single phase transformer to draw equivalent circuit.
8. To connect, start and reverse the direction of a 3 Phase Induction Motor and measure speed / torque.
9. Study and demonstration of earthing system for protection against shocks.
10. To measure power and power factor using two wattmeter of three phase load.

Course Code	**EC 103**
Course Title	**Introduction to Electronics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To Introduce the principles of semiconductor Physics 2. To familiarize with transistor models 3. To explain the working of semiconductor circuits and systems
Course Outcome	At the end of this course students will demonstrate the ability to 1. Understand the principles of semiconductor Physics 2. Understand and utilize the mathematical models of semiconductor devices. 3. Understand the working of semiconductor circuits and systems

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTOR: Bonding Forces and Energy Bands in Solids, Bonding Forces in Solids, Energy Bands in Metals, Semiconductors, and Insulators, Direct and Indirect Semiconductors, Variation of Energy Bands with Alloy Composition, Electrons and Holes, Effective Mass, Intrinsic Material, Extrinsic Material, Electrons and Holes in Quantum Wells, Carrier Concentration, The Fermi Level, Electron and Hole Concentrations at Equilibrium, Temperature Dependence of Carrier Concentrations, Compensation and Space Charge Neutrality, Drift of Carriers in Electric and Magnetic Field Electrons in periodic Lattices, Conductivity and Mobility, Drift and Resistance, Effects of Temperature and Doping on Mobility, The Hall Effect, Invariance of the Fermi Level at Equilibrium. (13 hours)

EXCESS CARRIERS IN SEMICONDUCTOR: Optical Absorption, Luminescence, Photoluminescence, Electroluminescence, Carrier Lifetime and Photoconductivity, Direct Recombination of Electrons and Holes, Indirect Recombination; Trapping, Steady State Carrier Generation; Quasi-Fermi Levels, Photoconductive Devices, Diffusion of Carriers, Diffusion Processes, Diffusion and Drift of Carriers; Built-in Fields, Diffusion and Recombination; The Continuity Equation, Steady State Carrier Injection; Diffusion Length (10 hours)

SECTION-B

JUNCTIONS: Equilibrium Conditions, The Contact Potential, Equilibrium Fermi Levels, Space Charge at a Junction, Forward- and Reverse-Biased Junctions; Steady State Conditions, Qualitative description of Current Flow at a Junction, Carrier Injection, Reverse Bias, Reverse-Bias Breakdown, Zener Breakdown, Avalanche Breakdown, Rectifiers, The Breakdown Diode, Transient and A-C Conditions, Time Variation of Stored Charge, Reverse Recovery Transient, Switching Diodes, Capacitance of p-n Junctions.
(10 hours)

JUNCTION BASED DEVICES: Working principle and applications of Avalanche breakdown, Zener diode, Schottky diode, LED, photodiode, Varactor Diode and solar cell. (5 hours)

BIPOLAR JUNCTION TRANSISTOR: Fundamentals of BJT Operation, Amplification with BJTs, Minority Carrier Distributions and Terminal Current I-V characteristics, Ebers-Moll Model. (7 hours)

TEXT BOOKS			
S. No.	**Title**	**Author(s)**	**Publisher**
1	Solid State Electronic Devices	G. Streetman, and S. K. Banerjee	7th edition, Pearson
2	Semiconductor Physics and Devices	Neamen , D. Biswas	McGraw-Hill Education
RECOMMENDED BOOKS			
1	Physics of Semiconductor Devices	S. M. Sze and K. N. Kwok	3rd edition, John Wiley & Sons
2	Fundamentals of solid state electronics	C.T. Sah	World Scientific Publishing Co. Inc

Course Code	**EC 153**
Course Title	**Introduction to Electronics (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. Familiarization with electronic components and usage of Multimeter
2. Familiarization with CRO and Signal Generator.
3. To study the V-I characteristics of PN junction diode and determine static resistance and dynamic resistance.
4. Investigate the AC characteristics of the PN junction diode, and find the zero-bias junction capacitance CJO.
5. To study the working of PN junction diode as a rectifier.
6. To study the characteristics of Zener diode.
7. To implement zener diode as voltage regulator.
8. To study the characteristics of the photodiode.
9. To study the characteristics of LED.
10. To study the characteristics of Varactor Diode.
11. To plot the study I-V characteristics of the basic configuration of BJT.
12. A project related to the implementation of an application based Electronic Circuit on a general purpose PCB.

Course Code	**EC 203**
Course Title	**Digital Design**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To apply minimization techniques for reducing the functions up to six variables. 2. To design various combinational circuits 3. To write the truth table, excitation table, characteristic equations of various flip flops and to design the sequential circuits using Flip flops. 4. To familiarize the various A/D, D/A Converters, Logic families and their characteristics.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Introduction (5 hours)

Digital logic, Number Systems and Conversions for Binary, Octal, Decimal, Hexadecimal, Binary Arithmetic, Basic and Universal gates, Boolean Alegbra, Binary addition and subtraction.

