Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	:**APPLIED SCIENCE**	Course Code	: **15SC03S**
Semester	: **I / II**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **4:0:0**	Credits	: **4 Credits**
Type of course	: **Lecture &Assignments**	Total Contact Hours	: **52**
CIE	: **25 Marks**	SEE	: **100 Marks**
Programme: **Common to all Engineering Diploma Programmes**			

Prerequisite:

Dynamics, Heat, Sound, Matter, recent trends in Physics, Basic chemistry in Secondary Education.

Course Objective:

1. Learn concepts of Units, Laws of vectors, parallel forces, moment of force, couple.
2. Learn the fundamentals of properties and behavior of the materials
3. Learn the concepts of heat and thermodynamics.
4. Enhance theoretical and practical principles with applications of sound wave.
5. Understand different types of communication systems.
6. Develop awareness about corrosion, materials, and energy sources in engineering field.

Course Content:

UNIT I:MECHANICS **(08 Hrs)**

Units and Measurements: Definition of unit, types of unit (fundamental and derived)
SI units: Definition, Basic and supplementary units, advantages.
Measuring Instruments: Vernier calipers, principle and least count, diagram of vernier calipers with labeling the parts. Screw gauge(pitch, ZE, ZC), principle and least count, diagram of screw gauge with labeling the parts, simple problems.

Scalars and Vectors: Definition of scalar and vector with examples, representation of a vector, definition of resultant, equilibrium and equilibrant. Laws of vectors: Statement of law of parallelogram of forces, Converse law of triangle of forces, Lami's theorem. Deriving an expression for magnitude and direction of resultant of two vectors acting at a point. Resolution of vectors, mentioning rectangular component of resolution of vector.

Experimental verification of law of parallelogram of forces, Converse law of triangle of forces, Lami's theorem. Simple problems on laws of vectors

Parallel forces. Types of parallel forces, Moment of force: definition, S.I unit, types and examples. Couple: definition with examples. Moment of a couple. Conditions of equilibrium of coplanar parallel forces, applications. Experimental verification of Conditions of equilibrium of coplanar parallel forces using moment bar and simple problems.

UNIT-2: PROPERTIES OF SOLIDS AND LIQUIDS: (10 Hrs)

Properties of solids: Definitions of deforming force, elasticity and plasticity, examples for elasticity and plasticity, definition of stress and its types with examples and its S.I unit, definition of strain and its types with examples, elastic limit, Hooke's law, stress - strain graph with explanation. Modulie of elasticity and its types, derivation of an expression for Young's modulus of a material. Definition of Compressibility and factor of safety. Simple problems on stress, strain and Young's modulus.

Properties of liquids: Definition of thrust and pressure with S.I units. Derivation of expression for pressure at a point inside the liquid at rest, simple problems.

Energy of liquid in motion: Kinetic, Potential energies and Pressure energy in moving liquid. Bernoulli's theorem: statement and expression (No derivation). Cohesive and adhesive forces, angle of contact.

Surface Tension: Definition of surface tension and its S.I unit, factors affecting surface tension, applications of surface tension, capillarity and its applications.

Viscosity: Types of flow of liquid, definition of stream line flow and turbulent flow, definition of viscosity, expression for coefficient of viscosity, experimental determination of coefficient of viscosity of water, effect of temperature on viscosity. List of applications of viscosity. Simple problems.

UNIT III: HEAT AND PROPERTIES OF GASES. (07Hrs)

Concept of heat & temperature: Definitions of heat and temperature with S.I units, definition of Specific heat of substance with S I unit, equation for specific heat of a substance (no derivation).

Transmission of heat: Definitions of conduction, convection and radiation with examples, definition of thermal conductivity, derivation of co-efficient of thermal conductivity(K) and its S.I unit. Applications of conduction, convection and radiation, simple problems on K.

Gas laws: Statement of Boyle's law, Charle's law, Gay-Lussac's law, derive the relation between them (PV=nRT), definition of C_p and C_v ,relation between them (Mayer's equation no derivation), simple problems on Boyle's law and Charle's law.

Thermodynamics: Definition of thermodynamics, Laws of thermo dynamics: Zeroth law, I^{st}law and II^{nd}law (only statement), types of thermodynamics process: isothermal process, adiabatic process.

UNIT IV: WAVE MOTION (10Hrs)

Simple Harmonic Motion: Definition of periodic motion with example, definition of Simple Harmonic Motion, representation of S.H.M with respect to particle in circular motion, derivation of displacement of a particle executing S.H.M. Definitions of period, frequency, amplitude, in case of vibrating particle.

Wave: Definition of wave, wave period(T), wave frequency (n or f), wave amplitude (a), wave length(λ) and wave velocity (v) in case of wave motion. Derive the relation between v, n and λ. simple problems.

Types of waves: Mechanical and Non mechanical waves with examples. Definition of longitudinal and transverse waves, differences.

Propagation of sound waves in air: Newton's formula for the velocity of sound in air and Laplace's correction to it, various factors affecting velocity of sound in air. Simple problems.

Vibrations: Free vibrations, Forced vibration, Damped vibrations and Un-damped vibrations with examples. Resonance with examples. Laws of transverse vibrations of stretched string, derivation of equation for fundamental frequency of vibrations of stretched string. Simple problems.

Experiment to determine the unknown frequency of a given tuning fork by absolute and comparison methods using sonometer.

Stationary waves: Formation of stationary waves and their characteristics. Experimental determination of velocity of sound in air by using resonance air column apparatus.

Beats: Formation of Beats, definition of beat frequency, its applications.

UNIT V:MODERN PHYSICS (07Hrs)

Electromagnetic waves: Definition, generation of electromagnetic waves and their properties.

Electromagnetic spectrum: Definition, classification and its applications.

Lasers: Principle and listing the types of Laser, properties of Laser, applications.

Nano-Technology: Definition of Nano-Technology, advantages and dis-advantages of nano-Technology.

Advance Communication Systems: Basic elements of communication systems with block diagram, List commonly used terms in electronic communication systems.

Satellite communication: Introduction, advantages and disadvantages,
Optical fiber: principle and applications.

UNIT VI: INDUSTRIAL CHEMISTRY (10 Hrs)

Electrolysis: Definition of electrolyte, types of electrolytes with examples, definition of electrolysis. Arrhenius theory of electrolytic dissociation. Mechanism of Electrolysis. Faradays laws of Electrolysis: state and explain.
Corrosion: Definition, necessary conditions for corrosion, electrochemical theory of corrosion, list the preventive methods of corrosion.
Batteries: Basic concept, classification and applications of batteries.
Fuel cells: Definition, mentioning the types and advantages.
Metallurgy: Definitions of minerals, ore, flux, slag, alloys. Purpose of making alloys, composition and uses of alloys.
Polymers: Definition and classification of polymers, methods of polymerization and applications.
Composite materials: Definition, types, advantages and dis-advantages of composite materials.
Solutions: Definition of solute, solvent, solutions. Saturated and unsaturated solutions, concentration of solutions: normal, molar and molal solutions, simple problems on concentration of solution.
pH Value: Hydrogen ion concentration and concept of pH, definition of pH of solution, pH scale, applications of pH in different fields.

Course Delivery:

The Course will be delivered through lectures, class room interaction and exercises.

Course Outcome:

On successful completion of the course the student will be able to:

1. Determine the dimensions of objects using measuring instruments and analyze vector in mechanics.
2. Create knowledge of properties of matter applicable to engineering.
3. Apply the concepts of thermal properties of matter and gas laws related to engineering.
4. Analyse the different concepts of waves and vibration in the field of engineering.
5. Analyse the recent trends in physics related to engineering.
6. Apply the basic concepts of chemistry in the field of engineering.

Mapping Course Outcomes with Program Outcomes:

CO –PO mapping

	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Determine the dimensions of objects using measuring instruments and analyze vector in mechanics	1,2,3,4,9	R/U/A	08	8	10	6	24
CO2	Create knowledge of properties of matter applicable to engineering.	1,2	R/U/A	10	6	15	6	27
CO3	Apply the concepts of thermal properties of matter and gas laws related to engineering	1,2,3,9	R/U/A	07	4	10	6	20
CO4	Apply the different concepts of waves and vibration in the field of engineering.	1,2,3,9	R/U/A	10	4	10	18	32
CO5	Apply the recent trends in physics related to engineering.	1,2,6	R/U/A	07	4	10	6	20
CO6	Apply the basic concepts of chemistry in the field of engineering.	1,2,6	R/U/A	10	4	20	6	30
		Total Hours of instruction		52	Total marks			153

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Applied Science	3	3	3	1	-	2	-	-	2	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference Books:

1. Principle of physicsfor class XI and XII by V.K.Mehata and Rohit Mehta, as per Karnataka state PUC syllabusS.Chand and Company, New Delhi
2. Engineering chemistry for Diploma by Ranjan Kumar Mahapatra (PHI Learning Pvt. Ltd., New Delhi)
3. Basic Physics by Kongbam Chandramani Singh (PHI Learning Pvt. Ltd., New Delhi)
4. Principle of physics by P.V.Naik (PHI Learning Pvt. Ltd. New Delhi)

Website:

1. www.rsc.org/Education/Teachers/resources/Inspirational/…/4.3.1.pdf
2. www.nanogloss.com/nanotechnology/advantages and disadvantages
3. www.freebookcentre.net/physics/ introductory-physics-books.html

e-books:

1. Introduction to physics – II, Robert P Johnson.
2. Lecture notes physics university of Rochester.
3. Text book of Physics poynting J.H Thomson sir J.J.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Books	1 to 6
		Class room Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	05	Log of Activity	1 and 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 3 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 6 Effectiveness of delivery of instructions and assessment

*__CIE__ – Continuous Internal Evaluation *__SEE__ – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM	APPLIED SCIENCE	20
	Year:	Course code:15SC03S	
Name of Course coordinator :			Units:__ CO's:____

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal Choice may be given for each CO at the same cognitive level (CL).

Question Paper Blue Print:

Course Title	:**APPLIED SCIENCE**	Course Code	: **15SC03S**

Name and Unit No.	Allotted Hours	Questions to be set for (2marks) PART - A	Questions to be set for (5marks) PART - B	Questions to be set for (6marks) PART - C
Mechanics **I**	08	04	02	01
Properties of Solids and Liquids **II**	10	03	03	01
Heat and properties of gases **III**	07	02	02	01
Wave motion **IV**	10	02	02	03
Modern Physics **V**	07	02	02	01
Industrial chemistry **VI**	10	02	04	01
Total	**52**	**15**	**15**	**8**

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weightage of model fixed for each unit.
2. The question paper pattern provided should be adhered to

Part – A: 10 questions to be answered out of 15 questions each carrying 02 marks
Part – B: 10 questions to be answered out of 15 questions each carrying 05 marks.
Part – C: 05 questions to be answered out of 08 questions each carrying 06 marks.

Model Question Paper:

Code:15SC03S

I Semester Diploma Examination

APPLIED SCIENCE

(Common for All Engineering Programmes)

Time: 3 Hours][Max Marks: 100

***Note*:** i) Answer any 10 questions from section A, each carry 02marks.
ii) Answer any 10 questions from section B, each carry 05 marks.
iii) Answer any 05 questions from section C, each carry 06 marks.

SECTION – A

1. Define Unit.
2. Differentiate scalars and vectors.
3. Define Resultant of forces.
4. Define moment of couple.
5. Define plasticity.
6. Define compressibility.
7. Define viscosity of liquid.
8. Define specific heat of substance.
9. Define thermodynamics.
10. Define time period.
11. Define beats.
12. Define Electro-magnetic waves.
13. Define Nano-Technology.
14. Define electrolyte.
15. Define composite materials.

PART-B

1. Draw a neat diagram of Vernier calipers and label its parts.
2. Write the condition for equilibrium of coplanar parallel forces with an example.
3. Explain stress-strain graph.
4. Define K.E of liquid in motion. State Bernoulli's theorem.
5. Define capillarity? Write any three application of surface tension.
6. State 1st law of thermodynamics. Explain isothermal & adiabatic process.
7. State the three gas laws.(Boyle's law, Charle's law & Gay-Lussac law)

8. Explain mechanical &non- mechanical waves with examples.
9. Distinguish between longitudinal & transverse waves.
10. Write any three advantages and two disadvantages of F.M.
11. Write the principle of laser. Lists its properties.
12. Explain the mechanism of electrolysis of HCL.
13. Write the basic concepts of batteries. Mention any three applications of batteries.
14. Distinguish between minerals and ore. Write any three applications of pH.
15. Define composite materials. Write the advantages of composite materials.

PART-C

1. Derive an expression for magnitude and direction of resultant of two forces acting at a Point.
2. Describe an experiment to determine coefficient of viscosity of water by Poiseuille's method.
3. 1.25cc volume of a gas at 15^0C &755mm of mercury pressure. Calculate volume at NTP.
4. Derive an expression for fundamental frequency of transverse vibrations of stretched string.
5. Describe an experiment to find the unknown frequency of the given tuning fork using sonometer by comparison method.
6. Calculate the velocity of sound in air at 25^0C & 75cm of mercury pressure, if the density of air at 0^0C & 76cm of mercury pressure is $1.29 kgm^{-3}$. (given γ=1.41 for air).
7. Write the basic elements of communication system with block diagram.
8. Explain any two methods of polymerization.

----0-0-0---

Model Question Bank:

Course Title :**APPLIED SCIENCE**	Course Code : **15SC03S**

UNIT – I : MECHANICS

PART – A (02MARKS QUESTIONS)

1. Define unit of a physical quantity.
2. Define fundamental and derived units.
3. List supplementary units in S.I systems.
4. Define S.I units give two eg of S.I, basic units.
5. Define least count of measuring instrument.
6. Write the principle of Vernier calipers and screw gauge.
7. Define least count of Vernier calipers?
8. Define pitch of a screw.
9. Define ZE and ZC in screw gauge.
10. Define scalar quantity & give its examples.
11. Define vector quantity & give its examples.
12. Write the relation between resultant and equilibrant.
13. State law of parallelogram of vectors.
14. State Converse law of triangle of forces.
15. State Lami's theorem.
16. Define moment of force.
17. Write the two rectangular component of a vector.
18. Write how moment of force is measured.
19. Discus why the handles of the doors and windows are fixed at the end.
20. Define couple.
21. Define is moment of couple.
22. Write how you measure moment of couple.
23. Define equilibrium.
24. Write the conditions of equilibrium when number of co-planar parallel forces acting on a body.
25. Define like & unlike parallel forces.

PART – B (05 MARKS QUESTIONS)

1. Mention seven basic units and two supplementary units of SI system.
2. Draw a neat diagram of Vernier calipers and label its parts.
3. Draw a neat diagram of Screw Gauge and label its parts.
4. Explain parallel forces with their types.

5. List two types of moment of force. Write any three applications of couple.
6. Write the advantages of S.I system.
7. Mention the difference between scalars and vectors.
8. State Converse law of triangle of forces; write the line diagram & equation of Converse law of triangle of forces.
9. State Lami's theorem, write the line diagram & equation of lami's theorem
10. Define moment of force, write the equation to measure moment of force & give its examples.

PART – C (06 MARKS QUESTIONS)

1. Derive an expression for magnitude and direction of resultant of two forces acting at a point.
2. Derive an expression for horizontal and vertical components of force acting at an angle θ with horizontal.
3. Write the conditions for equilibrium of coplanar parallel forces acting on a rigid body with equations & diagram.
4. Describe an experiment to verify law of parallelogram of forces.
5. Describe an experiment to verify Converse law of triangle of forces.
6. Describe an experiment to verify Lami's theorem.
7. Describe an experiment to verify the conditions of equilibrium of co-planar parallel forces using moment bar.
8. A main scale is divided into 0.5 mm the length of vernier attached to it is 12mm and is divided into 25equal parts. Calculate the value of 1vsd and L.C of vernier.
9. In Vernier calipers, main scale is divided into 1mm;9division of main scale is divided into 10 equal parts on Vernier scale. In a setting zero of Vernier scale lies between 4.8cm and 4.9cm, and 7^{th} division of vernier coincide with the main scale division. What is the total reading?
10. A screw gauge has a pitch of 0.5mm and 50 divisions on head scale. The reading when jaws touch is +5div. When gripping a wire the reading is 3 turns and 17 div. What is the diameter of the wire?
11. The resultant of two equal forces acting at a right angle to each other is 1414N.Findthe magnitude of each force.
12. Two forces of 5kg wt. and 10kg wt. acts at right angles to one another. Find the magnitude and direction of the resultant forces.
13. Two unlike parallel forces equal to 20N and 12N acts at two points A and B on a rigid body. Find the magnitude and direction of their resultant and the point where it acts if AB=0.8m
14. Two like parallel forces equal to 80N and 100N act on a body at two points A and B. If AB=0.6m,find the magnitude and the point where there resultant acts.
15. Three forces P, Q and 100 N acting on a body in equilibrium. If the angles opposite to P and Q are 120^0 and 150^0 respectively. Find the magnitude of P and Q.

UNIT II: PROPERTIES SOLIDS & LIQUIDS

PART – A (02MARKS QUESTIONS)

1. Define plasticity.
2. Define elasticity.
3. Define deforming force.
4. Define restoring force.
5. Define stress.
6. Write the types of stress.
7. Define strain.
8. Write the type of strain.
9. Define elastic limit.
10. State Hooke's law.
11. Define Young's modulus.
12. Define Bulk modulus.
13. Define Rigidity modulus.
14. Define compressibility? Write its S.I unit.
15. Write S.I units of stress and strain.
16. Define pressure of liquid.
17. Write equation for the pressure at a point inside the liquid at rest.
18. State Bernoulli's theorem.
19. Define cohesive force.
20. Define Adhesive force.
21. Write reason why glue stick to paper?
22. Define angle of a contact.
23. Name the type of angle of a contact formed for water and glass, water and mercury.
24. Define surface tension.
25. List the factors affecting surface tension.
26. Define capillarity.
27. Write any four applications of capillarity.
28. List the applications of surface Tension.
29. Write the equation used to determine surface tension of water by capillary raise method.
30. Define viscous force.
31. Give two examples of viscous liquid.
32. Define co-efficient of viscosity. Write its S.I unit.
33. List the factors affecting viscosity of liquid.
34. Write the effect on viscosity of gas if temperature is increased.
35. Write any four applications of viscosity.
36. List the types of flow of liquid.

PART – B (05 MARKS QUESTIONS)

1. Explain elasticity with an example.
2. Define elasticity and list three types of modulei of elasticity.
3. Define strain. Write the types of strain. Give e.g. for each type of strain.
4. Define stress. Write the types of stress. Give e.g. for each type of stress.
5. Define elastic limit. State Hooke's law? Write its mathematical form .
6. Explain stress-strain graph.
7. Define compressibility and factor of safety. Write the SI unit of stress.
8. Define thrust and pressure, write their SI units.
9. Define K.E and P.E of liquid. State the Bernoulli's theorem.
10. Define cohesive and adhesive force with an example.
11. Define pressure energy and angle of contact.
12. Define two types of flow of liquid with an example.
13. Define angle of a contact. What type of angle of contact is formed for water and glass, water and mercury? List the factors affecting surface tension.
14. Define capillarity. Write any four applications of capillarity.
15. Write the difference between stream line flow and turbulent flow of liquids.
16. Define viscosity and write the effect of temperature on viscosity of liquid & gas.
17. Define stress and explain the types of stress.
18. Define strain and explain the types of strain.
19. State Hooke's law? List any three applications of viscosity.
20. Define surface tension. Mention any three factors affecting surface tension.

PART – C (06 MARKS QUESTIONS)

1. Derive an expression for young's modulus of elasticity.
2. Derive an expression for pressure at any point inside the liquid at rest.
3. Derive an expression for co-efficient of viscosity of liquid.
4. Describe an experiment to determine the surface tension of water by capillary rise method.
5. Describe an experiment to determine coefficient of viscosity of water by Poiseuille's method.
6. A uniform wire of length 0.5m and diameter 0.0006m when stretched by a mass of 5kgextends by 0.0004m. Calculate Young's modulus of wire.
7. A wire of length 1m is fixed at one end and a mass of 1kg is hung from free end, the area of cross section of the wire is 2.5×10^{-6} m^2 and the Young's modulus of the material of the wire is 2×10^{11} Nm^{-2}. Calculate stress, strain and extension of the wire.
8. A spring 60cm long is stretched by 2cm by the application of a load 200g. What will be the length when the load of 500g is applied (given g = 980cm/s^2).