Minimization Techniques (6 hours)

Sum of Products and Products of Sum forms, Minterms & Maxterms, Karnaugh Map for two, three, four five and six variables, Quine-McCluskey method.

Combinational Circuit Design (6 hours)

Half adder, full adder, subtractor, BCD adder, comparator, code converter, encoder decoder, multiplexer, demultiplexer, parity detector and generator, PLA, PAL and ROM

Flip Flops (5 hours)

1-bit memory cell, clocked and unclocked flip flops, S-R Flip flop, D flip flop, JK Flip flop, T flip flop, edge triggered flip flop, race around condition , Master slave flip flop, conversion of flip flops using excitation table.

SECTION - B

Counters (5 hours)

Ripple counter, design of Mod-N ripple counter, design of synchronous counter with and without lockout condition, decade counter, ring counter, Johnson counter

Shift Registers (5 hours)

Serial in serial out shift register, serial in parallel out shift register, parallel in serial out shift register and parallel in parallel out shift register, bidirectional shift register, universal shift register.

A/D and D/A Converters (6 hours)

Weighted resistor D/A converter, Binary ladder D/A converter. A/D Converters- flash type, successive approximation, counter ramp type, dual slope type, characteristics of ADC and DAC.

Logic Families (7 hours)

Characteristics of logic families: fan-out, noise margin, propagation delay, power dissipation. Circuit diagrams and working of DTL, DCTL, I^2L, HTL, TTL, Totem pole TTL, ECL, CMOS logic families.

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Digital Design	Morris Mano	PHI, 4th edition
2.	Digital principles and Applications	Malvino Leach	Tata-McGraw Hill
3.	Digital System Principles and Applications	R J Tocci	PHI
4.	Modern Digital Electronics	R P Jain	Tata-McGraw Hill
5.	Digital Integrated Electronics	Taub Schilling	Tata-McGraw Hill

Course Code	**EC 253**
Course Title	**Digital Design (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. To Study the data sheets of TTL and ECL gates
2. Implementation of Adder and Subtractor using Logic Gates.
3. Implementation of Binary Adder/Subtractor.
4. Implementation of BCD Adder.
5. Design & implementation of Combinational circuits using Multiplexers
6. Design and implement a Universal shift register having shift-right, shift-left, SISO, PIPO capabilities.
7. Implementation of Flip-flops using Logic Gates.
8. Implementations of Ripple counter.
9. Implementation of Modulo-N Synchronous Counter.
10. Implementation of Synchronous counters with unused states and/or avoiding Lock Out condition.
11. To convert 8 bit Digital data to Analog value using DAC
12. To convert Analog value into 8 bit Digital data using ADC.

Course Code	**EC 204**
Course Title	**Electrical Science**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To acquire knowledge about Circuit components and Network graph. 2. To identify the Network Theorems and Two Port Network Descriptions. 3. To identify response of Network Functions. 4. To identify the characteristics of Attenuators, Filters, and network synthesis. 5. To acquire knowledge about Electrical motors. 6. To impart practical knowledge of Filter Design.
Course Outcome	1. Identify the circuit components and their applications in various circuits. 2. Evaluate RL, RC and RLC circuits by hand. 3. Evaluate and analyze the Norton and Thevenin equivalent circuits. 4. Measure the frequency response of circuits, analyze the two port networks and develop both active and passive filters. 5. Understanding of working of Electrical motors.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Circuit Concepts **(3 hours)**

Circuit elements, Independent and dependent sources, signals and waveforms, periodic and singularity voltages, Amperes law, Electromagnetic Induction and force, Self and mutual Inductance

Mesh & Nodal Analysis **(5 hours)**

Loop currents and loop equations, node voltages and node equations, mesh and nodal analysis, duality, graphical method of determining the dual of N/Ws, Star Connections, Delta connections

Network Theorems **(5 hours)**

Superposition, Thevenin's, Norton's, Maximum power Transfer, Tellegen's, Reciprocity theorem

Networks functions **(10 hours)**

Concept of complex frequency, Transform Impedance and transform circuits, Network functions for the one port and two port, Calculation of network functions, Poles and Zeros for Network functions, Restrictions on Poles and Zeros, Locations for Driving Point and Transfer functions, Time domain behavior from Pole and Zero plot, Stability of networks functions

SECTION-B

Two Port Network **(6 hours)**

Relationship of Two port variables, Short Circuit Admittance and Open circuit Impedance parameters, Transmission and hybrid parameters, Network Topology and Graph Theory

Filter Synthesis **(7 hours)**

Classification of filters, characteristic impedance and propagation constantof pure reactive network, Ladder network, T–section, Pi–section, terminating half section, Pass bands and stop bands, Design of constant–K, m–derived filters, Composite filters

Introduction to Electrical Motors **(9 hours)**

Introduction to DC motors: Construction, types, torque and EMF equations, Commutations, Armature reactions, Characteristics and Applications. Principle of single and three-phase induction motors, Rotating field concept, concept of slip, torque-slip characteristics, Starting and speed control methods

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Engineering Circuit Analysis	Milliam H. Hayt., Jack E. Kemmerly	
2.	Networks and Systems	Ashfaq Hussain	
3.	Network Analysis and Synthesis	D. R. Chaudhry	
4.	Circuits and Networks (Analysis and Synthesis)	A. Sudhakar & S.P. Shyammohan	Tata McGraw Hill 1994, Edition 2ND
5	Networks, Lines and Fields	John D. Ryder	PHI, Edition 2ND
6	A Course in Electrical Circuits Analysis	Soni-Gupta,	DhanpatRai& Sons
7	Theory and Problems of Electric Circuits	Joseph A. Edminister	Tata McGraw Hill, 1991, 2nd Edition
8	Network Analysis	M.E. Van Valkenburg	PHI
9	Network Analysis	G K Mithal	
10	Basic Electrical and Electronics Engineering	Kothari and Nagrath	Mc-Graw Hill

Course Code	**ESC X04**
Course Title	**Engineering Graphics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Objectives (CO)	1. To learn computer-aided-drafting skills using computer software. 2. To communicate ideas using engineering drawings. 3. To be able to interpret and express standard symbols and conventions engineering drawing.
Course Outcome	1. Students will gain the ability to draw engineering views of products using computers. 2. Ability to turn their ideas into sketches and drawings for good communication. 3. Ability to read and understand drawing symbols and conventions.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Section A

1. Introduction: Technical lettering as per BIS codes, Tabs and Panels, The Command Line Box , Command Tools, Starting a New Drawing , Naming a Drawing , Drawing Units , Drawing Limits , Grid and Snap, Save and Save As, Open, Close, Terminology and Conventions, Linear Dimension, Dimension Styles, Units, Aligned Dimensions, Radius and Diameter Dimensions, Angular Dimensions, Ordinate Dimensions, Baseline Dimensions, Continue Dimension, Quick Dimension, Center Mark, MLEADER and QLEADER, Text Angle, Tolerances, Dimensioning Holes, Placing Dimensions, Fillets and Rounds, Rounded Shapes (Internal), Rounded Shapes (External), Irregular Surfaces, Polar Dimensions, Chamfers, Symbols and Abbreviations, Symmetry and Centerline, Dimensioning to Points

2. Fundamentals of 2D Construction and Advanced Commands: Line-Random Points, Erase, Line-Snap Point, Line-Dynamic Inputs, Construction Line, Circle, Circle Centerlines, Polyline, Spline, Ellipse, Rectangle, Polygon, Point, Text, Move, Copy, Offset, Mirror, Array, Rotate, Trim, Extend, Break, Chamfer, Fillet, Table, Osnap, Osnap-Endpoint, Osnap-Snap From, Osnap-Midpoint, Osnap-Intersection, Osnap-Apparent Intersection, Osnap-Center, Osnap-Quadrant, Osnap-Perpendicular, Osnap-Tangent, Osnap-Nearest, Grips, Grips-Extend, Grips-Move, Grips-Rotate, Grips-Scale, Grips-Mirror, Edit Polyline, Edit Spline, Edit Text, Constructing the Bisector of an Angle

3. Sketching: Establishing Your Own Style, Graph Paper, Pencils, Lines, Proportions, Curves, Isometric Sketches, Oblique Sketches, Perspective Sketches, Working in Different Orientations

4. Orthographic Views: Points, Lines Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method, Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, Definition of solids, types of solids, and elements of solids. Projection of solids in first quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Three Views of an Object, Visualization, Hidden Lines, Hidden Line Conventions, Drawing Hidden Lines, Precedence of Lines.

Section B

5. Sectional Views: Cutting Plane Lines, Section Lines, Hatch, Styles of Section Lines, Sectional View Location, Holes in Sections, Gradients, Offset Sections, Multiple Sections, Aligned Sections, Drawing Conventions in Sections, Half, Partial, and Broken-Out Sectional Views, Removed Sectional Views, Sectional View of Castings.

6. Isometric Views: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder.

7. Development and Intersection: Purpose of development, Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere. Intersection of solids.

8. Auxiliary Views: Projection Between Normal and Auxiliary Views ,Transferring Lines Between Views , Projecting Rounded Surfaces , Projecting Irregular Surfaces , Partial Auxiliary Views , Sectional Auxiliary Views.