9. A rectangular tank is 3m long,2m wide and 1.5m in height, it contains water to a depth of 1m,the density of water is 1000kg/m^3. Calculate the pressure at the bottom of the tank.
10. Calculate the pressure at the bottom of a swimming pool 10m wide if the water is 3m deep, the density of water is 1000kg/m^3.
11. A square plate of 6cm side moves parallel to another plate with a velocity of 10cm/s, both the plates being immersed in water (η = 0.01poise). If the distance between the plates 0.5mm.Calculate the viscous force.
12. In a certain experiment on the flow of water through a capillary tube, the following data were obtained. Volume of water coming out per minute = 15cc; pressure head of water = 30cm
    Length of tube = 25cm; radius of tube = 0.05cm; calculate coefficient of viscosity of water(g=980cm/s^2, density=1gm/cc)
13. A castor oil of viscosity 98.6NS/ m^2 fills the space between two horizontal plates1cm apart. If the lower plate is stationary and upper plate is moving horizontally with a velocity of 3m/s . Find the tangential force per unit area.

UNIT-III: HEAT AND PROPERTIES OF GASES.

PART – A (02MARKS QUESTIONS)

1. Define heat & write SI unit of heat.
2. Define temperature & write SI unit of temperature.
3. Define specific heat of substance & write its SI unit.
4. Define conduction of heat.
5. Define convection of heat.
6. Define Radiation of heat.
7. Define Thermal conductivity.
8. Define specific heat of a gas at constant volume.
9. Define specific heat of a gas at constant pressure.
10. State Boyle's law.
11. State Charle's law.
12. State Gay-Lussac's law
13. Define isothermal process.
14. Define adiabatic process.
15. Define thermodynamics.
16. State zeroth law of thermodynamics.
17. State I^{st} law of Thermodynamics.
18. State II^{nd} law of Thermodynamics
19. Write Mayer's equation.

PART – B (05 MARKS QUESTIONS)

1. Write any five differences between heat & temperature.

2. Define heat, temperature & specific heat of Substance. Write Mayer's equation for gas.
3. Define conduction, convection, radiation and thermal conductivity.
4. Write any five applications of conduction.
5. Write any five applications of convection.
6. Write any five applications of radiation.
7. Define Cp & Cv , write the relation between them.
8. Define conduction, write applications of conduction.
9. Define convection, write applications of convection.
10. Define radiation, write applications of radiation..
11. State 1st law of thermodynamics, explain isothermal & adiabatic process.
12. Derive an expression for coefficient of thermal conductivity (K).
13. Compare the three modes of transfer of heat.
14. State the three gas laws. (Boyle's law, Charle's law & Gay-Lussac's law).
15. State zeroth law, 1st law& 2nd law of thermodynamics.

PART – C (06 MARKS QUESTIONS)

1. With usual notations prove that pv = nRT
2. Define thermal conductivity. Derive an equation for co-efficient of thermal conductivity (K).
3. Define specific heat of a substance. Derive an equation for specific heat of substance.
4. Describe an experiment to verify Boyle's law.
5. The volume of a gas at 27^0c at2 atmospheric pressure is 2 liters.
   If the pressure is double & absolute temperature is reduced to half.
   What will be the new volume of gas?
6. A sealed glass bulb contains air at 30^0C at normal pressure. The bulb is immersed in an oil bath &heated gradually. Find the temperature in degree centigrade at which the bulb bursts if it can withstand a maximum pressure of 3.5atm.
7. The volume of certain mass of a gas at STP is $2x10^{-4}$ m^3. Find its volume at 27 ^{0}C at pressure $2.2x10^5$ Pa.
8. The volume of a gas at 15^0C is1.25cc &755mm of mercury pressure. Calculate volume at NTP.
9. How much heat is required to raise the temperature of 5kg of copper from 27^0C to its melting point of 1063^0C? Given that specific heat of copper is 400 J/k^{0}C.
10. A hot iron ball of mass 0.2kg is dropped into 0.5g of water at 10^0C. The resulting temperature is 30^0C. Calculate the temperature of the hot ball. Specific heat of iron = 336J/kg^{0}C and specific heat of water = 4200J/kg^{0}C.
11. A silver rod 0.15m long has cross-sectional area of $0.0003m^2$. If one end is maintained at 10^0C and other end at 75^0C. How much heat will flow through the rod in 5 minutes? Given that co-efficient of thermal conductivity of silver = 406 J/ms^{0}C.

UNIT-IV: WAVE MOTION

PART – A (02MARKS QUESTIONS)

1. Define frequency and amplitude of a vibrating particle.
2. Wrote the relation between frequency and time period.
3. Define periodic motion with example.
4. Define S.H.M with example.
5. Write the equation for displacement of the particle in S.H.M.
6. Define wave motion.
7. Define wave period, wave frequency.
8. Write the relation between wave velocity, wavelength & wave frequency
9. Define non mechanical wave. Give an example.
10. Define mechanical wave. Write two types of Mechanical wave
11. Define transverse wave & give an example.
12. Define longitudinal wave & give an example.
13. Write any two differences between transverse wave and longitudinal wave.
14. Write two characteristics of transverse wave.
15. Write two characteristics of longitudinal wave.
16. Write Newton's equation for velocity of sound in a medium and name the terms involved in the equation.
17. Write the Newton's Laplace equation for velocity of sound in air
18. Write the effect of pressure on velocity of sound in air.
19. Write the effect of temp on velocity of sound in air.
20. Write the equation for velocity of sound in air at 0°c.
21. Write the effect of humidity on velocity of sound in air.
22. Define free and forced vibration.
23. Define natural frequency.
24. Define resonance.
25. Give any two practical examples of resonance.
26. Define how stationary waves are produced?
27. Write any two characteristics of stationary waves.
28. Define nodes and antinodes.
29. Write the difference between stationary waves and progressive waves.
30. Write the fundamental note in vibration of stretched string.
31. Write the formula for the fundamental frequency of vibration of stretched string.
32. State the law of tension as applied to the vibration of stretched string.
33. State the law of length as applied to the vibration of stretched string.
34. State the law of mass per unit length as applied to the vibration of stretched string.
35. Define beats.
36. Define beat frequency.
37. Write any two applications of beats.

38. Write how beat frequency can be calculated?

PART-A (05 MARKS QUESTIONS)

1. Define period, frequency & amplitude of vibrating particle.
2. Explain mechanical &non mechanical waves with examples.
3. Define longitudinal waves & transverse waves.
4. Define beat and beat frequency.
5. Obtain the relation between v, n and λ.
6. Define periodic motion & SHM with example in each.
7. Derive an expression for displacement of a particle executing SHM.
8. Define wave period, wave frequency, wave amplitude, wave length and wave velocity.
9. Distinguish between longitudinal & transverse waves.
10. Explain propagation of sound waves in air with practical example.
11. Describe Newton's formula for velocity of sound in air.
12. Explain Newton's formula for velocity of sound in air and hence Laplace correction to it.
13. Explain various factors affecting velocity of sound in air.
14. What is stationary wave? Mention the characteristics of stationary waves.
15. Why the soldiers are asked to break steps while marching across bridges.

PART- C (06 MARKS QUESTIONS)

1. Derive an expression for displacement of a particle executing SHM
2. Derive an expression for velocity of wave in terms of its frequency and wavelength.
3. Derive an expression for fundamental frequency of vibrations of stretched string.
4. Describe an experiment to determine the velocity of sound in air at room temperature by resonance air column method.
5. Describe an experiment to find the unknown frequency of the given tuning fork using sonometer by comparison method.
6. Describe an experiment to determine frequency of Turing fork by absolute method using sonometer.
7. A wave of frequency 600MHZ travels at a speed of $3x10^8$ m/s. Calculate its wavelength &calculate the frequency of same type of wave whose wavelength is 40m.
8. If the frequency of tuning fork is 500Hz & velocity of sound is 300m/s. Find how far sound travels while the fork completes 25 vibrations.
9. Calculate the velocity of sound in air at 25^0C & 75cm of mercury pressure, if the density of air at 0^0C & 76cm of mercury pressure is 1.29kgm^{-3}. (Given γ=1.41 for air).
10. Calculate the speed of sound at -50^0 C & at $+100^0$C, given speed of sound at 0^0c is 332 m/s.
11. The density of air at NTP is 1.293 kgm^{-3}&γ=1.402. Calculate the frequency of a tuning fork which emits sound of wavelength 0.75m at 26^0 c.
12. A string of length 2m is stretched by a force of 3200N. If the frequency of vibration is

100Hz. Find the mass of the string.

13. A string has length of 0.3m & weight $2x10^{-3}$kg. What must be the tension in the string so that when vibrating string transversely, it has a fundamental frequency 320 Hz?
14. A Sonometer wire of 0.5m long vibrates in two segments & is stretched by a force of 5kg wt. Calculate the frequency of the note emitted. ($g=9.8m/s^2$ linear density of the wire=0.018kg/m).
15. The frequency of Sonometer wire is doubled when the tension is increased by 12kg wt. Find the original tension.

UNIT V: MODERN PHYSICS

PART – A (02MARKS QUESTIONS)

1. Define electromagnetic waves.
2. State two characteristics of electromagnetic waves.
3. Write how electromagnetic waves are produced?
4. Define electromagnetic spectrum.
5. Write any two uses of electromagnetic spectrum.
6. Write the principle of LASER.
7. List any two types of LASER.
8. Write any two principle of LASER.
9. Write any two applications of LASER.
10. Define nanotechnology.
11. Write two advantages of nanotechnology.
12. Write two disadvantages of nanotechnology.
13. Write what do you mean by communication?
14. Write the basic elements of communication system.
15. List any two commonly used terms in electronic communication system.
16. Write two advantages of communication satellite.
17. Write two disadvantages of communication satellite.
18. Define optical fiber.
19. Write the principle of optical fiber.
20. Write two advantages of optical fiber.

PART-B (05 MARKS QUESTIONS)

1. Describe the generation of electromagnetic waves.
2. Write any five properties of electromagnetic waves.
3. Explain how electromagnetic spectrum is classified?
4. Write any five applications of electromagnetic spectrum.
5. Explain the principle of LASER. List the properties of LASER.
6. Write any five advantages of LASER.
7. Write five advantages of nanotechnology.
8. Write advantages and disadvantages of nanotechnology.

9. Write the block diagram of communication system.
10. List any five commonly used terms in electronic communication system..
11. Write five advantages of satellite communication.
12. Write any five disadvantages of satellite communication.
13. Write any five advantages of optical fiber.
14. Explain satellite communication. List any two disadvantages of satellite communication system.

PART- C (06 MARKS QUESTIONS)

1. Define electromagnetic waves. Write four properties of electromagnetic waves.
2. Define electromagnetic spectrum. Explain how electromagnetic spectrum is classified.
3. Write the applications of electromagnetic spectrum.
4. List six applications of LASER.
5. Write six advantages of nanotechnology.
6. Write what you mean by communication system. Write the block diagram of communication system..
7. Define satellite communication system. Write four advantages of satellite communication system.
8. Write the principle of optical fiber. Write four applications of optical fiber.

UNIT VI INDUSTRIAL CHEMISTRY

PART – A (02MARKS QUESTIONS)

1.Define electrolysis.
2.Define electrolyte.
3.Write any four examples of electrolyte.
4.Define strong and weak electrolyte.
5.Write any two postulates of Arrhenius theory of electrolytic dissociation.
6.State Faradays Ist law of electrolysis.
7.State Faradays IInd law of electrolysis.
8.Define corrosion.
9.List any two preventive methods of corrosion.
10.Define batteries.
11.Write any two applications of batteries.
12.Define fuel cells.
13.Write any two types of fuel cells.
14.Write any two advantages of fuel cells.
15.Define minerals.
16.Define ore.
17.Define flux.
18.Define slag.
19.Define an alloy.
20.Write any two uses of alloys.

21.Define polymers.
22.Define polymerization.
23.Write any two applications of polymers.
24.List the methods of polymerization.
25. Define composite materials.
26.Write any two types of composite materials.
27.Write two advantages of composite materials.
28. Write two disadvantages of composite materials.
29.Define solute.
30.Define solvent.
31.Define solution.
32.Define saturated solution.
33.Define unsaturated solution.
34.Define concentration of a solution.
35.Define normal solution.
36. Define molar solution.
37.Define molal solution.
38.Define pH of a solution.
39.Write any two applications of pH.
40.Write hydrogen ion concentration in case of neutral solution.

PART-B (05 MARKS QUESTIONS)

1.Explain the mechanism of electrolysis of HCl.
2.Define corrosion. Write the necessary condition of corrosion.
3.Write any five postulates of Arrhenius theory of electrolytic dissociation.
4.State Ist and IInd Faradays laws of electrolysis.
5.Write any five preventive methods of corrosion.
6. Write the classification of batteries. Write two applications of batteries.
7. Write two types of fuel cells. List any three advantages of fuel cells.
8.Define alloys. Write the purpose of making alloys.
9. Write the classification of polymers. Write any three applications of polymers.
10.Define composite material. Write any two advantages of composite materials.
11. Calculate the concentration of solution when 110gmof copper sulphate is dissolved in 550gm of a solvent.
12. Define pH of a solution. Explain acid, base, and neutral solution on the basis of pH value.

PART- C (06 MARKS QUESTIONS)

1. State and explain Faradays laws of electrolysis?
2. Explain the mechanism of electrolysis of HCL.
3. Define corrosion. Write the necessary condition for corrosion.
4. Write any six preventive methods of corrosions.
5. Explain the electrochemical theory of corrosion.

6. Mention what is battery? Write the applications of batteries.
7. Define fuel cells. Mention the types of fuel cells.
8. Write the advantages of fuel cells.
9. Define minerals, ore, flux, slag and alloys?
10. Write the composition steel. List three uses of alloys.
11. Explain any two methods of polymerization.
12. Write the applications of polymers.
13. Write the advantages and disadvantages of composite materials.
14. Define molar and normal solution. What is concentration of a solution?
15 .Write any six applications of pH.

---0-0-0---

Government of Karnataka
Department of Technical Education, Bengaluru

Course: APPLIED SCIENCE

Course code: 15SC03S

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Mr. R B Pawar	Principal	Govt. Polytechnic, Bijapur
2	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
3	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
4	Dr. HanumanthaNayak	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
5	Ms. Bhagirathi B N	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru

`

Curriculum Review Committee

	Name	Designation	Institution
1	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
2	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
3	Smt. Revathi	Selection Grade Lecturer	M.E.I. Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: **ENGINEERING MATHEMATICS – I**		Course Code	: **15SC01M**
Semester	: **I**	Core / Elective	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **4:0:0**	Credits	: **4 Credits**
Type of course	: **Lecture + Assignments**	Total Contact Hours	: **52**
CIE	: **25 Marks**	SEE	: **100 Marks**
Programmes: **Common to all Engineering Diploma Programmes**			

Pre-requisites:

Basics in Algebra, Trigonometry and Coordinate Geometry in Secondary Education.

Course Objectives:

1. Apply the concept of matrices and determinants and their applications to solve the linear equation in engineering field.
2. Apply the vector algebra in solving the problems of statics and mechanics.
3. Analyse the civil engineering problems using concepts of probability.
4. Evaluate the advanced engineering mathematical problems using logarithms.
5. Apply and evaluate trigonometric concept in vector engineering field.
6. Create the basic concept of calculus.

Course Content:

Topic and Contents	Hours	Marks
LINEAR ALGEBRA		
UNIT-1: MATRICES AND DETERMINANTS	10	31
(a) Matrices: Basic concepts of matrices: Definition, types of matrices and mathematical operations on matrices (addition, subtraction and multiplication of matrices).	02	
(b) Determinant: Definition, problems on finding the determinant value of 2^{nd} and 3^{rd} order. Problems on finding unknown quantity in a 2^{nd} and 3^{rd} order determinants using expansion. Solving simultaneous linear equations using determinant method (Cramer's rule up to 3^{rd} order).	04	

(c) Inverse and applications of matrices: Minors and Cofactors of elements of matrix. Adjoint and Inverse of matrices of order 2^{nd} and 3^{rd} order. Elementary row and column operations on matrices. Characteristic equation and characteristic roots (eigen values) of 2x2 matrix. Statement of Cayley-Hamilton theorem and its verification for 2x2 matrix. Solution of system of linear equations using Gauss Elimination method (for 3 unknowns only).	04	
ALGEBRA		
UNITS-2: VECTORS	08	27
Definition of vector. Representation of vector as a directed line segment. Magnitude of a vector. Types of vectors. Position vector. Expression of vector by means of position vectors. Addition and subtraction of vectors in terms of line segment. Vector in plane and vector in a space in terms of unit vector i, j and k respectively. Product of vectors. Scalar product and vector product of two vectors. Geometrical meaning of scalar and vector product. Applications of dot (scalar) and cross (vector) products. Projection of a vector on another vector. Area of parallelogram and area of triangle. Work done by force and moment of force.		
UNITS-3: PROBABILITY AND LOGARITHMS	08	14
(a) **Probability:** Introduction. Random experiments: outcomes and sample space. Event: Definition, occurrence of an event, types of events. Algebra of events- complementary event, the events A or B, A and B, A but not B, mutually exclusive events, exhaustive events, defining probability of an event. Addition rule of probability. Conditional probability: definition, properties of conditional probability, simple problems.	06	
(b) **Logarithms:** Definition of common and natural logarithms. Laws of logarithms (no proof). Simple problems on laws of logarithms.	02	

TRIGONOMETRY		
UNIT-4: ALLIED ANGLES AND COMPOUND ANGLES.	16	47
(a) Recapitulation of angle measurement, trigonometric ratios and standard angles. **Allied angles:** Meaning of allied angle. Signs of trigonometric ratios. Trigonometric ratios of allied angles in terms of θ. Problems on allied angles. (b) **Compound angles:** Geometrical proof of sin(A+B) and cos(A+B) and hence deduce tan(A+B). Write the formulae for sin(A-B), cos(A-B) and tan(A-B), problems. Multiple and sub multiple angle formulae for 2A and 3A. Simple problems. Transformation formulae. Expression for sum or difference of sine and cosine of angles into product form. Expression for product of sine and cosine of angles into sum or differences form.	02 06 08	
UNIT-5:COMPLEX NUMBERS	04	09
Meaning of imaginary number i and its value. Definition of complex number in the form of $a + ib$. Argand diagram of complex number$a + ib$ (Cartesian system). Equality of complex numbers. Conjugate of complex number. Algebra of complex numbers, modulus of complex number, principal value of argument of complex number, polar form: $Z = r(cos\theta + i\, sin\theta)$ and exponential form $Z = re^{i\theta}$of complex number, where r is modulus and θ is principal value of argument of complex number.		
UNIT-6: INTRODUCTION TO CALCULUS	06	17
Limits: Constants and variables. Definition of function. Types of functions: Explicit and implicit function, odd and even functions(definition with example). Concept of $x \to a$.Definition of limit of a function. Indeterminate forms. Evaluation of limit of functions by factorization, rationalization. Algebraic limits. Statement of $\lim_{x\to a} \frac{x^n - a^n}{x-a} = na^{n-1}$ where n is any rational number. Proof of $\lim_{\theta\to 0} \frac{\sin\theta}{\theta} = 1$ where θ is in radian. Related problems. Standard limit (statement only) 1. $\lim_{x\to 0} \frac{a^x - 1}{x} = \log_e a$, 2. $\lim_{x\to 0} \frac{e^x - 1}{x} = 1$ 3. $\lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n = e$, 4. $\lim_{n\to 0} (1+n)^{\frac{1}{n}} = e$ Simple problems on standard limits.		
TOTAL	**52**	**145**

Course outcomes:

On successful completion of the course, the student will be able to:

1. Find the product of matrices, value of determinants, and inverse of matrix and solve the simultaneous linear equation.
2. Find the product of vectors and their geometrical applications in finding moment of force, work done.
3. Determine probability of various types of events.
4. Solve the problems related to logarithms.
5. Solve the problems on trigonometric functions with angle of any magnitude.
6. Evaluate the limiting value of algebraic and trigonometric functions.