Suggested Books:

Title	**Author**	**Publisher**		**Edition**
Engineering Graphics with AutoCAD	James Bethune	Pearson	2016	
Fundamentals of Engg. Drawing	Warren J. Luzadder	Literary Licensing, LLC	2015	
Engineering Drawing and Design	Cecil Jensen	Mc-Graw Hill		2012
Manual of Engineering Drawing	T.E. French	WENTWORTH Press	2016	

Course Code	**ESC X54**
Course Title	**Engineering Graphics (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

The candidates will be required to make AutoCAD drawing sheets covering the following as per B.I.S. SP46-2003 for general engineering drawing:

1. To draw two dimensional drawings in AutoCAD by using draw, modify, dimension, layers and object-snap toolbars.
2. To draw orthographic views of points.
3. To draw orthographic views of lines and to find traces of the lines.
4. To find true length of lines using rotation as well as trapezoidal methods.
5. To draw orthographic views of laminas in different positions.
6. To draw orthographic views of polyhedral solids in different positions.
7. To draw orthographic views of solids of revolution in different positions.
8. To draw sectional views of solids, true sections and apparent sections.
9. To draw auxiliary views of solids.
10. To draw isometric views of laminas and solids.
11. To draw development of polyhedral solids.
12. To draw development of solids of revolution.
13. To draw orthographic views of solids-in-intersection.
14. To draw basic solid models using AutoCAD by using solids and solid editing toolbars and related commands.

Course Code	**MEC 101**
Course Title	**Statics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	Prior knowledge of integral and differential calculus and vector algebra
Course Objectives (CO)	The main objective of this course is to develop in the student the ability to analyze any engineering problem in a simple and logical manner with the help of free body diagrams and then to apply the basic principles of mechanics to solve the problem.The students should develop skills to apply equilibrium equations of statics to various problems to determine reactions and also could determine centre of gravity and moment of inertia of various bodies.
Course Outcome	The student can apply the principles of Engineering Mechanics to wide range of applications from Mechanical Engineering, Civil Engineering ,Automotive Engineering to Medicine and Biology and can make use of the concept of free body diagrams and equilibrium equations in statics to solve practical engineering problems that are applicable to engineering design. At the end of the course students can determine centre of gravity and moment of inertia of any lamina which is required to solve practical engineering problems.

SYLLABUS

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SECTION-A

General Principles: Mechanics. Fundamental Concepts, Units of Measurement, The International System of Units, Numerical Calculations, General Procedure for Analysis.

Force Vectors: Scalars and Vectors, Vector Operations, Vector Addition of Forces, Addition of a System of Coplanar Forces, Cartesian Vectors, Addition and Subtraction of Cartesian Vectors, Position Vectors, Force Vector Directed Along a Line, Dot Product.

Equilibrium of a Particle: Condition for the Equilibrium of a Particle, the Free-Body Diagram, Coplanar Force Systems, Three-Dimensional Force Systems.

Force System Resultants: Cross Product, Moment of a Force - Scalar Formulation, Moment of a Force - Vector Formulation, Principle of Moments, Moment of a Force about a specific Axis, Moment of a Couple, Movement of a Force on a Rigid Body, Resultants of a Force and Couple System, Further reduction of a Force and Couple System, Reduction of a Simple Distributed Loading.

Equilibrium of a Rigid Body: Conditions for Rigid-Body Equilibrium, Equilibrium in Two Dimensions and Free-Body Diagrams, Equations of Equilibrium, Two-Force and Three-Force Members, Equilibrium in Three Dimensions, Free-Body Diagrams, Equations of Equilibrium, Constraints for a Rigid-Body.

Structural Analysis: Simple Trusses, The Method of Joints, Zero-Force Members, The Method of Sections, Space Trusses, Frames and Machines.

SECTION-B

Internal Forces: Internal Forces developed in Structural Members, Shear and Moment Equations and Diagrams, Relationships between Distributed Load and Shear and Moment, Cables.

Friction – Characteristics of Dry Friction, Problems Involving Dry Friction, Wedges, Rolling Resistance.

Center of Gravity and Centroid – Center of Gravity and Center of Mass for a System of Particles, Center of Gravity and Center of Mass and Centroid for a Body, Composite Bodies, Theorems of Pappus and Goldinus, Resultant of a General Distribued Force System,

Moments of Inertia – Definition of Moments of Inertia for Areas, Parallel-Axis Theorem for an Area, Radius of Gyration of an Area, Moments of Inertia for an Area by Integration, Moments of Inertia for Composite Areas, Product of Inertia for an Area, Moments of Inertia for and Area about Inclined Axes, Mohr's Circle for Moments of Inertia, Mass Moment of Inertia.

Virtual Work – Definition of Work and Virtual Work, Principle of Virtual Work for a Particle and a Rigid Body, Principle of Virtual Work for a System of Connected Rigid Bodies, Conservative Forces, Potential Energy.

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Engineering Dynamics	R.C. Hibbeler	Pearson
2.	Engineering Dynamics	F.P. Beer et al.	McGrawHill
3.	Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

Course Code	**MEC 201**
Course Title	**Rigid Body Dynamics**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	Prior knowledge of integral and differential calculus and vector algebra
Course Objectives (CO)	The main objective of this course is to develop in the student the ability to analyze any engineering problem in a simple and logical manner with the help of free body diagrams and then to apply the basic principles of mechanics to solve the problem.
Course Outcome	The student can apply the principles of Engineering Mechanics to wide range of applications from Mechanical Engineering, Civil Engineering, Automotive Engineering to Medicine and Biology and can make use of the concept of free body diagrams to solve practical engineering problems that are applicable to engineering design.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Kinematics of a Particle: Introduction. Rectilinear Kinematics: Continuous Motion. Rectilinear Kinematics: Erratic Motion. General Curvilinear Motion. Curvilinear Motion: Rectangular Components. Motion of a Projectile. Curvilinear Motion: Normal and Tangential Components. Curvilinear Motion: Cylindrical Components. Absolute Dependent Motion Analysis of Two Particles. Relative-Motion Analysis of Two Particles Using Translating Axes.