Mapping Course Outcomes with Program Outcomes:

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Find the product of matrices, value of determinants, and inverse of matrix and solve the simultaneous linear equation	**1,2,3**	**R/U/A**	**10**	**9**	**10**	**12**	**31**
CO2	Find the product of vectors and their geometrical applications in finding moment of force, work done	**1,2,3**	**R/U/A**	**8**	**6**	**15**	**6**	**27**
CO3	Determine probability of various types of events	**1,2,**	**R/U/A**	**8**	**3**	**5**	**6**	**14**
CO4	Evaluate the integrations of algebraic, trigonometric and exponential function	**1,2,3,10**	**R/U/A**	**16**	**15**	**20**	**12**	**47**
CO5	Solve the problems related to logarithms.	**1,2**	**R/A**	**4**	**3**	**0**	**6**	**09**
CO6	Evaluate the limiting value of algebraic and trigonometric functions	**1,2,10**	**R/U/A**	**6**	**6**	**5**	**6**	**17**
		Total Hours of instruction		**52**	**Total marks**			**145**

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Engineering Mathematics-I	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference:

1. NCERT Mathematics Text books of class XI and XII.
2. Karnataka State PUC mathematics Text Books of I & II PUC by H.K. Dass and Dr.Ramaverma published by S.Chand & Co.Pvt.Ltd.
3. CBSE Class Xi & XII by Khattar&Khattar published PHI Learning Pvt. ltd.,
4. First and Second PUC mathematics Text Books of different authors.
5. www.freebookcentre.net/mathematics/introductory-mathematics -books.html

Course Assessment and Evaluation:

The Course will be delivered through lectures, class room interaction, exercises and self-study cases.

Method	What		To whom	When/where (Frequency in the course)	Max Marks	Evidence collected	Contributing to course outcomes
DIRECT ASSMENT	*CIE	Internal Assessment Tests	Student	Three tests (Average of Three tests will be computed).	20	Blue books	1 to 6
		Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	5	Log of record	1 to 6
				Total	25		
	*SEE	Semester End Examination		End of the course	100	Answer scripts at BTE	1 to 6
INDIRECT ASSESSMENT	Student feedback		Students	Middle of the course	-NA-	Feedback forms	1 to 3, delivery of the course
	End of Course survey			End of course		Questionnaire	1 to 6, Effectiveness of delivery of instructions and assessment methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	25
2	Understanding	40
3	Applying the knowledge acquired from the course	30
	Analysis and Evaluation	5

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM	ENGINEERING MATHEMATICS –I	20
	Year:	Course code: **15SC01M**	
Name of Course coordinator :			Units:__ CO's:____

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Model Question Paper:

Code: 15SC01M

I Semester Diploma Examination

ENGINEERING MATHEMATICS –I

(Common to All Engineering Diploma Programmes)

Time: 3 Hours.][Max marks: 100

Note:

(i) Answer any **Ten** questions from **section-A,** any **Eight** questions from **section-B** and any **Five** questions from **section-C.**

(ii) Each question carries **3** marks in **section-A**.

(iii) Each question carries **5** marks in **section-B**.

(iv) Each question carries **6** marks in **section-C**.

SECTION – A

1. Find the product of $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ -1 \\ 5 \end{bmatrix}$
2. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 1 \\ 0 & -3 \end{bmatrix}$ find adj(AB).
3. If $A + B = \begin{bmatrix} 3 & -7 \\ 0 & 2 \end{bmatrix}$,$A - B = \begin{bmatrix} 1 & 5 \\ 4 & -6 \end{bmatrix}$ find A.
4. If $\vec{a} = i + 2j - 3k$, $\vec{b} = 3i - 5j + 2k$. Find the magnitude of $2\vec{a} + 3\vec{b}$.
5. If $\vec{A}$=(3,-4), $\vec{B}$= (-5,6) find position vector of A and B and also find $|\overrightarrow{AB}|$
6. Three coins are tossed simultaneously. List the sample space for event.
7. If $\sin\theta = -{}^{8}/_{17}$ and $\pi < \theta < \frac{3\pi}{2}$ find the value of$4tan\theta + 3sec\theta$.
8. Find the value of $\sin 75^{o}$ using standard angles.
9. Show that $\frac{cosec(180-A)\cos(-A)}{\sec(180+A)\cos(90+A)} = cot^2 A$
10. Prove that$\sin(A + B)\sin(A - B) = \sin^2 A - \sin^2 B$.
11. Prove that$\frac{\sin 3A}{\sin A} - \frac{\cos 3A}{\cos A} = 2$.
12. Express the product $(1 + i)(1 + 2i)$ in $a + ib$ form and hence find its modulus.
13. Evaluate : $\lim_{x\to 3}\left[\frac{x-1}{2x^2-7x+5}\right]$
14. Evaluate: $\lim_{x\to\infty}\left[\frac{3x^2+4x+7}{4x^2+7x-1}\right]$

SECTION – B

1. Find the value of x if $\begin{vmatrix} 1 & x & 0 \\ 2 & -1 & 3 \\ -2 & 1 & 4 \end{vmatrix} = 0$.

2. Find the characteristic equation and its roots of a square matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$
3. Find the $sine$ of the angle between the vectors$2i - j + 3k \; and \; i - 2j + 2k$.
4. If vector $\vec{a} = i + j + 2k, \vec{b} = 2i - j + k$ show that $\vec{a} + \vec{b}$perpendicular$\vec{a} - \vec{b}$.
5. Find the projection of $\vec{a} = 2i + j - k$on $\vec{b} = 2i - 3i + 4k$.
6. Prove that $\frac{1}{\log_a abc} + \frac{1}{\log_b abc} + \frac{1}{\log_c abc} = 1$
7. Find the numerical value of$\sin\left(\frac{\pi}{3}\right).\cos\left(-\frac{\pi}{3}\right) - \cos\left(\frac{\pi}{4}\right).\sin\left(-\frac{3\pi}{4}\right)$
8. Prove that $\sin(A + B) = \sin A \cos B + \cos A \sin B$ geometrically
9. If$A + B + C = \frac{\pi}{2}$, prove that $\tan A \tan B + \tan B \tan C + \tan C \tan A = 1$.
10. Show that$\frac{\sin 56^o - \sin 44^o}{\cos 56^o + \cos 44^o} = \cot 82^o$
11. Evaluate:$\lim_{x \to 0}\left[\frac{\sqrt{1+x+x^2}-1}{x}\right]$

SECTION – C

1. Solve for x, y & z using determinant method

$x + y = 0, y + z = 1 \& z + x = 3.$

2. Solve the equation$x + y + z = 6, 2x - 3y + z = 1 \& x + 3y - 2z = 7$ using Gauss elimination method.
3. A force $\vec{F} = 2i + j + k$ is acting at the point (-3,2,1). Find the magnitude of the moment of force $\vec{F}$ about the point (2,1,2).
4. A die is thrown twice and the sum of the numbers appearing is absorbed tobe. What is the conditional probability that the number 5 has appeared at least once?
5. Prove that $\frac{\cos\left(\frac{5\pi}{2} - \theta\right)}{\sin(4\pi + \theta)} + \frac{\tan(-\theta)}{\cot(\pi - \theta)} = sec^2\theta$
6. Prove that $\cos 80^o \cos 60^o \cos 40^o \cos 20^o = \frac{1}{16}$
7. Find the modulus and argument of the complex number $z = -\sqrt{3} + i$ and hence represent in argand diagram.
8. Prove that $\lim_{\theta \to 0}\left(\frac{\sin\theta}{\theta}\right) = 1$ where θ is in radian.

Question Paper Blue Print:

Course: ENGINEERING MATHEMATICS – I **Course Code: 15SC01M**

UNIT NO		HOURS	Each questions to be set for 3 Marks Section - A	Each questions to be set for 5 Marks Section - B	Each questions to be set for 6 Marks Section- C	Weightage of Marks
1	a	2	2	-	-	31
	b	4	-	1	1	
	c	4	1	1	1	
2		8	2	3	1	27
3	a	6	1	-	1	14
	b	2	-	1	-	
4	a	8	1	1	1	47
	b	8	4	3	1	
5		4	1	-	1	9
6		6	2	1	1	17
TOTAL		**52**	**14**	**11**	**08**	**145**
Questions to be answered			**10**	**08**	**05**	**100**

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weigh age of model fixed for each unit.
2. The question paper pattern provided should be adhered to
   Section-A: 10 questions to be answered out of 14 questions each carrying 03 marks
   Section-B: 08 questions to be answered out of 11 questions each carrying 05 marks.
   Section-C: 05 questions to be answered out of 08 questions each carrying 06 marks.
3. Questions should not be set from the recapitulation topics.
4. Questions should not be set from the recapitulation topics.

Model Question Bank:

Course Title: **ENGINEERING MATHEMATICS – I**	Course Code: **15SC01M**

UNIT-1: MATRICES AND DETERMINANTS

3 MARK QUESTIONS

1. If $A = \begin{bmatrix} 3 & -9 \\ -4 & 7 \end{bmatrix}$, find $A + A'$.
2. If $A = [2 \quad -1 \quad 3]$ and $B = \begin{bmatrix} 5 & -2 \\ 3 & 1 \\ 2 & 4 \end{bmatrix}$, find AB matrix.
3. If matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ 5 & 1 & 0 \\ 1 & 0 & x \end{bmatrix}$ is a singular matrix, then find the value of x.
4. Find the adjoint of the matrix $A = \begin{bmatrix} 4 & -5 \\ 3 & -2 \end{bmatrix}$.
5. If $A = \begin{bmatrix} 3 & -1 \\ 0 & -2 \end{bmatrix}$ find the characteristic equation.

5 MARK QUESTIONS

1. Solve the equations $x + y = 3, 2x + 3y = 8$ by Cramer's rule.
2. Solve for x, if $\begin{vmatrix} 1 & 5 & 7 \\ 2 & x & 14 \\ 3 & 1 & 2 \end{vmatrix} = 0$
3. Verify Cayley-Hamilton theorem if $A = \begin{bmatrix} 1 & 3 \\ 2 & -4 \end{bmatrix}$.
4. Verify $A(AdjA) = |A|.I.$ if $A = \begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$.
5. Find the adjoint of the matrix $A = \begin{bmatrix} 3 & -1 & 2 \\ 2 & -3 & 1 \\ 0 & 4 & 2 \end{bmatrix}$

6 MARK QUESTIONS

1. Solve for x &y from the equations $4x + y = 7, 3y + 4z = 5, 5x + 3z = 2$ by Cramer's rule.
2. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$
3. Prove that adj(AB)=(adjB).(adjA) if $A = \begin{bmatrix} -1 & 0 \\ 5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 2 & 4 \end{bmatrix}$

4. Find the characteristic roots of a matrix $\begin{bmatrix} 1 & -1 \\ -6 & -2 \end{bmatrix}$.
5. Solve the equations by Gauss elimination method $3x - y + z = 0, x + 2y - 2z = 3, 3x + z = 4$.

UNIT-2: VECTORS

3 MARK QUESTIONS

1. Find the magnitude of vector 2i +3j – 6k
2. If $\vec{a} = i + 2j - 3k, \vec{b} = 3i - 5j + 2k$ find magnitude of $\overrightarrow{3a} - \overrightarrow{2b}$
3. Show that $\cos\theta i - \sin\theta j$ is unit vector
4. Show that the vectors $2i + 5j - 6k$,and $7i + 2j + 4k$ orthogonal vectors.
5. If $\vec{a} = 5i + 2j - 4k$, and $\vec{b} = 2i - 5j + 3k$find $\vec{a}X\vec{b}$.

5 MARK QUESTIONS

1. Find cosine of the angle between the vectors $4i - 2j - 3k$and $2i - 3j + 4k$.
2. Find the projection of $\vec{b}$ on $\vec{a}$ if $\vec{a} = 5i + 2j - 4k$and $\vec{b} = 2i - 5j + 6k$.
3. If $\vec{a} = 3i + 2j - 4k$ and $\vec{b} = i - 2j + 5k$ are two sides of a triangle, find its area.
4. Simplify $(\vec{a} + \vec{b}).(\vec{a} - \vec{b})$and $(\vec{a} + \vec{b})X(\vec{a} - \vec{b})$.
5. Find the magnitude of moment of force $4i - 2j + 5k$ about (2,5,-7) acting at (4,7,0)

6 MARK QUESTIONS

1. If A=(2,5,7), B=(3,9,4) and C=(-2,5,7) are three vertices of parallelogram find its area.
2. If a force $4i + 6j + 2k$ acting on a body displaces it from (2,7,-8) to (3,9,4). Find the work done by the force.
3. Find the sine of the angle between the vectors $4i - 2j - 3k$and $2i - 3j + 4k$.
4. Find the unit vector in the direction perpendicular to both vector $2i - 5j + k$and $5i + j + 7k$.
5. Show that the points whose position vectors are $i - 3j - 5k$, $2i - j + k$ and $3i - 4j - 4k$ form a right angled triangle.

UNIT-3: PROBABILITY AND LOGARITHMS

3 MARK QUESTIONS

1. Define equally likely events, Independent event, and mutually exclusive event.
2. Define probability of an event.
3. A coin is tossed twice. What is the probability that at least one head occurs.
4. A die is thrown once, what is the probability an odd number appears.
5. If E and F are events such that P(E)=0.6, P(F)=0.3 and P(E∩F)= 0.2. Find P(E/F).

5 MARK QUESTIONS

1. Prove that $\frac{1}{1+\log_c ab} + \frac{1}{1+\log_a bc} + \frac{1}{1+\log_b ca} = 1$
2. If $x = \log_c ab$, $y = \log_b bc$, $z = \log_a ca$,
   Prove that $xyz = x + y + z + 2$
3. If $x = \log_{2a} a$, $y = \log_{3a} 2a$, $z = \log_{4a} 3a$, prove that $xyz + 1 = 2yz$
4. If $a^2 + b^2 = 7ab$, prove that $\log\left(\frac{a+b}{3}\right) = \frac{1}{2}(\log a + \log b)$
5. Solve for x given that $(\log_2 x)^2 + (\log_2 x) - 20 = 0$

6 MARK QUESTIONS

1. An integer is chosen at random from the numbers ranging from 1 to 50 . What is the probability that the integer chosen is a multiple of 3 or 10 ?
2. Two unbiased dice are thrown once . Find the probability of getting the sum of the numbers obtained on the two dice is neither a multiple of 2 nor a multiple of 4 .
3. One card is drawn from a well shuffled pack of 52 cards. If E is the event "the card drawn is a king or an ace" and F is the event " the card drawn is an ace or a jack " then find the conditional probability of the event E, when the event F has already occurred .
4. A pair of dice is thrown once. If the two numbers appearing on them are different, find the probability that the sum of the numbers is 6.
5. A family has two children. What is the probability that both the children are boys given that (i) the youngest is a boy. (ii) at least one is a boy ?

UNIT-4: ALLIED ANGLES AND COMPOUND ANGLES

ALLIED ANGLES

3 MARKS QUESTIONS

1. Find the value of $\cos ec(-1110^0)$
2. Find the value of $\frac{\cos ec(180^0 - A)\cos A}{\sec(180^0 + A)\cos(90^0 + A)}$
3. 3.If $\sin\theta = \frac{1}{2}$ and $\frac{\pi}{2} \subset \theta \subset \pi$, find $\cos\theta$
4. 4. If A+B+C =180^0 Prove that $\cot\left(\frac{A+B}{2}\right) = \tan c/2$
5. 5.find the value of $\tan\left(\frac{7\pi}{3}\right)$

5 MARKS QUESTIONS

1. Prove that $\frac{\sin(180^0 - A)COS(360^0 - A)\tan(180^0 + A)}{COS(270 + A)\sin(90 + A)\cot(270 - A)} = 1$
2. If secx = 13/5 and $270^0 \subset x \subset 360^0$, Find the value of $\frac{3\sin x - 2\cos x}{9\cos x + 4\sin x}$
3. Find the value of $\cos 570^0 \sin 510^0 - \sin 330^0 \cos 390^0$
4. Evaluate $\frac{\sin(-\alpha)}{\sin(90^0 + \alpha)} - \frac{\cos(-\alpha)}{\cos(90 - \alpha)} - \frac{\sec(90^0 - \alpha)}{\cos(180^0 + \alpha)}$
5. Show that $\tan 225^0 x \cot 405^0 + \tan 765^0 x \cot 675^0 + \operatorname{cosec} 135^0 x \sec 315^0 = 0$

6 MARK QUESTIONS

1 .Evaluate $\tan 315^0 x \cot 405^0 + \tan 765^0 x \cot 675^0 + \operatorname{cosec} 135^0 x \sec 315^0$

2. Find x if $\frac{x \sin^2 300^0 \sec^2 240^0}{\cos 225^0 \cos ec^2 240^0} = \cot^2 315^0 \tan^2 300^0$
3. If $\sin\theta = \frac{-1}{4} and \pi \subset \theta \subset \frac{3\pi}{2}$, find the value of $\frac{\cos\theta + \tan\theta}{\cot\theta + \sec\theta}$
4. Evaluate $\frac{\sin(2\pi - A)}{\sin(\pi - A)} - \frac{\tan\left(\frac{\pi}{2} + A\right)}{\cot(2\pi + A)} + \frac{\cos ec(-A)}{\sec\left(\frac{\pi}{2} + A\right)}$
5. Show that $\tan^2(315^0)\cot(-405^0) + \cot(495^0)\tan(-585^0) = 0$

COMPOUND ANGLES

3 MARKS QUESTIONS

1. Find the value of $\sin 15^0$
2. Show that $\tan(45^0 + \theta) = \frac{1 + \tan\theta}{1 - \tan\theta}$
3. Prove that $\frac{\sin(A-B)}{\cos A \cos B} + \frac{\sin(B-C)}{\cos B \cos C} + \frac{\sin(C-A)}{\cos C \cos A} = 0$
4. Using tan(A+B), prove that $\cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$
5. Prove that $\frac{\sin 2A}{\sin A} - \frac{\cos 2A}{\cos A} = \sin A$

5 MARKS QUESTIONS

1. Prove that cos(A-B) cos(A+B)= $\cos^2 A - \sin^2 B$
2. Show that $\sin\left(A+\frac{\pi}{4}\right)+\cos\left(A+\frac{\pi}{4}\right)=\sqrt{2}\cos A$
3. If sinA= $\frac{1}{\sqrt{10}}, \sin B = \frac{1}{\sqrt{5}}$ $prove that A+B = 45^0$
4. Prove that $\tan 3\theta - \tan 2\theta - \tan\theta = \tan\theta \tan 2\theta \tan 3\theta$
5. If A+B = $\frac{\pi}{4}$, $prove that (1+\tan A)(1+\tan B)) = 2$

TRASFORMATION FORMULAE

3 MARKS QUESTIONS

1 P.T $\frac{\cos A+\cos B}{\sin A+\sin B} = \cot\left(\frac{A+B}{2}\right)$

2 P.T $\frac{\sin 68^\circ + \sin 52^\circ}{\cos 68^\circ + \cos 52^\circ} = \sqrt{3}$

3 Show that $\cos 40^\circ - \cos 50^\circ = \sqrt{2}\ \sin 5^\circ$

4 Show that $\sin 47^\circ + \cos 77^\circ = \cos 17^\circ$

5 Show that $\cos 80^\circ + \cos 40^\circ - \cos 20^\circ = 0$

MARKS QUESTIONS

1 P.T $\frac{\sin\theta+\sin 3\theta+\sin 5\theta}{\cos\theta+\cos 3\theta+\cos 5\theta} = \tan 3\theta$

2 In and triangle ABC prove that tanA + tanB +tanC = tanA tanB tanC

3 Show that $\frac{\sin 9^\circ + \cos 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \tan 54^\circ$

4 Prove that $\cos 55^\circ + \cos 65^\circ + \cos 175^\circ = 0$

5 Prove that $\sin 20^\circ \times \sin 40^\circ \times \sin 80^\circ = \frac{\sqrt{3}}{8}$

MARKS QUESTIONS

1 Prove that $\cos 20^0 x \cos 40^0 x \cos 80^0 x \cos 60^0 = 1/16$

2 In any triangle ABC prove that sinA + sinB + sinC=4Cos(A/2)cos(B/2)cos(C/2)

3 Show that $\frac{\cos x+\cos 2x-\cos 3x-\cos 4x}{\sin x+\sin 2x+\sin 3x+\sin 4x} = \tan x$

4 If A+B+C = 180^0 prove that $\cos^2 A+\cos^2 B+\cos^2 C = 1-2\cos A\cos B\cos C$

5 If A+B+C = 180^0 prove that sin2A-sin2B+sin2C=4cosAcosCsinB

UNIT-5: COMPLEX NUMBERS

3 MARK QUESTIONS

1. Evaluate i^{-999}
2. Find the complex conjugate of $(1+2i)(3i-4)$
3. Express $(3+4i)^{-1}$ in the form a+ib
4. Find the real part and imaginary part of $\frac{1}{\sqrt{2}+i}$
5. $if\, x+iy = \cos\theta + i\sin\theta$ show that $x+\frac{1}{x} = 2\cos\theta$

5 MARK QUESTIONS

1. Evaluate $\left(i^{19}+\left(\frac{1}{i}\right)^{25}\right)^2$
2. Find the modulus and amplitude of $\left(1-i\sqrt{3}\right)$
3. Express in a + ib form: $\frac{(2+3i)}{(1+3i).(2+i)}$
4. Express the complex number 1 + i in the polar form.
5. Find the amplitude of $\sqrt{3}+i$ and represent in Argand diagram.

UNIT-6: INTRODUCTION TO CALCULUS

3 MARK QUESTIONS

1. Evaluate: $\lim_{x\to -3}\frac{x^2-9}{x+3}$
2. Evaluate: $\lim_{\theta\to 0}\left(\frac{\tan m\theta}{\sin n\theta}\right)$
3. Evaluate: $\lim_{n\to\infty}\left(\frac{n+1}{n}\right)^n$.
4. Evaluate: $\lim_{x\to\infty}\left(\frac{3x^2-2x+1}{2x^2+5x-1}\right)$
5. Evaluate: $\lim_{x\to 0}\left(\frac{1-\cos 2x}{x^2}\right)$

5 MARK QUESTIONS

1. Evaluate:$\lim_{x\to 1}\frac{x^2+x-2}{x^2-1}$.
2. Evaluate: $\lim_{x\to 0}\left(\frac{\sqrt{a+x}-\sqrt{a-x}}{3x}\right)$
3. Evaluate: $\lim_{x\to 1}\left(\frac{x^m-1}{x^n-1}\right)$

4. Evaluate: $\lim_{\theta \to 0} \left(\frac{1-\cos x+\tan^2 x}{x \sin x} \right)$
5. Evaluate: $\lim_{x \to 0} \left(\frac{e^{ax}-e^{bx}}{x} \right)$.

6 MARK QUESTIONS

1. Prove that $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$, if θ is in "radian".
2. Evaluate: $\lim_{x \to 0} \left(\frac{\sin \pi x}{x-1} \right)$
3. Evaluate: $\lim_{n \to \infty} \left(\frac{(5-n^2)(n-2)}{(2n-3)(n+3)(5-n)} \right)$.
4. Evaluate: $\lim_{x \to 1} \frac{x^2-5x+4}{x^2-12x+11}$.
5. Evaluate: $\lim_{x \to 2} \left(\frac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}} \right)$

Government of Karnataka
Department of Technical Education, Bengaluru

Course: ENGINEERING MATHEMATICS - I

Course code: 15SC01M

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	**Dr. D.S. Prakash**	Asst. Director (LRDC)	DTE, Bengaluru
2	**Dr.MokaShekhu, ,**	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
3	**Sri.Sathyanaraya Dixit,**	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru
4	**Sri. Guruprasad V**	Lecturer (Selection Grade /Science)	APS Polytechnic, Somanahalli
5	**Dr.RajasekharHeera,**	Lecturer/Science,	Government Polytechnic, Gulbarga.

Curriculum Review committee

	Name	Designation	Institution
1	**Dr.MokaShekhu, ,**	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
2	**Sri.Sathyanaraya Dixit,**	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title:	ELEMENTS OF ELECTRICAL ENGG	Course Code	: 15EE11T
Semester	: I	Course Group	: Core
Teaching Scheme (L:T:P)	: 4:0:0(in Hours)	Credits	: 4 Credits
Type of course	: Lecture + Assignments	Total Contact Hours	: 52
CIE	: 25 Marks	SEE	: 100 Marks

Pre-requisites	**:** Mathematics and Science Secondary Education.
Course Objectives	**:**To introduce the concept of Electrical energy, with the knowledge of electrical current, voltage, power, energy and electrical circuits, DC circuits, electrostatics, Faraday's laws of electrolysis and electrical engineering materials.

Course Topics:

Unit No	Unit Name	Hours
1	Introduction and Electrical current and voltage	5
2	DC circuits and Resistance and temperature effects	12
3	Work, Power and Energy	7
4	Electrostatics	10
5	Faraday's laws of Electrolysis	9
6	Electrical Engineering Materials	9
	Total	**52**

Course Outcomes:

On successful completion of the course, the students will be able to attain CO:

1. Understand the sources of energy, applications, different electrical parameters and symbols.
2. Understand Ohm's law, Resistance combinations, temperature effects. Solve problems.
3. Distinguish Electrical Work, Power and Energy and understand Joule's law. Solve problems.
4. Understand Electrostatics laws and capacitor combinations. Solve problems.
5. Differentiate cells and batteries. Understand charging and discharging of Lead Acid battery. Analyse grouping of cells.
6. Understand electrical engineering materials, properties and their applications.

Composition of Educational Components

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (Out of 145)
1	Remembering	20	30
2	Understanding	40	60
3	Application	40	55
Total		**100**	**145**

Course Outcome linkage to Cognitive Level

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Understand the sources of energy, applications, different electrical parameters and symbols.	***R/U***	2,6,10	5
CO2	Understand Ohm's law, Resistance combinations, temperature effects. Solve problems.	***U/A***	2,10	12
CO3	Distinguish Electrical Work, Power and Energy and understand Joule's law. Solve problems.	***R/U/A***	1,2,5,10	7
CO4	Understand Electrostatics laws and capacitor combinations. Solve problems.	***R/U/A***	1,2,10	10
C05	Differentiate cells and batteries. Understand charging and discharging of Lead Acid battery. Analyse grouping of cells.	***U/A***	1,2,10	9
C06	Understand electrical engineering materials, properties and their applications.	***R/U***	1,2,10	9
		Total sessions		**52**

Course Content and Blue Print of Marks for SEE:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for (5marks) PART - A			Questions to be set for (10marks) PART - B			Marks weightage (%)
				R	U	A	R	U	A	
1	Introduction and Electrical current and voltage	5	15	1				1		10
2	DC circuits and Resistance and temperature effects	12	35	1	1	1			2	24
3	Work, Power and Energy	7	20	1	1				1	15
4	Electrostatics	10	25		1			1	1	17
5	Faraday's laws of Electrolysis	9	25	1				1	1	17
6	Electrical Engineering Materials	9	25		1		1	1		17
	Total	**52**	**145**	**9 (45 Marks)**			**10 (100 Marks)**			**100**

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
ELEMENTS OF ELECTRICAL ENGG.	3	3	-	-	1	1	-	-	-	3

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
IF ≥40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Contents:

Unit I

Introduction to sources of electrical energy, advantages of electrical energy and the effects of electric current and its applications.

Electrical Current, Voltage and Circuits: Electrical current, e.m.f., voltage, potential difference, open circuit, closed circuit and short circuit. Symbolic representation of sources, loads and basic protective devices.

Unit II

DC circuits: Ohm's law, Ohm's law applications and its limitations. Simple problems on ohm's law.

Resistance and Temperature effects: Electrical Resistance and its unit.Series, Parallel and Series-Parallel circuits.Simple problems.

Laws of Resistance, Specific Resistance and its unit. Effect of temperature on resistance and temperature co-efficient**.**Simple problems.

Unit III

Work, Power and Energy: Work, Power, Energy, Problems on Power and energy, conversion from Mechanical units into Electrical units and vice- versa. Joule's law of heat.Simple problems.

Unit IV

Electrostatics: Electric charge, Electric flux, Flux density, Electric field, Electric field intensity, Laws of electrostatics, dielectric constant and permittivity, Capacitance. Types of Capacitors, Capacitors in series and parallel, Energy stored in a capacitor. Simple problems on Electrostatic laws, capacitor combinations and energy stored.

Unit V

Faraday's laws of Electrolysis: Laws, Difference between Cell and a Battery. Difference between Primary and Secondary Cells. Lead - Acid Battery- Construction, Chemical action during charging and discharging. Grouping of cells. Problems on grouping of cells.

Unit VI

Electrical Engineering Materials: Different Conductor materials, properties and applications. Different Resistor materials, properties and applications. Different Insulating materials, properties and applications. Different magnetic materials, properties and applications.

Reference Books:

1. Basic Electrical and Electronics Engineering By V.Jegathesan, K.Vinoth Kumar &R.Saravakumar Wiley India Pvt.Ltd.
2. Basic Electrical and Electronics Engineering By B.L.Theraja S. Chand Publications.
3. Basic Electrical Engineering By V.K. Mehta &Rohit Mehta S. Chand Publications

e-Resources:

1.http://www.facstaff.bucknell.edu

2. http://electrical4u.com/

3. http://www.electronics-tutorials

Course Delivery:

The Course will be delivered through Lectures, Classroom Interaction, Animations, Group Discussion, Exercises and Assignments.

Course Assessment and Evaluation Scheme:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Books	1 to 6
				Student activity	05	Log of activity	1 to 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Questionnaire		Effectiveness of Delivery of instructions and Assessment Methods
	End Of Course Survey			End Of The Course			

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Suggested Student Activities:

Each Student has to prepare and submit at least 3 pages of self hand written report, considering any one of the following topics (**Mini project or Charts or Applications**)

1. **DC circuits, Electrical Current, Voltage, Power and Energy and Meters to measure, etc.**
2. **Resistance -materials used and Temperature effects**
3. **Cells and Batteries**
4. **Electrostatics**
5. **Electrical Engineering Materials**

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM		20
	Year:		
Name of Course coordinator : CO's:____			Units:__

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
1st Test/ 6 th week, 9 Aug 15, 10-11 AM	I SEM, E & E Engg	**Elements Of Electrical Engg**	20
	Year: 2015-16	Course code:	

Name of Course coordinator :
Units Covered :1 and 2
Course Outcomes : 1 and 2
Instruction :*(1). Answer all questions (2). Each question carries five marks*

Question No.	Question	CL	CO	PO
1	State the advantages of electrical energy.	R	1	2,6,10
2	Show symbolical representations of electrical sources. OR Draw an electric circuit showing (i) Switch (ii) Protective Device (iii) Voltage Source and (iv)Load.	U U	1	2,6,10
3	State Ohms' Law and explain.	U	2	2,10
4	Differentiate between positive temperature co-efficient and negative temperature co-efficient? OR Find the resistance of a bulb which takes 2A when connected to 230V supply.	U A	2	2,10

CL: Cognitive Level, R-Remember, U-Understand, A-Application, PO: Program Outcome

Model Question Paper:

Code: 15 EE 11T

I Semester Diploma Examination.

ELEMENTS OF ELECTRICAL ENGINEERING

Time: 3 Hours] **[Max. Marks: 100**

Note: (i) Answer any **SIX** questions from Part – A.*(Each question carries 5 marks)*
(ii) Answer any **SEVEN** questions from Part – B. *(Each question carries 10 marks)*

PART - A

1. State the sources of Electrical energy. 5
2. State and explain Ohms' Law. 5
3. What is positive temperature co-efficient and negative temperature co-efficient? 5
4. Explain Joule's law of heat. 5
5. Explain the Laws of electrostatic. 5
6. Define Electric field intensity and Flux density. 5
7. Differentiate between Primary and Secondary Cells. 5
8. Explain the need of grouping of cells. 5
9. What are the applications of copper conductor? 5

PART - B

10. (a) Derive the total resistance when three resistances are connected in series. 5

    (b) Show the symbolical representations of Electrical Sources. 5

11. (a) Find the total current when three 100 ohm, 150 ohm and 200 ohm are Connected in parallel. 5

    (b)Find total charge when three capacitors 10microFarad, 20microFarad and 30microFarad are connected in parallel. 5

12. (a) Explain Laws of Resistance. 4

    (b)A wire 50cm long and having a diameter of 0.05 am is in a room at 20^{o}C. The specific resistance of the material of wire is 2 micro-ohm per cm cube while its temperature coefficient is 0.004 at 20^{o}C. Calculate the resistance of wire at 20^{o}C. If the temperature of the room rises to 25^{o}C, find the new resistance of wire. 6

13. (a)What is the effect of temperature on resistance?
    5(b) A house is fitted with 5 lamps of 100 watts each, one electric press of

220V drawing 2A of current, 4 fans of 110 watts each and a heater of 1120 watts. If all the appliances work for 2 hours a day, find the electricity bill for the month of September. Electrical energy is supplied at Rs.2 per KWh. 5

14. (a) List the properties of Insulating materials. 5
    (b) Explain the chemical action during discharging in a lead-acid battery. 5

15. (a) List the applications of Resistor materials. 5
    (b) Twelve cells, each of emf 2 V and internal resistance 0.5 Ω, are connected in series across an external resistance of 4.5Ω. Determine (i) the current supplied by the battery (ii) terminal voltage of the battery. 5

16. a) List the properties of Resistor materials. 5
    b) Four cells, of emf 1.5 V and internal resistance 0.5 Ω, are connected in parallel across an external resistance of 2.5Ω. Determine (i) the current supplied by the battery (ii) current supplied by each cell and (iii) the terminal voltage of the battery. 5

17. a) Explain with a neat sketch the construction of a Lead - Acid Battery. 6
    b) State the applications of magnetic materials. 4

18. a) Derive the total capacitance when three capacitors are connected in series. 6
    b) Explain Energy stored in a capacitor. 4

19. a) Find the resistance of a bulb which takes 2A when connected to 230V supply. 5
    b)Find energy stored in a capacitor when three capacitors 100μF, 120μF and 130μF are connected across 230 V supply. 5

---xxx---

MODEL QUESTION BANK

Code: 15 EE 11T

I Semester Diploma Examination.

ELEMENTS OF ELECTRICAL ENGINEERING

Cognitive Level: REMEMBER

1. State the sources of electrical energy.
2. Define current and voltage and mention their units.
3. Draw open circuit, closed circuit and short circuit.
4. State Joule's law of heat.
5. Define (i) Capacitance (ii) Dielectric strength of a medium.
6. Explain laws of electrostatics.
7. Define electric charge, electric field, electric flux, electric field intensity and flux density.
8. State the different sources of electrical energy.
9. State any five effects of electrical current with an example.
10. Define the following and mention their units (i) electric current (ii) voltage.
11. What are the factors on which the resistance of a material depend?
12. Define (i) resistance (ii) Specific resistance and mention their SI units.
13. Define temperature co-efficient of resistance and mention its unit.
14. Define (i) Electrical Power (ii) Electrical Energy and mention their units.
15. State and explain Joules law of heating.
16. Mention the SI units of (i) Work (ii) Electrical Power (iii) Electrical energy (iv)
17. Mechanical Power (v) Mechanical energy and (vi) Heat energy.
18. State the different types of conductor materials.
19. Statethe different types of resistor materials.

Cognitive Level: UNDERSTAND

20. State the advantages of electrical energy.
21. State any five effects of electrical current.
22. State any five applications of electrical energy.
23. Show symbolical representations of electrical sources.
24. Draw an electric circuit showing (i) Switch (ii) Protective Device (iii) Voltage Source and (iv)Load.
25. State Ohms' Law and explain.
26. What are the limitations of Ohm's Law?
27. State Laws of Resistance.
28. State the effect of temperature on resistance.
29. Draw the symbols of loads and basic protective devices.
30. Convert mechanical units into electrical units.

31. State the characteristics of good conducting materials.
32. What are resistor materials? Mention their uses. Give examples.
33. State the properties of a good insulation material.
34. Mention the properties and composition of silicon steel.
35. Mention the advantages of electrical energy over other sources of energy.
36. State the applications of electrical energy.
37. Differentiate between e.m.f and potential difference.
38. What is an electric circuit? What are the requirements of good electric circuit?
39. Give SI symbol of (i) a.c. supply (ii) switch (iii) fuse (iv) load (v) battery.
40. With reference to an electric circuit differentiate between (i) open circuit (ii) closed circuit (iii) short circuit.
41. Draw an electric circuit showing the following and mark the direction of current (i) d.c. supply (ii) switch (iii) fuse and (iv) load.
42. Explain the construction of lead-acid battery.
43. Explain the chemical reaction with equation in a lead acid battery during discharging.
44. Explain the need of grouping cells in Series and Parallel combination.
45. Twelve cells, each of emf 2 V and internal resistance 0.5 Ω, are connected in series across an external resistance of 4.5Ω. Determine (i) the current supplied by the battery (ii) terminal voltage of the battery.
46. Explain the chemical reaction with equation in a lead acid battery during charging.
47. A battery consists of 4 cells, each of emf 1.46V. The cells are connected in parallel to an external resistance of 0.525Ω. If the current supplied by the battery is 0.8A, find the internal resistance of each cell.
48. State the different types of insulating materials.
49. State on the different types of Magnetic materials.
50. State the properties of conductor material.
51. State the applications of conductor material.
52. State the properties of Resistor materials.
53. State the applications of Resistor materials.
54. State the properties of Insulating materials.
55. State the applications of Insulating materials.
56. State the properties of magnetic materials.
57. State the applications of magnetic materials.

Cognitive Level: APPLICATION

58. Differentiate between positive temperature co-efficient and negative temperature co-efficient?
59. Find the resistance of a bulb which takes 2A when connected to 230V supply.
60. What are the applications of Ohm's law?
61. Explain the terms (i) absolute permittivity (ii) relative permittivity.
62. Derive an equation for energy stored in a capacitor.
63. Distinguish between primary cell and secondary cell with examples.

64. Differentiate between a cell and a battery.
65. Explain (i) positive temperature co-efficient and (ii) negative temperature co-efficient of resistance and give one example each.
66. A tungsten lamp has a resistance of 150Ω at 2850^{o}C. What is its resistanceat 20^{o}C? Given temperature co-efficient of resistance of tungsten is 0.0049^{o}C at 0^{o}C.
67. State and explain Ohm's law.
68. State the limitations of Ohm's law.
69. Derive the equation for total resistance when three resistances are connected in series.
70. Three resistors 4Ω, 12Ω and 6Ω are connected in parallel. If the total current taken is 12A, find the current through each resistor.
71. Derive the equation for total resistance when three resistances are connected in parallel.
72. Three resistances of 30Ω, 40Ω and 50Ω are connected in series across a voltage supply of 100 V, find (i) total current (ii) voltage drop across each resistor.
73. Derive the total resistance when three resistances are connected in series.
74. Three resistances of 10, 20 and 30 are connected in parallel across a voltage supply of 50V, find (i) total current (ii) current through each resistor.
75. Compare the properties of Copper and Aluminium conductors.
76. State the properties of nichrome material and mention the applications.
77. Explain the terms (i) Ferro-magnetic material (ii) Para-magnetic material and (iii) Dia-magnetic material.
78. Differentiate between soft and hard magnetic materials.
79. A copper wire has a resistance of 25Ω, at 0^{o}C what would be its resistance at100^{o}C. Assume the temperature co-efficient at 0.004^{o}C at 0^{o}C.
80. State the factors on which the resistance of a material depends.
81. Calculate the resistance of a copper conductor having length of 2 kms and a cross section of 22mm^{2}. Assume resistivity as 18 x 10^{-9} Ωm.
82. A house is fitted with four lamps each of 40W capacity and a T.V. of 60W and used on average for 4 hours per day. Find the KWh consumed in a month of 30 days and also electricity bill at the rate of Rs.2 per unit.
83. An electric kettle rated 500W 230V, was found to take 15 minutes to bring 1kg of water at 25^{o}C to boiling point of 100^{o}C. Determine the heat efficiency of the kettle.
84. A motor of 1 H.P. works 4 hours per day. Find the monthly energy consumption for a month having 30 days. Also find the monthly electricity bill if the cost per unit is Rs.2.00
85. Derive the total capacitance when three capacitances are connected in series.
86. Three capacitors have capacitances of 2μF, 3μF and 4μF respectively. Calculate the total capacitance when they are connected (i) in series (ii) in parallel.
87. Derive the total capacitance when three capacitances are connected in parallel.
88. Three capacitors of capacitance 2μF, 4μF and 6μF respectively are connected in series to a 220 V d.c. supply. Find (i) the total capacitance (ii) charge on each capacitor and (iii) potential difference across each capacitor.
89. Derive an equation for effective capacitance of 3 capacitance connected in parallel.

90. Three capacitances of 8μF, 10μF and 12μF are connected in series. Calculate the equivalent capacitance.
91. Derive an equation for effective capacitance of 3 capacitance connected in series.
92. Three capacitances of 8μF, 10μF and 12μF are connected in parallel. Calculate the equivalent capacitance.
93. Derive an equation for energy stored in a capacitor.
94. A capacitance has a charge of 1000 micro-Coulomb and is connected across a 100 V a.c. 50 Hz supply. Calculate the capacitance and energy stored in the capacitor.

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	:**APPLIED SCIENCE LAB**	Course Code	: **15SC04P**
Semester	: **I / II**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **0:2:4**	Credits	: **3** Credits
Type of course	: **Tutorial & Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	: **50 Marks**
Programme	: **Common to all Engineering Diploma Programmes**		

Prerequisite:

Applied Science theory in the current semester.