Kinetics of a Particle: Force and Acceleration - Newton's Laws of Motion. The Equation of Motion. Equation of Motion for a System of Particles. Equations of Motion: Rectangular Coordinates. Equations of Motion: Normal and Tangential Coordinates. Equations of Motion: Cylindrical
Coordinates. Central-Force Motion and Space Mechanics.

Kinetics of a Particle: Work and Energy - The Work of a Force. Principle of Work and Energy. Principle of Work and Energy for a System of Particles. Power and Efficiency. Conservative Forces and Potential Energy. Conservation of Energy.

Kinetics of a Particle: Impulse and Momentum - Principle of Linear Impulse and Momentum. Principle of Linear Impulse and Momentum for a System of Particles. Conservation of Linear Momentum for a System of Particles. Impact. Angular Momentum. Relation Between Moment of a Force and Angular Momentum. Angular Impulse and Momentum Principles. Steady Fluid Streams. Propulsion with Variable Mass.

Planar Kinematics of a Rigid Body - Rigid-Body Motion. Translation. Rotation About a Fixed Axis. Absolute General Plane Motion Analysis. Relative-Motion Analysis: Velocity. Instantaneous Center of Zero Velocity. Relative-Motion Analysis: Acceleration. Relative-Motion Analysis Using Rotating Axes.

SECTION- B

Planar Kinetics of a Rigid Body: Force and Acceleration - Moment of Inertia. Planar Kinetic Equations of Motion. Equations of Motion: Translation. Equations of Motion: Rotation About a Fixed Axis. Equations of Motion: General Plane Motion.

Planar Kinetics of a Rigid Body: Work and Energy - Kinetic Energy. The Work of a Force. The Work of a Couple. Principle of Work and Energy. Conservation of Energy.

Planar Kinetics of a Rigid Body: Impulse and Momentum - Linear and Angular Momentum. Principle of Impulse and Momentum. Conservation of Momentum. Eccentric Impact.

Three-Dimensional Kinematics of a Rigid Body: Rotation About a Fixed Point. The Time Derivative of a Vector Measured from a Fixed and Translating-Rotating System. General Motion. Relative-Motion Analysis Using Translating and Rotating Axes.

Three-Dimensional Kinetics of a Rigid Body: Moments and Products of Inertia. Angular Momentum. Kinetic Energy. Equations of Motion. Gyroscopic Motion. Torque-Free Motion.

Vibrations: Undamped Free Vibration. Energy Methods. Undamped Forced Vibration. Viscous Damped Free Vibration. Viscous Damped Forced Vibration. Electrical Circuit Analogs.

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Engineering Dynamics	R.C. Hibbeler	Pearson
2.	Engineering Dynamics	F.P. Beer et al.	McGrawHill
3.	Engineering Dynamics	Merriam and Kraige	Wiley and Sons Publishers

Course Code	**MEC 251**
Course Title	**Rigid Body Dynamics (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. Wheel and Axle - Demonstration of the formation of an equilibrium of moments in static systems
2. Determination of parameters of System of pulleys.
3. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
4. Determine the mechanical advantage, Velocity ratio and Mechanical efficiency of Wheel and Axle.
5. To determine the MA, VR of Worm Wheel (double-start)
6. To find the time period of a simple and compound pendulum.
7. To calculate the mass moment of inertia and radius of gyration of the compound pendulum of two bodies different in shapes and compare them to the theoretical values.
8. To study various types of gears – Helical, Cross helical, Worm, Bevel gear.
9. To Study various types of gear trains – Simple, Compound, reverted, Epicyclic and Differential.
10. To obtain by experiment the velocity ratios of a simple or a compound train of gears and to verify calculated values.

Course Code	**ESC X02**
Course Title	**Computer Programming (Matlab)**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	No specific prerequisites are needed. It is advisable to have a have a good familiarity with PC operations and a working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.
Course Objectives (CO)	The course provides a gentle introduction to the MATLAB computing environment, and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of lectures and sample MATLAB problems given as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include basic use, graphical representations and tips for designing and implementing MATLAB code. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.
Course Outcome	Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

SYLLABUS

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SECTION-A

Introduction: Introduction to basic features of Matlab and Matlab desktop. (2 hours)

Basic Programming Operations: Script M-files, Arrays and array operations, Multidimensional arrays, Numeric data types, Cell arrays and structures, Character strings, Relational and logical operations, Control flow. (6 hours)

Advance Programming Operations: Functions, M-file debugging and profiling, File and directory management, Set, bit and base functions, Time computations. (6 hours)

Basic Mathematical Applications: Matrix Algebra, Data analysis, Data interpolation, Polynomials, Cubic splines. (6 hours)

SECTION-B

Advance Mathematical Applications: Fourier analysis, Optimization, Integration, Differentiation, Differential equations. (5 hours)

Basic Graphical Operations: Two-dimensional graphics, Three-dimensional graphics, Use of colors and light in graphics, Generation of images. (5 hours)

Advance Graphical Operations: Development of movies and sounds, Printing and exporting graphics, Handling graphics, Development of graphical user interfaces. (5 hours)

Classes and Interfacing: Matlab classes and Object-Oriented Programming, Matlab programming interfaces. (5 hours)

RECOMMENDED BOOKS

S.No.	NAME	AUTHORS	PUBLISHER
1.	Mastering MATLAB 7	D. Hanselman and B. Littlefiels	Pearson Education, New Delhi, 2009
2.	Getting started with Matlab: A quick introduction for scientists and engineers	Rudra Pratap	Oxford University Press, USA, 2009.
3.	Programming in MATLAB for Engineers	Chapman Stephen J.	Cengage Learning, New Delhi, 2009.
4.	MATLAB An Introduction with Applications	Amos Gilat	John Wiley and Sons, New Delhi, 2009
5.	Essential Matlab for Engineers and Scientists	Brian HHahn	Elsevier India
6.	Matlab: A practical Introduction To Programming	Attaway	Elsevier India

Course Code	**ESC X05**
Course Title	**Basics of electrical and electronics engineering**
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Elements in an electrical circuit: R, L, C, Voltage and current sources (independent and dependant/controlled sources with examples. (3 hours)

DC circuits: Voltage and current sources, KCL, KVL, network analysis by mesh and node analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum-power transfer theorem (numerical based on these theorem), Two port networks (6 hours)

Single Phase AC Fundamentals: Alternating current systems, average and RMS values of alternating, quantities, phasor notation, solution and phasor diagram of single phase ac circuits with sinusoidal source excitation. (4 hours)

Three Phase AC Fundamentals: Three phase voltages and currents generation, voltages and currents in star and delta connected systems, power in a three phase system, solution of three phase balanced circuits, power and power factor measurement by two watt-meters method. (4 hours)

Electronic Devices: p-n Junction diode and its VI characteristics, Transistor operation and Characteristics, CB, CC and CE configurations, Introduction, FET Construction, types of FET,
Characteristics of FETs (4 hours)

SECTION-B

Magnetic Circuit: Introduction to magnetic circuit, comparison of electric and magnetic circuits, B/H curve, magnetic circuits calculations, self and mutual inductance. Energy in magnetic field.
(5 hours)

Transformers: Introduction, Basic Principle, EMF equation, losses, efficiency and condition for maximum efficiency, voltage regulation, open circuit and short circuit tests. (6 hours)

Electric Machines: Operating principle and application of DC machine and three phase induction motors. Electromechanical energy conversion principles with examples. Principle of measurement of voltage, current and power. (7 hours)

Electrical Generation and Transmission: Introduction to Resources of Electrical Power, Conventional and Non-Conventional, AC transmission voltage levels, Single Line Diagram of Power transmission network. Distribution network and Single Line Diagram of Distribution Network.
(6 hours)

Introduction to digital electronics: Introduction to digital electronics: Introduction to Number Systems-Types-Decimal, Binary, Octal, Hexadecimal; Conversion from one number system to other , Logic Gates-Basic Gates, Other gates, Universal Gates and realization of other gates using universal gates,

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Electrical & Electronic Technology	Edward Hughes	Pearson Education Publication Asia, 2003.
2.	Basic Electrical Engineering	T.K. Nagsarkar and M.S. Sukhija	OXFORD University Press, 2004.
3.	Basic Electrical Engineering	Fitzgerald, Higginbotham, & Gabriel	McGraw Hill, 4th edition.
4.	Principles of Electrical Engineering	Del Toro	PHI, New-Delhi, 2nd edition
5.	Basic Electrical Engineering TMH	I.J.Nagrath and D.P. Kothari	TMH, New Delhi, 3rd edition.
6.	Experiments in Basic Electrical Engineering	S. K. Bhattacharya and K. M. Rastogi	New Age International Publishers Ltd., New Delhi

Course Code	**ESC X52**
Course Title	**Computer Programming (Matlab) (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Prerequisites	No specific prerequisites are needed. It is advisable to have a have a good familiarity with PC.
Course Objectives (CO)	The course provides a gentle introduction to the MATLAB computing environment. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.
Course Outcome	Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

1. Basics such as command window, workspace, m-files, clc, clear, who, save, load, format,,if, else, switch, for, while, continue, break, try, catch, return, ctrl+C, entering matrices, transpose, subscripts, colon operator, modifying or deleting rows and columns, addition, subtraction, matrix multiplication, element-by-element multiplication / division / left-division, sum, diag, eye, zeros, ones, rand, randn, det, inv, variables, numbers, strings, numeric operators, relational operators, functions.