Course objective:

1. Learn to measure different dimensions of objects accurately using measuring instruments.
2. Enhance the vectorial concepts of concurrent forces.
3. Learn the concepts of properties of fluids.
4. Enhance the practical concept of resonance.

Experiments:

PART- A

1. **Vernier Calipers**:
   a) To determine the dimensions of given solid cylinder and hence calculate its volume.
   b) To determine the dimensions of given hollow cylinder and hence calculate its volume

Activity: To calculate the density of material of given solid/hollow cylinder knowing its volume and mass.

2. **Screw Gauge**:
   a) To determine the thickness of given metal and glass plate.
   b) To determine the diameter of given thin wire and hence to calculate its volume.
   c) To determine the diameter of given metallic sphere and hence to calculate its volume.

Activity: 1.To calculate volume of such half meter length wire.
2. To calculate volume of such number (50 or 75 etc) of spheres.

3. **Laws of concurrent forces**:
   a) Verify the law of parallelogram of forces.

b) Verify the converse law of triangle of forces.
c) Verify Lami's theorem.

Activity: To determine the weight of given body using law of parallelogram of forces.

4. Moment bar:

To verify the conditions of equilibrium of coplanar parallel forces acting on a body.

Activity: To determine the weight of given body using moment bar.

PART-B

5. Viscosity:

a) To determine the co-efficient of viscosity of water by poiseuille's method(for a given radius of capillary tube)

Activity: To plot a graph of **ht** versus **V** and to find ht/**V** from slope.

6. **Sonometer**:

a) To determine the frequency of given tuning fork by comparison method.
b) To determine the frequency of given tuning fork by absolute method.

Activity: 1.Plot a graph of 'n' versus 'l' from the graph, find the frequency unknown Tuning fork

2.Plot a graph of $\sqrt{T}$versus 'l' from the slope of graph find $\sqrt{T}$/l

3.To calculate linear density 'm' by knowing$\sqrt{T}$/l and 'n'

7. Resonance:

a). To determine the velocity of sound in air at room temperature by using resonance air column apparatus. (for single resonating length)

Activity:1. To calculate velocity of sound in air at 0^0 C.

2. To determine the unknown frequency of tuning fork.

8.**Surface Tension**:

a) To determine the Surface Tension of water by capillary rise method using Travelling Microscope. (radius of capillary tube is given)

Activity: Calculate radius of the capillary tube by knowing the surface tension of the liquid and height of liquid column in capillary tube.

9. Boyle's law:

a) To verify Boyle's law using Boyle's law apparatus.

Activity:1.To plot a graph of pressure versus volume

2. To plot a graph of 1/pressure versus volume.

Course outcome:

On successful completion of the course, the student will be able to:

1. Measure the various dimensions of given objects using instruments.
2. Apply the vector concepts in engineering.
3. Apply the acquired knowledge of fluid dynamics in the field of engineering.
4. Apply the concepts of wave motion in engineering.

Mapping Course Outcomes with Program Outcomes:

CO –PO mapping

	Course Outcome	Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Measure the various dimensions of given objects using instruments.	**1,2**	**1,2,3,4,9**	**U/A**	**24**
CO2	Apply the vector concepts in engineering.	**3,4**	**1,2,9**	**U**	**16**
CO3	Apply the acquired knowledge of fluid dynamics in the field of engineering.	**5,8,9**	**1,2,3,9**	**A**	**24**
CO4	Apply the concepts of wave motion in engineering.	**6,7**	**1,2,3,9**	**U**	**14**
Total Hours of instruction					**78**

U-Understanding; A-Application;

Course outcomes –Program outcomes mapping strength

Course	**Programme Outcomes**									
	1	2	3	4	5	6	7	8	9	10
Applied Science lab	**3**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**3**	**-**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average of Two Test marks will be computed)	10	Blue Books	1 to 4
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Record Book	1 to4
		Class room Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	05	Log of Activity	1 to 4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts at BTE	All the CO's
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 2 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 4 Effectiveness of delivery of instructions and assessment

Note: I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering and Understanding	35
2	Applying the knowledge acquired from the course	45
3	Analysis	05
4	Evaluation	05
5	Creating new knowledge	10

Reference Books:

1. Practical physics by pro. J.D.Belani and N.J.Belani. Published by Nebhandas Hiranand.
2. Practical physics by C.L. Arora. Published by S. Chand and company.
3. www.jac production.co.za

Model Question Bank:

Course: APPLIED SCIENCE LAB Course Code: **15SC04P**

PART- A

1. Determine the dimensions of given Solid Cylinder using Vernier Caliper and hence calculate its volume.
2. Determine the dimensions of given Hollow Cylinder using Vernier Caliper and hence calculate its volume.
3. Determine the thickness of given metal and glass plate using screw gauge.
4. Determine the diameter of given thin wire using screw gauge and hence, to calculate its volume.

5. Determine the diameter of given metallic sphere using screw gauge and hence, calculate its volume.
6. Verify the law of parallelogram of forces.
7. Verify the converse of triangle law of forces.
8. Verify lami's theorem.
9. Verify the conditions of equilibrium of coplanar parallel forces using Moment bar.

PART- B

10. Determine the coefficient of viscosity of water by Poiseuille's method (For a given radius of capillary tube)
11. Determine the frequency of given tuning fork by comparison method using sonometer.
12. Determine the frequency of given tuning fork by absolute method using sonometer.
13. Determine the velocity of sound in air at room temperature by using resonance Air column Apparatus.
14. Determine the Surface Tension of water by capillary rise method. (For a given radius of capillary tube)
15. Verify Boyle's law using Boyle's law apparatus.

Scheme of Valuation for SEE (Semester End Examination)

Sl. no.	Performance	Max. Marks
1	Writing Observation, Tabular column, formula.	05x2=10
2	Conduction of experiment.	10x2=20
3	Calculation and Result.	05x2=10
4	Viva Voce.	10
	TOTAL	**50 Marks**

Note: The students will submit record books at the time of semester end exam.

Guidelines for Question Paper Setting

The question paper must be prepared by selecting **ONE** experiment from **PART – A** and **ONE** question from **PART – B**.

Specification of the Apparatus Required for Applied Science Lab

The following are the specification of the apparatus required for science lab, and number of apparatus required for the batch of 20 students.

Sl. No.	Name of the Apparatus	Specification	Required Number
1	Vernier calipers	With L.C 0.01cm having Metallic scale marked in cm, with objects :solid cylinder &hollow cylinder	10
2	Screw gauge	U-Shaped metallic frame with L.C 0.01mm with objects :glass plate, metal plate, thin wire and metallic sphere	10
3	Law of concurrent forces apparatus	Vertical Drawing Board fixed with pulleys. Weights 50g each with weight hangers set	10
4	Moment bar	Having two vertical metallic stands, two spring balances measuring up to 500 g .horizontal bar.	10
5	Surface tension apparatus	Traveling microscope, having L.C 0.005cm, both horizontal and vertical movement of telescope, eye piece with fine cross-wire, slow moving stand, beaker, with capillary tube	10
6	Viscosity apparatus	Aspiratory bottle, cork, capillary tube, stopwatch, measuring jar. With stand to keep Aspiratory bottle	10

7	Boyle's law apparatus	Wide bore glass tube mounted vertically in front of a scale graduated 0 to 60cm Zero corresponds to the inside of the closed (top) end of the tube Air is confined in the tube by a coloured oil contained in a metal pressure chamber Pressure chamber is fitted with a Bourdon type gauge calibrated 0 to 3.5kg cm^2 (0 to 50 lb/in^2) actual pressure A valve is fitted to the air inlet tube from the pump As the pressure in the oil chamber is increased, oil level and its actual (total) pressure are directly indicated Tube is made of extra strong glass and is securely covered with transparent plastic on the front Overall height of apparatus approx. 690mm	05
8	Sonometer	Wooden box fixed with meter scale, pulley, metallic string, weight with weight hanger (500g each)	10
9	Resonance air column apparatus	Consists of a resonance tube brass N.P. 100cms, reservoir brass N.P. 250ml & meter scale both sides millimeters, which are mounted on wooden polished board. The reservoir is caged in wooden block that has sliding facility.	10
10	Electronic balance	0.1g accuracy 500g capacity	01
11	Tuning fork set	Set of eight tuning forks of different frequency blue steel(Ragg's type)	06

---0-0-0---

Government of Karnataka
Department of Technical Education, Bengaluru

Course: APPLIED SCIENCE LAB

Course code: 15SC04P

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	Mr. R B Pawar	Principal	Govt. Polytechnic, Bijapur
2	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
3	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
4	Dr. HanumanthaNayak	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
5	Ms. Bhagirathi B N	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru

`

Curriculum Review Committee

	Name	Designation	Institution
1	Mr. K.Nazeer Ahmed	Selection Grade Lecturer	Govt. Polytechnic, Mulbagilu
2	Mr. Liyakhat Ali Khan	Selection Grade Lecturer	S.J. Govt. Polytechnic, Bengaluru
3	Smt. Revathi	Selection Grade Lecturer	M.E.I. Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title:	**ELECTRICAL WIRING LAB**	Course Code	: **15EE12P**
Semester	: **I**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **0:2:4**	Credits	: **3 Credits**
Type of course	: **Tutorial + Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	: **50 Marks**

Pre-requisites	: Knowledge of modern science in secondary education.
Course Objectives	: To develop electrical wiring skills in students through systematic training that would enable the students to construct and test various electrical circuits using appropriate electrician tools, wires, protective devices and wiring accessories as per IS standards.

Course Outcome:

On successful completion of the Course the student will be able to:

1. Use appropriate electrician tools, wires, protective devices and wiring accessories.
2. Rig up wiring diagrams using conduit system of wiring.
3. Apply IS standards for electrical wiring.
4. Prepare different types of wiring joints.

Course Content:

TUTORIAL

Sl. No	Topic	Hours
1.	**Safety precautions and first aid** Draw standard electrical symbols related to electrical wiring. Understand the components of simple electrical circuit consisting of source , load , protective devices and measuring instruments. Identify open, close and short circuit.	6
2	**Identify different types of electrician tools** Combination plier, Cutting Plier, Nose plier, screw driver set, line tester , Poker, Hand Drill, Power Drill, Concrete Drill, Megger, Earth tester, Continuity tester, crimping tool, wire cutter , Wire splicer, wire stripper standard wire gauge, , soldering iron, wooden mallet ,ball pin hammer, testing board and multimeter. **Identify different types of wiring systems and their applications** Surface conduit , concealed conduit, PVC casing capping Types of wires, cables used for different current and voltage ratings	6
3	**Identify different wiring accessories and hardware items**	6

	SP, DP, ICDP, ICTP, change over switch, SPST, DPST,DPDT, TPST,TPDT, rotary switches , micro switches, modular switches, 2 pin socket ,3 pin socket, 2 pin plug top , 3 pin plug top, ceiling rose, round block, switch boards, switch plates, modular switch enclosures, blank insert gang box , junction box, fan box, saddles ,screws	
4	**Identify various safety devices** Types of fuse units and Materials for fuse wire, Glass cartridge fuse, types of HRC fuse, Kit kat fuse. Types of MCB, MCCB, RCCB, ELCB Types of Earthing- Pipe earthing , Plate earthing and Chemical earthing	3
	Total	**21**

CONDUCTING EXPERIMENTS

	List of graded exercises	Hours
1	Prepare the following joints . Straight joint , Tee joint, Britannia joint, Western union joint	09
2	Rig up a circuit to control three lamps in (a) series and (b) parallel using one SP switch.	03
3	Rig up a circuit to control one lamp from one place and test the wiring for phase control.	03
4	Rig up a circuit to control two lamps from two places independently	03
5	Rig up a circuit to control one lamp and a socket independently	03
6	Rig up a circuit to control one lamp from two place using two way switches (staircase wiring)	03
7	Rig up a circuit to control a fan using electronic regulator.	03
8	Wire up a fluorescent tube fitting, connect and test it.	03
9	Rig up a calling bell circuit with indicator to be operated from three different places using push button switches.	03
10	Connect a rotary switch to a two element heater to get low, medium and high effects.	03
11	Prepare a meter board for lighting installation using energy meter, fuse, MCB, DP switch ELCB and indicator	06
12	Connect different domestic appliances and measure the current drawn by them using tong tester.	06
13	Test the lighting installation for open circuit, short circuit, polarity, insulation resistance and earth fault.	09
	Total hours	**78**

Note:

1. All exercises to be done using surface conduit system
2. PVC casing capping may be demonstrated for any one of the exercises.

Resources:

1. Electrical trade practical's – NIMI
2. Electrical workshop practice – ANWANI.
3. Guidelines for Electrical wiring in residential buildings -www.st.gov.my/
4. General specifications for electrical works- www.cpwd.gov.in/
5. Code of practice for electrical wiring installations- www.law.resource.org
6. Electric supply and distribution code – www.kptcl.com

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	20
2	Understanding	20
3	Application/ Analysis	60
Total		**100**

Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome		Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Use appropriate electrician tools, wires, protective devices and wiring accessories.	Tutorial 1, 2, 3, 4	2, 3, 8, 9, 10	R/U/A	21
CO2	Rig up wiring diagrams using conduit system of wiring.	2 to 13	2, 3, 8, 9, 10	U/A	58
CO3	Apply IS standards for electrical wiring.	2 to 13	2, 3, 8, 9, 10	U/A	58
CO4	Prepare different types of wiring joints.	1	2, 3, 8, 9, 10	U/A	9

U-Understanding; A-application/ Analysis; App-Application

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Electrical Wiring Lab	-	**3**	**3**	-	-	-	-	**3**	**3**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Delivery:

The laboratory Course will be delivered through Tutorial, laboratory interaction, group discussion, practical exercises, instructions, assignments and viva voice.

Tutorial - 1Hr:

Staff-in-charge will;

1. Explain the concept and working of experiment to be conducted.
2. Impart/ discuss required selection of fuses, switches, devices/ meters /equipment / suitable accessories for the experiment to be conducted.
3. Ask students to draw the circuit diagram/ wiring diagram, tabular column and truth table if any.
4. Give clear instructions about safety precautions to be followed while conducting the experiment.

Conduction/ Execution- 2 Hr:

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Practical Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average marks of both the tests are considered)	10	Blue Books	1 to 4
		Classroom Assignments		Mini project	05	Models	1 to 4
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Record Book	1 to 4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	50	Answer Scripts at BTE	ALL COs
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feed Back Forms		1 – 4
	End Of Course Survey			End Of The Course	Questionnaire		All COs

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Suggested Student Activity:

Mini-Projects: Like preparing extension box, switch box and wiring models, simple panel board, and distribution board, building wiring of a lab/ room, etc.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

Scheme of Valuation:

Sl. no.	Performance	Max. Marks
1	Identify the electrician tools and components	**05**
2	Prepare the given type of Joint	**05**
3	Draw wiring diagram and write procedure (Only One Question to be given)	**10**
4.	Conduction	**15**
5	Result	**05**
6	Viva	**10**
	Total	**50**

Model Questions:

1. Identify the tools and components.
2. Prepare a straight joint.
3. Rig up a circuit to control three lamps in (a) series and (b) parallel using one SPS.
4. Rig up a circuit to control one lamp from one place.
5. Rig up a circuit to control two lamps from two places independently
6. Rig up a circuit to control one lamp and a socket independently
7. Rig up a circuit to control one lamp from two place using two way switches
8. Rig up a circuit to control one lamp from three places using intermediate switch.
9. Rig up a circuit to control a fan using electronic regulator.
10. Wire up a fluorescent tube fitting, connect and test it.
11. Rig up a calling bell circuit with indicator to be operated from three different places.
12. Connect a rotary switch to a two element heater to get low, medium and high effects.

List of Equipment:

(For a batch of 20 students)

Sl.no	Name of equipment	Qty
1	Wooden board 2'x 3'	20 Nos.
2	Electrician Tools	
	Screw driver 8",10",12"	10 Nos
	Combination plier 6",8"	10 Nos
	Neon tester	10 Nos
	Round nose plier 15cm	10 Nos
	Electrician knife 10cm	10 Nos
	Heavy duty screw driver 10",12"	10 Nos
	Nose fliers 6"	10 Nos
	B.P Hammer 1/2kg.1/4kg	10 Nos
	Cold chisel 15cm	10 Nos
	Tri square 15cm	10 Nos
	Former chisel 14cm,20cm,25cm	10 Nos
	Poker 15cm	10 Nos
	Hacksaw 30cm	10 Nos
	Hand drilling machine 6mm	02 Nos.
	Wire stripper 10cm	10 Nos
	Measuring tapes 5meter	02 Nos.
	Standard wire gauge.	02 Nos.
3	Wiring accessories	
	a) PVC conduit 1/2",3/4",1"	10 lengths each
	b) Saddles of assorted sizes	20 dozens
	c) Different Switches 5A, 230v	50 Nos.
	d) Different Sockets 5A, 230v	50 Nos.
	e) Different Holders 5A, 230v	50 Nos.
	f) Ceiling Roses	50 Nos.
	g) Wooden / PVC round blocks	50 Nos.
	h) Wires of different sq. mm 1.5sq.mm,2.5sq.mm,	50 Nos
	i) Different Gang boxes	50 Nos.
	j) Kit –Kat fuses5A, 230v	50 Nos.
	k) Screws of assorted sizes	200 Nos
	l) 7/18, 7/16 SWG Alu conductor PVC cable(for joints)	02 coils
	m) Fluorescent lamp fitting	10 Nos.
	n) Rotary switch	10 Nos.
	o) 1.5sqmm copper wire	04 coils
	p) Electronic regulator	05 Nos.
	q) Buzzer	05 Nos
4	Megger 500V	05 Nos.
5	Earth tester	02 Nos.
6	Tong tester	02 Nos.
6	AVO meters / multimeter	05 Nos.
7	Single phase energy meter 10 A 230 volts- analog type	05 Nos.
8	ELCB , 16 A single phase and three phase	02 Nos. each
9	16A , 32 A , 230 v different DP switches	05 Nos. each

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	**BASIC COMPUTER SKILLS LAB**	Course Code	: **15EE13P**
Semester	: **I**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **0:2:4**	Credits	: **3 Credits**
Type of course	: **Tutorial + Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	: **50 Marks**

Pre-requisites	**:** Knowledge of English comprehension
Course Objectives	**:** To provide practical knowledge about the Basics of Computers hardware and software, internet, email, and to solve exercises using the application tools like Word processor, Spread sheet and Presentation.

Course Outcomes:

After completion of the Course the student will be able to,

1. Identify Computer hardware parts and connect peripherals.
2. Install Operating Systems and Utility software.
3. Install and configure Printer and LAN card.
4. Use internet to search, download, and access email account.
5. Create documents on Word processor, Spread sheet, and Presentation applications.

LIST OF GRADED EXERCISES:

Computer hardware and software:-

1. Understand and identify Computer front panel switches and back panel connections and physical components of a Computer.
2. Create Icons, Folders, Creating/ Opening of file, Editing and saving the document, Copy, Cut and Paste operations on Operating System.
3. Install and Use the Utilities like pdf Reader, Zip tool, Audio/ Video players, etc.
4. Install any one Operating System.
5. Install and configure Printer and LAN card.
6. Create E-Mail account, Send & Check email, Search, Download and Upload an attachment.

Using Word Processor (select page A4, portrait, with margins)

7. Create a Business or Personal Letter using Italics, Bold, Fonts, Indent, Paragraph, etc.
8. Create a Company Letterhead using Tables, Text Box, Picture and Background.

9. Create a Simple Newsletter using 2 columns, Drop Cap, Pictures, etc.
10. Create a Resume or Curriculum Vitae using Bullets, Lines, Tables, etc.
11. Create an Invitation/ Greeting card.
12. Create the Cover page of a Project Report using Word Art, insert Picture Image.

Using Spread sheet

13. Create a worksheet with ten columns, each column for Sl. No., Register No., Student Name, and one column for each Course, enter ten student records and find the sum of all columns and rows using sum feature.
14. Create a worksheet containing the pay details of employees (containing Basic pay, DA, HRA, Medical allowance, with Deductions- PF, PT, Insurance) and find Gross and Net salary using different formulas.
15. Create a results sheet containing Candidate's Register No., Name, Marks for all Courses, Total Marks, Percentage and Result. Result must be calculated as below:
    Distinction if Total Percentage >= 70 %
    First Class if Total Percentage > = 60 % and < 70 %
    Second Class if Total Percentage >= 50 % and < 60 %
    Pass if Total Percentage >= 35 % and < 50 % provided the candidate has secured at least 35 marks in each Course or Fail otherwise.
16. Create a Simple Bar Chart and Pie Chart to highlight the sales of a company for three different periods, also give different colours and legends.

Using Presentation Tool,

17. Create a Presentation consisting of 6 slides about Computer hardware, Software, Peripheral devices (including Input and Output devices).
18. Create automated/ slide transition Presentation of six slides with timings & animation about Sources of Electrical Energy, Advantages and Applications.

Resources:

1. Computer Fundamentals Concepts, Systems, Application by D. P. Nagapal, S. Chand Publications, RP-2014, ISBN: 81-219-2388-3.
2. Fundamentals of Computers by V. Rajaraman and Neeharika Adabala, PHI Publications, 2015 Edition.
3. http://www.tutorialsforopenoffice.org/
4. http://www.libreoffice.org/get-help/documentation/

Software Tools: Any open source tool or equivalent proprietary tools

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	20
2	Understanding	20
3	Application/ Analysis	60
Total		**100**

Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome		Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Identify Computer hardware parts and connect peripherals.	1	2, 3, 8, 9, 10	R/U/A	6
CO2	Install Operating Systems and Utility software.	3,4	2, 3, 8, 9, 10	U/A	12
CO3	Install and configure Printer and LAN card.	5	2, 3, 8, 9, 10	U/A	6
CO4	Use internet to search, download, and access email account.	6	2, 3, 8, 9, 10	R/U/A	6
CO5	Create documents on Word processor, Spread sheet, and Presentation applications.	7,8,9,10, 11,12,13,14, 15,16,17,18	2, 3, 8, 9, 10	U/A	58

R- Remember, U-Understanding, A-Application

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Basic Computer Skills Lab	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
IF ≥40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Delivery:

The course will be delivered through tutorials (1 Hour) and hands on practice (2 Hours).

Tutorial - 1Hr:

Staff-in-charge will

1. Demonstrate the Computer hardware, software and give inputs for exercise solution.
2. Ask students to write down the steps for solution on above exercises.

Conduction/ Execution - 2 Hr:

Execute and solve/ create the exercise on Computer.

Course Assessment and Evaluation

	What		To Whom	Frequency	Practical	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average marks of both the tests will be computed)	10	Blue Books	1 to 5
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Lab Record	1 to 5
				Assignments	05	Log of Activity	1 to 5
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	50	Answer Scripts	ALL COs
Indirect Assessment	Student Feedback on course		Students	Middle of The Course	Feed Back Forms		All Cos
	End Of Course Survey			End of The Course	Questionnaire		All COs

Note: I.A. test shall be conducted as per SEE scheme of valuation. However the obtained marks shall be reduced to 10 marks. (Any decimals shall be rounded off to next higher digit).

Suggested Student Activity (any one to be submitted with 3 pages report):

1. Mini project on Computer hardware and Software.
2. Identify the faulty part in the PC and replace the same for its working.
3. Mini project on Super Computer and Server System.
4. Mini project on Computer configurations with different makes/ Manufacturer
5. Mini project on DTP using Computers.
6. Mini project on Computers available in the Institute with complete configurations.
7. Applications of Computers in Engineering field.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

Scheme of Valuation for SEE (Semester End Examination):

Scheme of Valuation for SEE

Sl. No.	*Particulars*	*Marks*
1.	Exercise on Computer Hardware or Software	10
2.	Exercise on Word / presentation	15
3.	Exercise on spreadsheet	15
4.	Viva-voce	10
	Total	**50**

Note: Question Paper will have ONE question on Graded exercises

MODEL QUESTION BANK

Computer hardware and software

1. For the given Personal Computer (PC), Identify and List out front panel switches, back panel connections, and internal & external physical components. Mention the functions of each component.
2. For the given Personal Computer, Create System Application Shortcut Icons on desktop, Folders and Sub-folders in D Drive for one Semester and the Courses demonstrating Copy, Paste, Rename, etc. operations.
3. Install and Use the Utilities like pdf Reader, Zip tool, Audio/ Video players, etc.
4. For the given PC, Install any one Operating System.
5. For the given PC, Install and configure Printer and LAN card.
6. Create E-Mail account, download, attach a document demonstrate to Send & Check e-mail.

Using Word Processor Application (select page A4, portrait, with 1" L-R-B-T margins),

7. Create a Business letter enquiring for Computer quotation demonstrating Italics, Bold, Fonts, Indent, Paragraph, etc.
8. Create a Personal Letter to your Polytechnic HOD/ Principal using Italics, Bold, Fonts, Indent, Paragraph, etc.
9. Create a Company Letterhead demonstrating Tables, Text Box, Picture and Background.
10. Create a Simple Newsletter using 2 columns, Drop Cap, Pictures, Tables, etc.
11. Create a Resume/ Curriculum Vitae using Bullets, Lines, Tables, etc.
12. Create an Invitation/ Greeting card using insert picture, text box, map, etc.

13. Create the Cover page of a Project Report using Word Art, insert Picture Image.

Using Spread sheet Application,

14. Create a worksheet with ten columns, each column for Sl. No., Register No., Student Name, and one column for each Course, enter ten student records and find the sum of all columns and rows using sum feature.
15. Create a worksheet containing the pay details of Ten employees (containing Basic pay, DA, HRA, Medical allowance, with Deductions- PF, PT, Insurance) and find Gross and Net salary using different formulas.
16. Create a results sheet containing Candidate's Register No., Name, Marks for all Courses, Total Marks, Percentage and Result. Result must be calculated as below:
    Distinction if Total Percentage >= 70 %
    First Class if Total Percentage > = 60 % and < 70 %
    Second Class if Total Percentage >= 50 % and < 60 %
    Pass if Total Percentage >= 35 % and < 50 % provided the candidate has secured at least 35 marks in each Course or Fail otherwise.
17. Create a Simple Bar Chart to highlight the sales of Anchor Switch Company for three different periods, also give different colours and legends.
18. Create a Pie Chart to highlight the sales of a Finolex Cable/ Wire Company for three different periods, also give different colours and legends.

Using Presentation Application Tool,

19. Create a Presentation with minimum 6 slides about Computer hardware, Software, Peripheral devices (including Input and Output devices).
20. Create an automated/ slide transition Presentation of six slides with timings & animation to present Sources of Electrical Energy, Advantages and Applications.

COMPUTER LAB REQUIREMENT

Students Intake : 60 Students per Batch : 20

Sl. No.	Equipment Details	Specifications	Required Quantity
1	Personal Computers	Intel Core i5- 4th Generation- Processor, 3 GHZ, 4GB DDR3 RAM 1 TB Hard Disk DVD R/W Drive ATX Cabinet 19.5'' LED Monitor Multimedia Keyboard 104 keys, Optical Mouse, Multimedia Speakers	20
2	Anti-Virus Software with Internet Security	20 Users	20
3	Laser Jet Printers	Multi-function All in-One Printer (Including Scanner)	05
4	Laser Jet Printers	Printer	05
5	LAN Switch for Networking	LAN Switch for Networking – 20 Computers	5
6	UPS with Batteries	5 KVA UPS with Batteries 140 A-Hr,4 Hrs Backup	2
7	Software's	[Open Office/ Libre-Office] Office Package (Word Processing, Spread sheet, Database, and Power Point) PDF Reader, Zip tool, Audio/ Video Players	20
8	Air Conditioning System	1 Tonne	2
9	LCD Projectors with Screen	With Illumination Bulb capacity 1000 W	5

GOVERNMENT OF KARNATAKA
DEPARTMENT OF TECHNICAL EDUCATION
Board of Technical Examinations, Bengaluru

Course Title	: **COMMUNICATION SKILLS IN ENGLISH**	Course Code	: **15CP01E**
Semester	: **I / II**	Course Group	: **Core**
Teaching Scheme (L:T:P)	: **4:0:0** (in hours)	Credits	: **4 Credits**
Type of course	: **Theory**	Total Contact Hours	: **52**
CIE	: **25 Marks**	SEE	: **100 Marks**

Pre-requisites:

- Basic Knowledge of Grammar
- Listening, Speaking, Reading and Writing Skills as acquired in Secondary Education

Course Objectives:

The students shall be able to:

- Learn to apply the basic grammar in day to day communication in English
- Comprehend the given ideas in a passage and be able to effectively express the same in written form
- Enrich their vocabulary through reading
- Face oral examinations and interviews
- Express their ideas creatively through (spoken/written) exercises

Course Delivery:

The Course will be delivered through lectures, class room interactions, exercises and case studies as detailed below:

Sl. No.	Description	Teaching contact hours
1.	Text	24
2.	Grammar	18
3.	Descriptive writing	5
4.	Comprehension	5
Total		**52**

Text book: Communication Skills in English for Polytechnics – by **ORIENT BLACKSWAN** publishers – published by NITTTR Chennai

Course Content:

UNIT I: CAREER PLANNING (09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Spelling; Grammar- Parts of Speech; Newspaper Reading and Comprehension; Descriptive Writing – Describing Objects; Listening/ Speaking Exercise – Self Introduction.

UNIT-II: THE GREAT INDIAN PSYCHOTHERAPY (09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Prefixes and Suffixes; Grammar – Articles and Prepositions; Descriptive Writing – Describing People; Listening/ Speaking Exercises – Listening to speeches and writing gist of it in one's own words.

UNIT III: GLOBAL WARMING (08Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Synonyms and Antonyms; Grammar – Auxiliaries, Question Tags and Short-form Answers; Descriptive Writing – Describing Places; Listening/ Speaking Exercises – Narrating one's own experiences of different situations in their day- to-day life.

UNIT IV: RENDEZVOUS WITH A WOMAN CORPORATE GIANT (09Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Homonyms, Homophones, Homographs; Grammar – Subject-Verb Agreement; Descriptive Writing – Describing Processes; Listening/ Speaking Exercises – A short presentation on a given topic ;Paraphrasing of Proverbs; Different kinds of Interviews.

UNIT V: A UNIQUE PATIENT (09 Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Compound words; Grammar –Tenses; Descriptive Writing – Describing Events (Eg: College Day, National Festivals, Etc.); Comprehension of a paragraph; Quiz – Questions on health and hygiene.

UNIT VI: A FARMER'S WIFE (08 Hrs)

Glossary; Comprehension Exercises; Vocabulary Exercises – Formation of plurals; Grammar – Active and Passive Voices; Descriptive Writing – Describing one's goal and its attainment; Developing hints into a paragraph; Comprehension of an unseen passage.

Reference Books:

1. **HIGH SCHOOL ENGLISH GRAMMAR AND COMPOSITION** BY WREN AND MARTIN (S.CHAND & CO.)
2. **THE KING'S GRAMMAR** BY SANJAY KUMAR SINHA (S.CHAND & CO.)
3. **STRENGTHEN YOUR WRITING** BY V.R. NARAYANA SWAMY (ORIENT BLACKSWAN)
4. **ESSENTIAL ENGLISH** BY E. SURESH KUMAR et.al (ORIENT BLACKSWAN)
5. **ENGLISH GRAMMAR &COMPOSITION AND EFFECTIVE BUSINESS COMMUNICATION** BY M.A.PINK AND THOMAS S.E. (S.CHAND & CO.)
6. **WHAT YOUNG INDIA WANTS: SELECTED ESSAYS AND COLUMNS** BY CHETAN BHAGAT (RUPA PUBLICATION, NEW DELHI)
7. **CHICKEN SOUP FOR THE INDIAN DOCTOR'S SOUL** BY JACK CANFIELD et.al (WESTLAND LIMITED PUBLISHERS)
8. **SOFT SKILLS** BY K. ALEX**(**S.CHAND AND COMPANY)
9. **"REFLECTIONS":** I PUC ENGLISH COURSE BOOK, PUBLISHED BY DEPT.OF PRE-UNIVERSITY EDUCATION, GOVT OF KARNATAKA
10. **A PRACTICAL COURSE FOR WRITING SKILLS IN ENGLISH**BY J.K.GANGAL. (PHI PUBLICATIONS)
11. **ENGLISH LANGUAGE LABORATORIES** – A COMPREHENSIVE MANUAL BY NIRA KONAR (PHI LEARNING)

Course outcomes:

On successful completion of the course, the student will be able to:

1. Read their text, and respond to basic comprehension questions
2. Enhance the students' English grammar skills by using the following grammatical components in written and verbal communication
    - Parts of speech
    - Auxiliaries
    - Articles
    - Tenses
    - Active and Passive voice
    - Prepositions
    - Question Tags and Short form answers
    - Prefixes and Suffixes
    - Subject-Verb Agreement
    - Homonyms/Homophones/ Synonyms /Antonyms
3. Communicate an idea in series logically connected sentences by describing an event such as objects, people, places, processes, expanding proverbs and also conducting activity such as group discussion, presentation, reporting and documentation
4. Comprehend the given passage and able to answer the linked questions

Mapping Course Outcomes with Program Outcomes:

CO –PO Mapping

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Read their text, and respond to basic comprehension questions	5, 6, 7,9	R/U	24	30	25	-	55
CO2	Enhance the student English grammar skills by using the following grammatical components in written and verbal communication • Parts of speech • Auxiliaries • Articles • Tenses • Active and Passive voice • Prepositions • Question Tags and Short form answers • Prefixes and Suffixes • Subject-Verb Agreement • Homonyms/Homophones/ Synonyms /Antonyms	9	U/A	18	-	16	25	41
CO3	Communicate an idea in series logically connected sentences by describing an event such as objects, people, places, processes, expanding proverbs and also conducting activities such as group discussion, presentation, reporting and documentation	7,8,9,10	U/A	7	-	-	15	15
CO4	Comprehend the given passage and able to answer the linked questions	8,9,10	U/A	3	-	10	-	10
		Total Hours of instruction		52	Total marks			121

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Program Outcomes									
	1	2	3	4	5	6	7	8	9	10
COMMUNICATION SKILLS IN ENGLISH	-	-	-	-	**3**	**3**	**3**	**1**	**3**	**1**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Question Paper Blue Print:

Course: COMMUNICATION SKILLS IN ENGLISH
Course code: 15CP 01E

Sl. No.	Content	Knowledge	Comprehension	Application	Total
1.	**TEXT**				**55**
a	Lesson	30	25		
2.	**GRAMMAR**				**41**
a	Parts of speech			4	4
b	Auxiliaries: Primary and Modals			3	3
c	Articles			3	3
d	Identification of tenses			4	4
e	Active and Passive voice			4	4
f	Prepositions	4			4
g	Question tags			3	3
h	Short form answers			2	2
i	Prefixes and Suffixes	2			2
j	Homonyms/Homophones/	4			4
k	Synonyms and Antonyms	4			4
l	Agreement of the Verb with its Subject	4			4
3.	**DESCRIPTION WRITING**				**15**
a	Descriptive writing – Describing objects, people and places, Process and Events			15	
4.	**COMPRHENSION**				**10**
a	Comprehension of an unseen passage		10		
	Total	**48**	**35**	**38**	**121**

Question Paper Pattern:

Sl. No.	Source	Question	Type	Marks
1.	Textual Units	Answer any twelve of the following questions in one or two sentences each	15 questions to be asked from 6 Textual Units	12 x 2 = 24
2.	Textual Units	Write short notes on any three of the following	5 questions to be asked from 6 Textual Units	3 x 5 = 15
3.	Grammar	Identify the parts of speech of the underlined words	4 sentences are to be given and word to be identified is underlined	4 x 1= 4
4.	Grammar	Fill in the blanks using suitable Auxiliaries	3 sentences are to be given.	3 x 1= 3
5.	Grammar	Fill in the blanks using suitable Articles	3 sentences are to be given	3 x 1=3
6.	Grammar	Identification of Tenses	4 sentences are to be given	4 x 1= 4
7.	Grammar	Active and Passive Voice: Change the voice of the verb in the following sentences	4 sentences are to be given for changing the voice of the verb	4 x 1= 4
8.	Grammar	Prepositions: Fill in the blanks with appropriate prepositions	4 sentences are to be given	4 x 1= 4
9.	Grammar	Question Tags: Add question tags	3 sentences are to be given	3 x 1= 3
10.	Grammar	Short form answers: Give short form answers	2 sentences are to be given	2 x 1= 2
11.	Grammar	Prefixes and Suffixes: Add Prefixes/Suffixes to the stem words	2 stem words are to be given	2 x 1= 2
12.	Grammar	Homonyms, Homophones and Homographs: Use the following words in your own sentences.	4 words are to be given	4 x 1= 4
13.	Grammar	Synonyms / Antonyms: Give the	2 words each are to be given	

		Synonyms/Antonyms for the following words		2 x 1= 2
14.	Grammar	Agreement of the Verb with its Subject: Fill in the blanks with verbs that agree with their subjects	4 sentences are to be given	4 x 1= 4
15.	Composition	Descriptive Writing: Describe objects, people, places and processes	3 questions are to be given	2 x 5 = 10
16.	Composition	Comprehension of an unseen passage: Read the following passage and answer the questions that follow	Questions to be set for 10 marks	10
	Total	-	-	100

Guidelines for Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weightage of marks fixed for each category. (As per model question paper)
2. The question paper pattern provided should be adhered to.
3. Care must be taken so that there is only one possible answer for all ‘fill in the blanks’ questions.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	I A Tests	Students	Three tests (average of three tests will be computed)	20	Blue Books	1 and 2
		Class room Assignments		Any one Activity(*)	05	Log of Activity	3
				TOTAL	**25**		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts at BTE	1 to 4
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 3 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 4 Effectiveness of delivery of instructions and assessment

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit. Any decimals shall be rounded off to the next higher digit. **Eg: 15.1** should be rounded of to **16**.

* Class room Assignments: Evaluated for any ONE activity

Suggested list of Tutorial Exercises leading to the Development of Speaking Skills

1. Introducing oneself
2. Discussion about weather
3. Discussion about hobbies
4. Discussing holiday plans
5. Telephonic conversation
6. Talking about favorite sports, movie, TV shows etc.
7. Description about one's goal and its attainment.

8. Any other topic of your/students' choice.

MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY

RUBRICS FOR ACTIVITY(5 Marks)						
Dimension	**Unsatisfactory**	**Developing**	**Satisfactory**	**Good**	**Exemplary**	**Student Score**
	1	**2**	**3**	**4**	**5**	
Speaks on the given topic	Does not perform any duties assigned to them	Performs very few duties but unreliable	Performs very few duties	Performs nearly all duties	Performs all duties assigned	Ex: 4
Students' Enunciation	Does not enunciate clearly	Enunciation not up to the mark	Enunciation adequate	Enunciation above average	Enunciation extremely good	3
Presentation Skills	Poor presentation	Scope for improvement	Average presentation skills	Presentation effective	Excellent Presentation	2
Submission of Assignment	Does not collect any information relating to the topic	Collects very limited information	Collects some information	Collects much information	Collects a great deal of information	5
Average / Total marks = (4+3+2+5) /4 = 14/4= 3.5 = 4						**4**

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (course coordinator) for assessing the given activity.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1.	Remembering	42
2.	Understanding the course	25
3.	Applying the knowledge acquired from course	33

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/ Date and Time	Semester/ Year	Course / Course Code	Max. Marks
Ex: I test/6 th week of sem. 10-11 a.m.	I/II SEM	COMMUNICATION SKILLS IN ENGLISH	20
	Year: 2015-16	Course Code:15CP01E	

Name of Course Coordinator : **Units: 2 CO's: 2**

Question No.	QUESTIONS	MARKS	CL	CO	PO
I	**Answer any <u>five</u> of the following in one or two sentences each:** 1. What do you mean by career? 2. Define 'Career Planning'? 3. What should be the major focus of career planning? 4. What are the questions often asked by the young? 5. What are the three traits as identified by the author? 6. How have the content of our films changed? 7. What has startled global experts?	5x 2 = 10	R/U	1	5,7,9
II	**<u>Grammar:</u>** **1. Identify the parts of speech of the underlined words:** a. **<u>All</u>** spoke in his favour. b. Let us **<u>even</u>** the ground. **2. Fill in the blanks with suitable articles:** a. Charlie is ___ European. b. She is ____untidy girl. **3. Fill in the blanks with appropriate prepositions:** a. Caesar was killed ____Brutus____ a dagger. b. We arrived____ Belagavi_____6 o' clock. **4. Add Suffix and Prefix to the following:** _____ nation_____	**2 x 1 = 2** **2 x 1 =2** **4 x 1 = 4** **2 x 1 = 2**	U /A	2	9

Sources:

UNIT 1: CAREER PLANNING: **SOFT SKILLS** -BY DR. K. ALEX

UNIT 2: THE GREAT INDIAN PSYCHOTHERAPY: **WHAT YOUNG INDIA WANTS: SELECTED ESSAYS AND COLUMNS** - BY CHETAN BHAGAT

UNIT 3: GLOBAL WARMING: AN ESSAY BY DR. B.M.RAVINDRA, RETD. DY. DIR., DEPT. OF MINES AND GEOLOGY

UNIT 4: RENDEZVOUS WITH A WOMAN CORPORATE GIANT**: ESSENTIAL ENGLISH** BY E. SURESH KUMAR et.al.