2. 2-D and 3-D plotting. Modifying graph properties such as title, labels, limits, colors, line-types, line-weights, lights etc. using graphic handles. Exporting graphs as TIFF, PDF and JPEG files.

3. Application of matrix inversion in solving a system of simultaneous linear equations. Measurement of time consumed in solving the problem.

4. Curve fitting and simple regression analysis of some simulated data.

5. Use of FFT method to find the frequency components of a signal buried in a noisy time domain signal.

6. Solution of a multi-variable optimization problem.

7. Differentiation and integration of a function using symbolics.
8. Solution of an ordinary differential equation and development of a corresponding GUI.

Course Code	**CIV 201**
Course Title	**Building Materials and Construction**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Prerequisites	None
Course Objectives	1. To learn the various building materials and their utilization in construction. 2. To learn standardized techniques used to evaluate construction materials performance. 3. To understand the various types of masonry works, causes and effects of dampness, various damp proofing methods. 4. To understand and utilize basic principles used in building construction.
Course Outcomes	1. Identify the factors to be considered in construction of buildings and develop the construction practices and techniques. 2. Select appropriate material for construction of building. 3. Identify the components of building and differentiate various types of building materials depending on their function.

SECTION – A

BUILDING STONES

General, Qualities of a good building stone, Deterioration of stones, Preservation of stones, Common building stones of India & their Uses, Artificial stones.

BRICKS

General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks. Varieties of fire bricks, sand lime bricks, building tiles- roofing; flooring and wall tiles.

LIME

Cementing material, Characteristics of good quality lime, classification & testing of Lime, Hydraulic test, acid test, setting & slaking of lime, uses of different varieties of lime

TIMBER

Advantages of timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber

CEMENTAND CONCRETE

Constituents of concrete, different types of cements used and their strengths, Ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and various tests of cement

SECTION - B

BRICK & STONE MASONRY

Terms used; types of bonds; their merits and demerits; Rubble and ashlar joints in stone masonary, introduction to cement concrete hollow blocks

WALLS AND FOUNDATION

Load bearing and non-load bearing walls, estimation of load on walls and footings, Thickness considerations, partition and cavity walls .

DAMP PROOFING

Sources, Causes of dampness in buildings, bad effects of dampness, methods of damp proofing.

ARCHES AND LINTELS

Introduction to terms used in Arches; different types of arches; brick and stone arches, types and functions of lintels.

DOORS AND WINDOWS

Introduction terms used location of doors and windows, types of doors and windows, Ventilators

PLASTERING, POINTING AND PAINTING

Introduction, objects and types, special materials for plastered surfaces, distempering, white washing and color washing of plastered surfaces.

FLOORS

Introduction, various types of floors commonly used and their suitability for different buildings, anti- termite treatment.

BOOKS:

1. Engineering Materials : S. K. Sharma & G. C. Mathur, R.Chand & Co. Delhi
2. Engineering Materials : S. C. Rangwala, Charotar Publishing House, India.
3 .Building Construction: S.K. Sharma, S. Chand
4. Building Construction : Sushil Kumar, Standard Publishers
3.Building Construction:B.C. Punmia , Laxmi Publications

Course Code	**CIV 202**
Course Title	**Fluid Mechanics**
Course Assessment Methods **End Semester Assessment(University Exam)** **Continuous Assessment (Minors, Assignments, Quiz)**	 **50** **50**
Course Objectives (CO)	1. To introduce the students with various types of Fluids and their properties, 2. To understand the concept of Fluid Statics 3. To understand the concept of Fluid Dynamics, 4. to study various types of Flows. 5. to study dimensional analysis and model studies
Course Outcome	1. Ability to study various types of Fluids and their properties 2. To apply concept of Fluid Statics in various engineering problems 3. To apply concept of Fluid Dymanics in various engineering problems 4. To understand behaviour of various types of Flows. 5. To apply dimensional analysis and model studies in various engineering problems.

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

FLUID AND THEIR PROPERTIES

Concept of fluid, difference between solids, liquids and gases; ideal and real fluids; Continuum concept of fluid: density, specific weight and relative density; viscosity and its dependence on temperature; surface tension and capillarity, vapor pressure and cavitation: compressibility and bulk modulus; Newtonian and non-Newtonian fluids.

FLUID STATICS

Concept of pressure, Pascal's law and its engineering hydrostatic paradox. Action of fluid pressure on plane (horizontal, vertical and inclined) submerged surface, resultant force and center of pressure, force on a curved surface due to hydrostatic pressure.
Buoyancy and floatation, stability of floating and submerged bodies, Metacentric height and its determination.

FUNDAMENTALS OF FLUID FLOW

Types of fluid flow, Basic Principles of Fluid Flow, Continuity Equation, Acceleration of a Fluid Particle, Rotational and Irrorational Motions, Circulation and Vorticity, Velocity Potential, Stream Function, Streamlines, Equipotential Lines and Flow Net, Uses of Flow Net .