UNIT 5: A UNIQUE PATIENT: **CHICKEN SOUP FOR THE INDIAN DOCTOR'S SOUL** - BY JACK CANFIELD et.al.

UNIT 6: A FARMER'S WIFE: **REFLECTIONS:** I PUC ENGLISH COURSE BOOK, PUBLISHED - BY DEPT. OF P.U. EDUCATION, GOVT. OF KARNATAKA

Government of Karnataka
Department of Technical Education, Bengaluru

Course: COMMUNICATION SKILLS IN ENGLISH

Course code: 15CP 01E

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1.	Mrs. Geetha K.	Selection Grade Lecturer	GRICP, Bengaluru
2.	Mr. C.V. Inamdar	Selection Grade Lecturer	Govt. Polytechnic, Belagavi
3.	Mrs. Bharathi Naik	Selection Grade Lecturer	Women's Polytechnic, Mangaluru
4.	Mrs. Rajyashree Srikant	Selection Grade Lecturer	Govt. Polytechnic, Bagepalli
5.	Mrs. Sunitha M.N.	Selection Grade Lecturer	HMS Polytechnic, Tumakuru
6.	Mr. Deepak Dongre	Selection Grade Lecturer	Govt. Residential Women's Polytechnic, Shivamogga

Review committee

	Name	Designation	Institution
1.	Mrs. Rajyashree Srikant	Selection Grade Lecturer	Govt. Polytechnic, Bagepalli
2.	Mrs. Shailaja D.	Lecturer	Women's Polytechnic, Bengaluru

Model Question Paper:

Code: 15CP 01E

I / II Semester Diploma Examination

COMMUNICATION SKILLS IN ENGLISH

(Common to all Diploma programmes)

Time: 3 Hours] **[Max. Marks: 100**

Note:

(i) Answer all the questions as directed.
(ii) Spelling and grammatical errors shall be penalized.
(iii) Answers to Question No. I and II are based on the prescribed text.

I. Answer any TWELVE of the following in one or two sentences each: **2 x 12 = 24**

1. What do you mean by career?
2. Define 'Career Planning'?
3. What should be the major focus of career planning?
4. What are the questions often asked by the young?
5. What are the three traits as identified by the author?
6. How have the content of our films changed?
7. What is Global Warming?
8. How does Global Warming occur?
9. What are the major causes for Global Warming?
10. What was the usual talk when the parents of the children met?
11. What ambition did Nooyi's mother have for her daughter?
12. Who is the sinner according to the poem?
13. Why did the farmer commit suicide?
14. Explain in your own words the reason for the farmer's visit to the clinic.
15. Describe how the doctor fixed the bull's tooth.

II. Write short notes on any THREE of the following: **5 x 3 = 15**

1. How does career planning play a major role in making career choices?
2. How does our environment contribute to our numbness to injustice?
3. Explain in your own words the traditional and modern views of one or two facts expressed in the interview?
4. Explain in your own words the reason for the farmer's visit to the clinic.
5. Why does the farmer's wife resolve to live?

III. GRAMMAR:

1. **Identify the parts of speech of the underlined words:** **4 x 1= 4**
   a. **<u>All</u>** spoke in his favour.
   b. Let us **<u>even</u>** the ground.
   c. I can **<u>shift</u>** for myself.
   d. She lives in **<u>luxury.</u>**

2. **Fill in the blanks with suitable auxiliaries:** **3 x 1 =3**
   a. You _____ not use calculators in the exam hall.
   b. _____I come in sir?
   c. _____ you lend me your scooter?

3. **Fill in the blanks with suitable articles:** **3 x 1 = 3**
   a. Charlie is ___ European.
   b. She is ____untidy girl.
   c. What is ____matter?

4. **Identify the tense of the verbs in the following sentences:** **4 x 1 = 4**
   a. I am writing a letter.
   b. Sun rises in the east.
   c. I have done my homework.
   d. She has been learning western music.

5. **Change the voice of the verb in the following sentences:** **4 x 1 = 4**
   a. Who did this?
   b. The money was lost.
   c. The cat is chasing the mouse.
   d. He was made the king.

6. **Fill in the blanks with appropriate prepositions:** **4 x 1= 4**
   a. Caesar was killed ____Brutus____ a dagger.
   b. We arrived____ Belagavi_____6 o' clock.

7. **Add suitable question tag:** **3 x 1=3**
   a. You were late this morning,_____?
   b. I did not hurt you, _____?
   c. Your father is a doctor, _____?

8. **Give short form answers for the following:** **2 x 1=2**
   a. Does your father smoke? (Negative)
   b. Have you read today's newspaper? (Affirmative)

9. **Add Suffix and Prefix to the following:** **2 x 1= 2**
   a. _____ nation_____

10. **Frame sentences using each word to bring out the difference in meaning clearly:**

4 x 1 = 4

a. (i) Sight (ii) Site
b. (i) Present (ii) Present

11. Give Synonyms to the following words: **2 x 1=2**

a. Teach
b. Agree

12. Give Antonyms to the following words: **2 x 1 = 2**

a. War
b. Happy

13. Fill in the blanks with verbs to agree with their subjects: **4 x 1 = 4**

a. Twenty kilometers _____not a long distance.
b. Either you or I_____ mistake.
c. Gold and Silver_____ precious metals
d. The captain with his team _____arrived.

IV. COMPOSITION: (Answer any <u>two</u> in 80 -100 words each) **5 x 2 = 10**

1. Describe your favorite tourist place.
2. Describe the process of preparing tea.
3. Expand – Work is worship.

V. **COMPREHENSION:**

Read the following passage and answer the questions that follow:

She was all of one-and-a-half years old. Two nurses were holding her down while a third was trying to insert a syringe into a vein to get a blood sample. She was crying loudly, but I was crying even louder. We had no option. It was the fifth day and the fever had not broken; it was imperative that we run the test to rule out typhoid. They finally asked me to leave the room, not just because they were embarrassed at a grown-up crying, but because they thought it would be easier and quicker for the child if the mother was not in the room. They got her out within a few minutes. She jumped into my arms and gave a few more loud wails. Fresh tears streamed down my eyes as we made our way out of the wretched pathology lab. Her paediatrician was getting into the building just then. Between sobs I told him how my daughter had flung the syringe and the lab had to have three attendants on her to collect the sample. As I was talking, my voice broke. To my surprise, Dr. Patel handed me his briefcase and stethoscope, took my girl in his arms and went to the store just a few paces away. He bought her a Cadbury bar and my daughter's face lit up like a million bucks. Gone were the tears, the memory of the syringe, smell of antiseptic, cotton …everything receded to the background as she un wrapped the big bar with her tiny fingers and dug into it with all her heart. I smiled as the angelic doctor handed me my princess.

Meanings of difficult words:

1. **Imperative:** absolutely essential
2. **Wretched:** miserable; unpleasant
3. **Pathology lab:** where the causes and effects of diseases are studied
4. **Receded:** moved back gradually
5. **Paediatrician:** children's doctor
6. **Flung:**(past tense of fling) an act of throwing violently
7. **Attendants:** one who attends

Questions:

1.	How old was the child?	1
2.	What did the nurses have to do to get a blood sample?	2
3.	Why was the mother asked to leave the room?	2
4.	Why does the mother called the pathology lab 'wretched'?	2
5.	How did Dr. Patel calm down the little girl?	2
6.	Suggest a suitable title for this passage.	1

****

Model Question Bank:

Course Title :**COMMUNICATION SKILLS IN ENGLISH**	Course Code: **15CP01E**

I. ANSWER IN ONE OR TWO SENTENCES EACH:

1. What do you mean by career?
2. Define 'Career Planning'?
3. What should be the major focus of career planning?
4. List out the benefits of career planning?
5. Identify the guidelines for choosing a career?
6. What are the frequently asked questions about career fields?
7. How do connections help in searching for a suitable job?
8. What are the sample questions asked about a particular job title?
9. What is the role of a career counselor in charting out a career path?
10. List out the factors influencing career decisions?
11. What has startled global experts?
12. What are the questions often asked by the young?
13. What are the three traits as identified by the author?
14. How have the content of our films changed?
15. In what way have we been exposed to corruption from our childhood?

16. How can we contribute to India's progress?
17. What is global warming?
18. How does global warming occur?
19. What are the major causes for Global Warming?
20. What is the quantity of fossil fuel burnt each year?
21. How does the concentration of carbon dioxide in the air increase?
22. Define Greenhouse effect?
23. By burning forests around the world, how much carbon dioxide is added to the atmosphere?
24. What are the steps to be taken to save our environment?
25. What is the possible problem of global warming and its result?
26. What is the effect of global warming?
27. What was the usual talk when the parents of the children met?
28. What ambition did Nooyi's mother have for her daughter?
29. How did Nooyi's mother threaten Nooyi?
30. What good news did Indra Nooyi want to share with her mother?
31. What did Nooyi's mother say when she was told the good news?
32. What lesson did Nooyi learn from her mother?
33. Why does Nooyi's mother take full credit for Nooyi's success?
34. What does Indra Nooyi discover about the language of business in the U.S?
35. What does Indra Nooyi think about herself as a mother?
36. What is the secret of Indra Nooyi's success?
37. How does Indra Nooyi manage time?
38. What is Indra Nooyi's passion?
39. Describe the farmer who visited the dentist's clinic.
41. What was the curious act of the farmer?
42. What request did the farmer make?
43. Why did the doctor almost 'faint in shock'?
44. What did the farmer say when he came back to the clinic?
45. Who do 'you' and 'I' in the poem refer to?
46. Who is the sinner according to the poem?
47. Why did the farmer commit suicide?
48. Explain the meaning of the phrase 'you crossed over'.
49. What are the contrasts depicted by the writer between the farmer's wife and her husband?
50. What memories of her husband trouble her now?

II. ANSWER IN A PARAGRAPH OF NOT MORE THAN 100 WORDS EACH:

1. Write a short note on Guidelines for Choosing a Career.
2. How does career planning play a major role in making career choices?
3. Explain in your own words the first trait of our psyche.
4. How does our environment contribute to our numbness to injustice?
5. Describe the divisiveness that the author talks about**.**
6. What are the causes and effects of global warming?
7. How does deforestation affect our environment?

8. What information do you gather about Indra Nooyi after going through the interview with Nandan Nilekani?

9. How did Indra Nooyi's mother try to teach her the role of a woman in a family? Do you agree with her?
10. How do you think Indra Nooyi's mother and her husband contribute to her success?
11. What does Indra Nooyi mean when she says "I have to decide every moment in time whether I am going be a mother or a wife or an executive"?
12. Explain in your own words the traditional and modern views of one or two facts expressed in the interview?
13. Explain in your own words the reason for the farmer's visit to the clinic.
14. Describe how the doctor fixed the bull's tooth.
15. Describe the lament of the farmer's wife on her husband's death?

III.GRAMMAR:

1. Fill in the blanks with suitable articles:

a. Dr. Sanjay is ___ dentist.
b. My friend is ___ MLA.
c. Have you ever visited___ Himalayas?
d. Please bring me ___ cup of coffee.
e. He is ___untidy boy.
f. She is __backbone of her organization.
g. He is ___ honour to his profession.
h. Raghu is going to___ mall.
i. ____world is ___happy place.
j. I met___ European at ___ party in ___ friend's house.

2. Fill in the blanks with suitable prepositions:

a. She works __ a big shop __ Jayanagar.
b. There is a book ___ the floor. Put it __ the table.
c. I often see Mrs. Dixit __ the station, waiting __ her train.
d. Mangalore is __ the coast __ the south __ India.
e. My daughter isn't __ work today because she isn't feeling well.
f. There were several people __ the bus stop.
g. Mr. and Mrs. Sharma were __ the shop talking __ the assistant.
h. Yesterday we spent the day __ the country.
i. We had lunch __ a pretty little village.
j. When I was __ the bus stop this morning; I saw two boys __ the church roof.

3. Add appropriate prefixes to form new words:

a. form b. regular c. literate d. accurate e. operate
f. pure g. fix h. technic i. tone j. national

4. Add appropriate suffixes to form new words:

a. rich b. love c. start d. beauty e. differ
f. use g. cheer h. attract i. save j. slow

5. Give the synonyms of the following:

a. release b. arrive c. trap d. happinesse. e. large
f. teach g. change h. confusion i. discover j. charge

6. Give the antonyms for the following:

a. rise b. increase c. smiled. d. strict. e.sadness
f. full g. host h. success i. discover j. charge

7. Add the correct question tags to the following statements:

a. It is cold,_____?
b. But it isn't as cold as yesterday, ____?
c. It was very cold yesterday,_____?
d. It hasn't been so cold for a long time, ____?
e. It is snowing in the north, ____?
f. It often snows there, ____?

8. Give short form answers for the following:

a. Does Renu work hard?_____._____.
b. Can you swim?_____._____.
c. Are you angry with me?_____._____.
d. Do you like watching movies?_____._____.
e. Have you met our Prime Minister?_____._____.

9. Fill in the blanks with appropriate words from the brackets:

a. His father-in-law owns a _____ farm. (dairy/diary)
b. Diabetics must take extra care of their _____. (feat/feet)
c. Rekha is a popular ____ of Bollywood.(heroin/heroine)
d. The country was prosperous during the_____of Krishnadevaraya.(rein/reign/rain)
e. You should be_____ in the class. (quite/quiet)

10. Differentiate between the following pairs of words by using each of them in a sentence of your own:

a. Wrong, rung b. Principal, principle c. Hair, hare
d. Gate, gait. e. Sea, see f. Fair, fare
g. Some, sum. h. Sell, cell i. Weather, whether
j. Birth, berth k. Vacation, vocation l. Bear, bare

11. Fill in the blanks with verbs to agree with their subjects:

a. Every seat in the bus ____ taken.
b. All the seats in this bus ____ reserved.
c. One of my friends _____ visiting me this week end.
d. Neither Gopal nor Deepak ____ come today.
e. The Captain of Indian team as well as his players ____ staying here.
f. Intelligence and hard work _____ required to get good marks.
g. Mathematics ____ my favourite subject.
h. _____ your father and mother at home?

12. Identify the tense of the verbs in the following in the sentences.

a. He was listening to her attentively.
b. Raghu denies stealing my purse.
c. She has bought a flat near my house.
d. Kiran fought bravely.
e. The teachers are discussing the details of the annual day function.
f. I am not trying to copy you.
g. Sushma was cooking pasta.
h. The students have been waiting eagerly for the results.
i. Risheeba speaks Tamil very fluently.
j. I have been waiting for her for over an hour.

13. Change the voice:

a. Ramu was making a kite.
b. Close the door.
c. Cable wires have been cut.
d. We prohibit smoking.
e. Everyone loves him.
e. My watch was lost.
f. He was refused admission.
g. Do not insult the poor.
h. Without effort nothing can be gained.
i. They made him captain.

****

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: **ENGINEERING MATHEMATICS – II**		Course Code	: **15SC02M**
Semester	: **II**	Course Group	: **Core**
Teaching Scheme (L:T:P)	: **4:0:0**(in hours)	Credits	: **4 Credits**
Type of course	: **Lecture + Assignments**	Total Contact Hours	: **52**
CIE	: **25 Marks**	SEE	: **100 Marks**
Programmes: **Common to all Engineering Diploma Programmes**			

Pre-requisites:

Engineering Mathematics-I, in First Semester Diploma curriculum.

Course Objectives:

1. Apply the concept of straight line and conic section in engineering field.
2. Determine derivatives of functions involving two variables.
3. Apply the concepts of differentiation in physics and engineering courses.
4. Evaluate the integrals of functions of two variables.
5. Apply the concepts of definite integrals and its application over a region.
6. Solve the ODE of first degree, first order in engineering field.

Course Contents:

Topic and Contents	Hours	Marks
Unit-1: COORDINATE GEOMETRY	08hr	23
a. **Straight lines:** Different forms of equations of straight lines: $y = mx + c$, $y - y_1 = m(x - x_1)$, $y - y_1 = \left(\frac{y_2 - y_1}{x_2 - x_1}\right)(x - x_1)$. General equation of a line$ax + by + c = o$ (graphical representation and statements) and problems on above equations. Equation of lines through a point and parallel or perpendicular to a given line. Problems.	04 hr	
b. **Conic Section:** Definition of conic section. Definition of axis, vertex, eccentricity, focus and length of latus rectum. Geometrical representation of parabola, ellipse and hyperbola: Equations of parabola$y^2 = 4ax$,	04hr	

Equation of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$and Equation of hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$(without proof of above 3 equations). Equations of parabola, ellipse and hyperbola with respect to x-axis as axis of conic. Finding axes, vertices, eccentricity, foci and length of lattice rectum of conics. Problems on finding the above said equations with direct substitution.		
UNIT – 2: DIFFERENTIAL CALCULUS	15hr	39
Differentiation. Definition of increment and increment ratio. Definition of derivative of a function. Derivatives of functions ofx^n, $\sin x$, $\cos x$and $\tan x$with respect to 'x' from first principle method. List of standard derivatives of $\text{cosec}x$, $\sec x$, $\cot x$, $\log_e x$, a^x, e^x.....etc. Rules of differentiation: Sum, product, quotient rule and problems on rules. Derivatives of function of a function (Chain rule) and problems. Inverse trigonometric functions and their derivatives. Derivative of Hyperbolic functions, Implicit functions, Parametric functions and problems. Logarithmic differentiation of functions of the type u^v,where u and v are functions of x.Problems. Successive differentiation up to second order and problems on all the above types of functions.		
UNIT – 3: APPLICATIONS OF DIFFERENTIATION.	07hr	17
Geometrical meaning of derivative. Derivative as slope. Equations of tangent and normal to the curve y = f(x) at a given point- (statement only). Derivative as a rate measure i.e.to find the rate of change of displacement, velocity, radius, area, volume using differentiation. Definition of increasing and decreasing function. Maxima and minima of a function.		
UNIT-4: INTEGRAL CALCULUS.	12hr	30
Definition of Integration. List of standard integrals. Rules of integration (only statement) 1.$\int kf(x)dx = k\int f(x)dx.$ 2.$\int \{f(x)\pm g(x)\}dx = \int f(x)dx \pm \int g(x)dx$ problems. Integration by substitution method. Problems. **Standard integrals of the type**		

1. $\int \frac{dx}{x^2+a^2} = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right)+c$ 2. $\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}\left(\frac{x}{a}\right)+c$. 3. $\int \frac{dx}{x\sqrt{x^2-a^2}} = \frac{1}{a}\sec^{-1}\left(\frac{x}{a}\right)+c$ (1 to 3 with proof) 4. $\int \frac{dx}{x^2-a^2} = \frac{1}{2a}\log\left(\frac{x-a}{x+a}\right)+c$ if x > a > 0. 5. $\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\log\left(\frac{a+x}{a-x}\right)+c$ if a > x > 0. (4 & 5 without proof) and problems on above results Integration by parts of the type $\int x^n e^x dx$,$\int x\sin x dx$, $\int x\cos x dx$, $\int x\log x dx$, $\int \log x dx$, $\int \tan^{-1} x\, dx$, $\int x\sin^2 x\, dx$, $\int x\cos^2 x\, dx$ where n=1, 2. Rule of integration by parts. Problems		
UNIT – 5: DEFINITE INTEGRALS AND ITS APPLICATIONS	05 hr	22
Definition of Definite integral. Problems on all types of integration methods. Area, volume, centres of gravity and moment of inertia by integration method. Simple problems.		
UNIT – 6: DIFFERENTIAL EQUATIONS.	05 hr	14
Definition, example, order and degree of differential equation with examples. Formation of differential equation by eliminating arbitrary constants up to second order. Solution of O. D. E of first degree and first order by variable separable method. Linear differential equations and its solution using integrating factor.		
Total	52	145

Course Delivery:

The Course will be delivered through lectures, class room interaction, exercises, assignments and self-study cases.