FLUID DYNAMICS

Forces acting on Fluid in motion, Euler's equation of motion, Bernoulli's equation, Impulse momentum equation, kinetic energy and momentum correction factors, flow along a curved streamline, free and forced vortex motions.

SECTION –B

LAMINAR FLOWS

Flow regimes and Reynolds number, critical velocity and critical Reynolds number, laminar flow in circular cross section pipes. Navier-stokes equations in Cartesian coordinates (no derivation), meaning of terms, flow between parallel plates, stokes law.

TURBULENT FLOWS

Turbulent flows, scale and intensity, Effects of turbulent flow in pipes and flow losses in pipes, Darcy equation, Minor head losses in pipe fittings.. Equation for velocity distribution in smooth and rough pipes (no derivation).

BOUNDARY LAYER ANALYSIS

Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Seperation and Control.

DIMENSIONAL ANALYSIS AND SIMILITUDE

Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimension less number and their significance, geometric, kinematic and dynamic similarity, model studies.

BOOKS:

1. Fluid Mechanics : Dr. Baljeet S. Kapoor , New Age Publishers
2. Fluid Mechanics & Hydraulic Power Engineering: D.S Kumar, Kataria & Sons
3. Fluid Mechanics : Victor Streeter, McGraw Hill.
4. Elementary Mechanics of Fluids : Hunter Rouse, J. Willey & Sons
5. Fluid Mechanics : Frank M White, McGraw Hill.
6. Fluid Mechanics & Hydraulic Machines : S.C. Gupta, Pearson Education
7. Hydraulics & Fluid Mechanics : Modi And Seth, Standard Book House.

Course Code	**CIV 252**
Course Title	**Fluid Mechanics (P)**
Course Assessment Methods **Practical** **(Continuous and end semester evaluation)**	**50**

List of experiments

1. To determine metacentric height of the ship model.
2. To verify the Bernoulli's theorem.
3. To determine coefficient of discharge for an Orifice meter.
4. To determine coefficient of discharge of a venturimeter.
5. To determine the various hydraulic coefficients of an Orifice (Cd, Cc, Cv).
6. To determine coefficient of discharge for an Orifice under variable head.
7. To calibrate a given notch.
8. To determine coefficient of discharge for a mouth piece.
9. Drawing of a flow net by Viscous Analogy Model and Sand Box Model.
10. To study development of boundary layer over a flat plate.
11. To study velocity distribution in a rectangular open channel.
12. Velocity measurements by current meter, float, and double float (demonstration only)
13. Experiment on Vortex formation (demonstration only).

Course Code **Course Title**	**ESC X07** **Engineering Mechanics**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Prerequisites	None
Course Objectives (CO)	1. To impart knowledge of statics with emphasis on force equilibrium and free body diagrams. 2. To impart the knowledge of mechanics and develop understanding of the behavior of structures. 3. To serves as an introduction to the structural systems, and to methods of analyzing these systems under various loading conditions including basic dynamics.
Course Outcome	1. At the end of the course students will have knowledge of various force systems, joint systems and various day to day phenomena of mechanics. 2. The students will develop concept of centroid and moment of inertia of various bodies, and use this knowledge in solving relevant practical engineering problems. 3. They will develop understanding of how friction works and taken into account in mechanics. 4. The students will be able to analyse a determinate structural system under given loading with equilibrium methods as well as virtual work if deemed appropriate. 5. They will have sufficient knowledge of dynamics and apply the same for analysis of motion of simple rigid bodies including vibration. 6. Gain a firm foundation in Engineering Mechanics for furthering the career in Engineering.

SECTION – A

Introduction to Engineering Mechanics:

Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Basic Structural Analysis : Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines;

Centroid and Centre of Gravity : Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

SECTION – B

Virtual Work and Energy Method: Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

Review of particle dynamics*:* Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy.Impulse-momentum (linear, angular); Impact (Direct and oblique).

Introduction to Kinetics of Rigid Bodies : Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation;

Mechanical Vibrations : Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums;

Text/Reference Books:

1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. R.C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4. A.K. Dhiman, P. Dhiman, D.C. Kulshreshtha (2015), Engineering Mechanics: Statics & Dynamics, McGraw Hill Publication.
5. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press.
6. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
7. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications.

Course Code	**ESC X57**
Course Title	**Engineering Mechanics (P)**
Course Assessment Methods Practical (Continuous and end semester evaluation)	50

List of Experiments

1. To verify the Law of Polygon of Forces, by using force board.
2. To determine the coefficient of friction between different pairs of given surfaces.
3. To verify the parallelogram law of Forces, by using force board.
4. To verify the principle of moments using Bell Crank Lever Apparatus.
5. To compare experimental and theoretical results of forces in the members and the component displacement of the loaded joint of a three bar suspension system for vertical loads.
6. To verify the principle of moments with the help of beam supported at its ends.
7. To find the time period of a simple and compound pendulum.
8. To calculate the mass moment of inertia and radius of gyration of the compound pendulum of two bodies different in shapes and compare them to the theoretical values.