Course outcome:

On successful completion of the course, the student will be able to:

1. Formulate the equation of straight lines and conic sections in different forms.
2. Determine the derivatives of different types of functions.
3. Evaluate the successive derivative of functions and its application in tangent, normal, rate measure, maxima and minima.
4. Evaluate the integrations of algebraic, trigonometric and exponential function.
5. Calculate the area under the curve, volume by revolution, centre of gravity and radius of gyration using definite integration.
6. Form and solve ordinary differential equations by variable separable method and linear differential equations.

Mapping Course Outcomes with Program Outcomes:

CO	Course Outcome	PO Mapped	Cognitive Level	Theory Sessions	Allotted marks on cognitive levels			TOTAL
					R	U	A	
CO1	Formulate the equation of straight lines and conic sections in different forms.	**1,2,3,10**	**R/U/A**	**08**	**6**	**5**	**12**	**23**
CO2	Determine the derivatives of different types of functions.	**1,2,3,10**	**R/U/A**	**15**	**12**	**15**	**12**	**39**
CO3	Evaluate the successive derivative of functions and its application in tangent, normal, rate measure, maxima and minima.	**1,2,3,10**	**R/U/A**	**07**	**6**	**5**	**6**	**17**
CO4	Evaluate the integrations of algebraic, trigonometric and exponential function	**1,2,3,10**	**R/U/A**	**12**	**9**	**15**	**6**	**30**
CO5	Calculate the area under the curve, volume by revolution, centre of gravity and radius of gyration using definite integration	**1,2,3,10**	**R/U/A**	**05**	**6**	**10**	**6**	**22**
CO6	Form and solve ordinary differential equations by variable separable method and linear differential equations.	**1,2,3,10**	**R/U/A**	**05**	**3**	**5**	**6**	**14**
		Total Hours of instruction		**52**	**Total marks**			**145**

R-Remember; U-Understanding; A-Application

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Engineering Maths-II	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Reference Books:

1. NCERT Mathematics Text books of class XI and XII.
2. Higher Engineering Mathematics by B.S Grewal, Khanna publishers, New Delhi.
3. Karnataka State PUC mathematics Text Books of I & II PUC by H.K. Dass and Dr. Ramaverma published by S.Chand & Co.Pvt. ltd.
4. CBSE Class Xi & XII by Khattar & Khattar published PHI Learning Pvt. ltd.,
5. First and Second PUC mathematics Text Books of different authors.
6. E-books:www.mathebook.net
7. www.freebookcentre.net/mathematics/ introductory-mathematics -books.html

Course Assessment and Evaluation:

Method	What		To whom	When/where (Frequency in the course)	Max Marks	Evidence collected	Contributing to course outcomes
DIRECT ASSMENT	*CIE	Internal Assessment Tests	Student	Three tests (Average of Three tests to be computed).	20	Blue books	1 to 6
		Assignments		Two Assignments based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	5	Log of record	1 to 6
				Total	25		
	*SEE	Semester End Examination		End of the course	100	Answer scripts at BTE	1 to 6
INDIRECT ASSESSMENT	Student feedback		Student	Middle of the course	-NA-	Feedback forms	1 to 3, delivery of the course
	End of Course survey			End of course		Questionnaire	1 to 6, Effectiveness of delivery of instructions and assessment methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	31
2	Understanding	41
3	Applying the knowledge acquired from the course	25
	Analysis Evaluation	3

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM	**ENGINEERING MATHEMATICS –II**	20
	Year:	Course code: **15SC02M**	
Name of Course coordinator :			Units:__ CO's:____

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Model Question Paper:

Code: 15SC02M

II Semester Diploma Examination

ENGINEERING MATHEMATICS –II

(For All Engineering Diploma Programmes)

Time: 3 Hours][Max. Marks: 100

NOTE: i)Answer any 10 questions from section A, 8 questions from section B and 5 questions from section-C

ii) Each question carries 3 marks in section A.

ii) Each question carries 5 marks in section B.

iii) Each question carries 6 marks in section C.

SECTION-A

1. Find the equation of the line passing through the point (2,-3) with slope 1/3.
2. Find the equation of parabola with vertex (2,0) and focus (5,0)
3. Differentiate: $(3x + 8)^7$ with respect to x.
4. If $y = \cos^{-1} x$ show that $\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2}}$.
5. If $y = x^x$, find $\frac{dy}{dx}$.
6. If $y = \frac{1+\sin x}{1-\sin x}$ find $\frac{dy}{dx}$.
7. Find the equation to the tangent to the curve $2x^3 + 5y - 4 = 0$ at (-2,4).
8. The volume of the sphere is increasing at the rate of 6cc/sec. Find the rate of change of radius when the radius is 3 cm.
9. Integrate: $(2x + 1)(x + 5)$ with respect to x
10. Evaluate: $\int \tan^2 x dx$
11. Evaluate: $\int \frac{\cos x}{1+\sin x} dx$
12. Evaluate: $\int_0^{\pi/4} (\sec^2 x + 1) dx$.
13. Find area bounded by the line $x + 2y = 0$, x- axis, and ordinates $x = 0, and x = 4$ by integration.
14. Form differential equation for curve $y^2 = 4ax$

SECTION – B

1. Find the equation of line passing through the point (2,5) and (-3,2).
2. Differentiate $\sqrt{x} + \log x + \sin^{-1} x + e^{\tan x} - a^x$ with respect to x.
3. Differentiate $\tan x$ with respect to x using first principal method.
4. If $y = \sinh 3x \cosh 2x$ then find $\frac{dy}{dx}$.
5. If $S = t^3 - t^2 + 9t + 8$, where S is distance travelled by particle in t seconds. Find the velocity and acceleration at t = 2 sec.
6. Integrate: $\frac{1}{x} - \tan x + e^{-3x} + \frac{1}{1+x^2} + 5$ with respect to x.
7. Evaluate: $\int \frac{(1+\log x)^2}{x} dx$
8. Evaluate: $\int x \sin x dx$

9. Evaluate: $\int_0^{\pi/2} \cos 5x \cos 3x \, dx$
10. Evaluate: $\int_0^{\pi/2} \cos^3 x \, dx$
11. Solve the differential equation $\sin^2 y dx - \cos^2 x dy = 0$

SECTION – C

1. Find the equation of median through B in a triangle with vertices A(-1 ,3), B(-3, 5) and C(7,-9)
2. Find the equation of hyperbola, given that vertices are $(\pm 7, 0)$ and eccentricity, e=4/3
3. If $x^y = a^x$, show that $\frac{dy}{dx} = \frac{x \log_e a - y}{x \log_e x}$.
4. If $y = e^{\tan^{-1} x}$ then show that $(1 + x^2)\frac{d^2y}{dx^2} + (2x - 1)\frac{dy}{dx} = 0$.
5. Find the maximum and minimum values of the function
$f(x) = 2x^3 - 21x^2 + 36x - 20$.
6. Evaluate: $\int \tan^{-1} x \, dx$
7. Find the volume of solid generated by revolving the curve
$y = \sqrt{x^2 + 5x}$ between x=1 & x=2.
8. Solve the differential equation $x\frac{dy}{dx} - 2y = 2x$

****

Question Paper Blue Print:

Course: **ENGINEERING MATHEMATICS – II** Course Code**: 15SC02M**

UNIT NO		HOURS	Each questions to be set for 3 Marks Section - A	Each questions to be set for 5 Marks Section - B	Each questions to be set for 6 Marks Section- C	Weightage of Marks
1	a	4	01	01	01	23
	b	4	01	--	01	
2		15	04	03	02	39
3		07	02	01	01	17
4		12	03	03	01	30
5		05	02	02	01	22
6		05	01	01	01	14
TOTAL		52	14	11	08	145
Questions to be answered			**10**	**08**	**05**	**100**

Guidelines to Question Paper Setting:

1. The question paper must be prepared based on the blue print without changing the weight age of model fixed for each unit.
2. The question paper pattern provided should be adhered to
   Section-A: 10 questions to be answered out of 14 questions each carrying 03 marks.
   Section-B: 08 questions to be answered out of 11 questions each carrying 05 marks.
   Section-C: 05 questions to be answered out of 08 questions each carrying 06 marks.
3. Questions should not be set from the recapitulation topics.

Model Question Bank:

Course Title: **ENGINEERING MATHEMATICS – II**	Course Code: **15SC02M**

UNIT-1: STRAIGHT LINES AND CONIC SECTION:

3 MARK QUESTIONS

1. Find the equation of the straight line passing through (2,3) and having slope 5.
2. Find the slope and x-intercept and y-intercepts of the line $2x + 3y - 11 = 0$.
3. Find the vertex and focus of the parabola $(y - 2)^2 = 8x$.
4. Show that the lines 3x-2y+2=0, 2x+3y+7=0 are perpendicular.
5. Find the eccentricity of the ellipse $\frac{x^2}{64} + \frac{y^2}{9} = 1$

5 MARK QUESTIONS

1. Find the equation to the line passing through the point (6,-4) and perpendicular to the line 7x-6y+3=0.
2. Find the equation to the line passing through the point (2,3) parallel to the line joining the points (-8,-6) & (2,-4).
3. Find the equation of straight line inclined at 135o to the x-axis having y-intercept 2/3.
4. Find the equation of straight line joining the points (2,3) & (-4,6).
5. Find the equation of the line passes through (-3,-2) which is perpendicular to x-axis.

6 MARK QUESTIONS

1. Find the equation to the median of the triangle through the vertex A with vertices A(-1,3), B(-3,5) &C(7,-9).
2. The vertices of a quadrilateral taken in order are A(1,2), B(2,1),C(3,4) & D(-1,-2). Find the equation to the diagonal BD.

3. Obtain the equation of the hyperbola in the form $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, whose eccentricity is 8 and distance between the foci is 12.
4. Find the equation of the ellipse with length of major axis is 8 and minor axis is 3.
5. Find the equation to the line passing through point (3,-2) and perpendicular to the line joining points (5,2) &(7,-6).

UNIT-2: DIFFERENTIATION:

3 MARK QUESTIONS

1. Find $\frac{dy}{dx}$, if $y=2x^2-3x+1$.
2. Differentiate xtanx with respect to x.
3. Find $\frac{dy}{dx}$, if $x^2+y^2=25$
4. Find $\frac{dy}{dx}$ if $x=ct, y=\frac{c}{t}$,
5. If $y=4ax$, find $\frac{d^2y}{dx^2}$.

5 MARK QUESTIONS:

1. Differentiate the function x^n by method of first principle.
2. Find $\frac{dy}{dx}$ if $y=6x^3-3\cos x+4\cot x+2e^{-x}-\frac{5}{x}$.
3. Find $\frac{dy}{dx}$ if $y=\frac{\cos x+\sin x}{\cos x-\sin x}$
4. Find $\frac{dy}{dx}$ if $y=(\cos x)^{\sin x}$
5. If $y=\tan^{-1}x$, provethat $(1+x^2)y_2+2xy_1=0$

6 MARK QUESTIONS:

1. Find $\frac{dy}{dx}$ if $y=\frac{x\log x}{1+\sin x}$
2. Find $\frac{dy}{dx}$ if $x=a\cos^3\theta, y=a\sin^3\theta$ at $\theta=\pi/4$.
3. Find $\frac{dy}{dx}$ if $y=x^{x^{x^{x^{\cdot^{\cdot^{\cdot^{\infty}}}}}}}$.
4. If $y=\tan^{-1}\left(\frac{1+x}{1-x}\right)$, find $\frac{dy}{dx}$.
5. If $y=e^{m\sin^{-1}x}$, provethat $(1-x^2)y_2-xy_1-m^2y=0$

UNIT-3 APPLICATIONS OF DIFFERENTIATION

3 MARK QUESTIONS

1. Find the slope of the tangent to the curve $x^2 + 2y^2 = 9$ at a point (1, 2) on it.
2. Find the slope of the normal to the curve $y = 2 - 3x + x^2$ at (1, 0).
3. The law of motion of a moving particle is $S = 5t^2 + 6t + 3$ where 'S' is the distance in metres and 't' time in seconds. Find the velocity when t=2.
4. Find the rate of change of area of a circle with respect to its radius.
5. Show that the curve $2x^3 - y = 0$ is increasing at the point (1, 2).

5 MARK QUESTIONS

1. For a moving body vertically upwards, the equation of motion is given by $S = 98t - 4.9t^2$. When does the velocity vanish?
2. Find the equation to the tangent to the curve $y = 2x^2 - 3x - 1$ at (1,-2).
3. A circular patch of oil spreads on water and increases its area at the rate of 2 sq.cm/min. find the rate of change of radius when radius when radius is 4 cm.
4. The volume of the spherical ball is increasing at the rate of 36π cc/sec. Find the rate at which the radius is increasing. When the radius of the ball is 2cm.
5. Find the max value of the function $y = x^3 - 3x + 4$.

6 MARK QUESTIONS

1. Find the max & min values of the function $y = x^5 - 5x^4 + 5x^3 - 1$.
2. Find the equation of normal to the curve $y = x^2 + 2x + 1$ at (1,1).
3. If S is the equation of motion where $S = t^3 - 2t^2$ find its acceleration when velocity is 0.
4. The volume of sphere is increasing at 3c.c per second. Find the rate of increase of the radius, when the radius is 2cm.
5. Water is flowing into a right circular cylindrical tank of radius 50 cms at the rate of 500π cc/min. Find how fast is the level of water going up.

UNIT-4: INTEGRATION

3 MARK QUESTIONS

1. Evaluate: $\int (x^2 + x + 1)\, dx$.
2. Evaluate: $\int \cot^2 x\, dx$
3. Evaluate: $\int e^{5x+8}\, dx$
4. Evaluate: $\int \frac{1}{2x+5} dx$
5. Evaluate: $\int \sin^5 x \cos x\, dx$

5 MARK QUESTIONS

1. Evaluate $\int \left(x^4 - \frac{1}{x} + \operatorname{cosec}^2 x - e^{-2x} + \cos x\right) dx.$
2. Evaluate: $\int \cos^3 x \, dx$
3. Evaluate: $\int \sin 6x \cos 2x \, dx$
4. Evaluate: $\int \log x \, dx$
5. Evaluate: $\int \frac{(\tan^{-1} x)^3}{1+x^2} dx$

6 MARK QUESTIONS

1. Evaluate: $\int (\tan x + \cot x)^2 dx.$
2. Evaluate: $\int (x+1)(x-2)(x-3) dx$
3. Evaluate: $\int x^2 \cos x \, dx$
4. Prove that $\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + c$
5. Evaluate: $\int \frac{1}{9\sin^2 x + 4\cos^2 x} dx$

UNIT-5: DEFINITE INTEGRATION AND ITS APPLICAITON.

3 MARK QUESTIONS

1. Evaluate: $\int_2^3 (2x+1) \, dx.$
2. Evaluate: $\int_0^{\pi/4} \sec^2 x \, dx.$
3. Evaluate: $\int_0^2 e^x \, dx$
4. Evaluate: $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx.$
5. Evaluate: $\int_0^{\pi/2} \cos x \, dx.$

5 MARK QUESTIONS

1. Evaluate: $\int_0^{\pi/2} \sin 3x \cos x \, dx.$
2. Evaluate: $\int_0^{\pi} \frac{\cos x}{1+\sin^2 x} dx.$
3. Evaluate: $\int_0^1 x(x-1)(x-2) \, dx.$
4. Find the area bounded by the curve $y = x^2 + 1$ the x-axis and ordinates$x = 1, x = 3.$
5. Find the volume of the solid generated by the revolving of the curve $y^2 = x^2 + 5x$ between the ordinates x=1, x=2 about x-axis.

6 MARK QUESTIONS

1. Evaluate: $\int_0^1 \frac{\cos(\tan^{-1} x)}{1+x^2} dx$.
2. Find the area between the curves $y = x^2 + 5$ and $y = 2x^2 + 1$.
3. Find the volume of ellipsoid generated by revolving $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ between the ordinates $x = \pm a$ about x-axis.
4. Find the centre of gravity of a solid hemisphere.
5. Determine the moment of inertia of a uniform rod of length 2l,
   Cross-sectional area "a" about an axis perpendicular to the rod and passing through the mid-point of the rod.

UNIT-6: INTEGRATION

3 MARK QUESTIONS

1. Write the order and degree of the differential equation $\left(\frac{dy}{dx}\right)^8 + 3\frac{d^2y}{dx^2} - ye^x = 0$.
2. Form the differential equation by eliminating arbitrary constants in $y = m e^{2x}$.
3. Solve $xdx + ydy = 0$.
4. Solve $\frac{dy}{1+y^2} = \frac{dx}{1+x^2}$.
5. Solve $e^x dx + dy = 0$.

5 MARK QUESTIONS

1. Form the differential equation by eliminating arbitrary constants A and B in $y = Ae^x + Be^{-x}$.
2. Form the differential equation by eliminating arbitrary constants in $y = a\cos mx + b\sin mx$.
3. Solve $(1 + y)dx + (1 + x)dy = 0$.
4. Solve $\frac{dy}{dx} + 3y = e^{2x}$.
5. Solve $\frac{dy}{dx} + y\tan x = \cos x$

6 MARK QUESTIONS

1. Solve $x(1 + y^2)dx + y(1 + x^2)dy = 0$.
2. Solve $\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$.
3. Solve $x\frac{dy}{dx} + y = x^3$
4. Solve $\frac{dy}{dx} + 3y = e^{2x}$.
5. Solve $\frac{dy}{dx} + 2y\cot x + \sin 2x = 0$

Government of Karnataka
Department of Technical Education, Bengaluru

Course: ENGINEERING MATHEMATICS - II

Course code: 15SC02M

Curriculum Drafting Committee 2015-16

	Name	Designation	Institution
1	**Dr. D.S. Prakash**	Asst. Director (LRDC)	DTE, Bengaluru
2	**Dr.MokaShekhu**	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
3	**Sri.Sathyanaraya Dixit**	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru
4	**Sri. Guruprasad V**	Lecturer (Selection Grade /Science)	APS Polytechnic, Somanahalli
5	**Dr.RajasekharHeera**	Lecturer/Science,	Government Polytechnic, Gulbarga.

Curriculum Review committee

	Name	Designation	Institution
1	**Dr.MokaShekhu**	Lecturer (Selection Grade /Science)	Government Polytechnic, Channasandra, Bengaluru
2	**Sri.Sathyanaraya Dixit**	Lecturer (Selection Grade /Science)	PVP Polytechnic, Bengaluru

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: **ELECTRICAL CIRCUITS**		Course Code	: **15EE21T**
Semester	: **II**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **4:0:0**	Credits	: **4 Credits**
Type of course	:**Lecture + Assignments**	Total Contact Hours	: **52**
CIE	: **25 Marks**	SEE	: **100 Marks**

Pre-requisites	**:**Applied Science, Applied Mathematics-I and EEE in I- Semester Diploma.
Course Objectives	**:**Prepare the student to understand the working of Electrical Circuits.

COURSE TOPICS:

Unit Nos.	Topics	Teaching Hours	SEE Max. Marks
1	Introduction and DC circuits	14	40
2	Magnetism and magnetic circuits	06	15
3	Electromagnetic Induction	06	20
4	AC Principles and Vector Algebra	10	30
5	Single-phase AC circuits	10	30
6	Poly-phase AC circuits	6	10
Total		**52**	**145**

Course Outcomes:

On successful completion of the course, the student will be able to:

1. Understand different theorems and apply them on DC circuits.
2. Comprehend magnetic circuits with its laws and parameters.
3. Understand Electromagnetic Induction.
4. Comprehend the principles of AC fundamentals and Understand vector algebra
5. Understand various single phase AC parameters in R, L, C, R-L, R-C, R-L-C series and parallel circuits.
6. Understand Polyphase AC circuits.

Composition of Educational Components

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)	Total Marks (145)
1	Remembering	10	15
2	Understanding	55	80
3	Application	35	50
Total		**100**	**145**

Course Outcome linkage to Cognitive Level

Cognitive Level Legend: R- Remember, U- Understand, A- Application

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Understand different theorems and apply them on DC circuits.	***R/U/A***	2,8,10	14
CO2	Comprehend magnetic circuits with its laws and parameters	***R/U/A***	2,8,10	06
CO3	Understand Electromagnetic Induction.	***R/U***	1,2,3,8,10	06
CO4	Comprehend the principles of AC fundamentals and Understand vector algebra	***R/U/A***	1,2,8,10	10
C05	Understand various single phase AC parameters in R, L, C, R-L, R-C, R-L-C series and parallel circuits	***U/A***	2,8,10	10
C06	Understand Polyphase AC circuits.	***U/A***	2,8,10	6
		Total sessions		**52**

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE:

Unit No	Unit Name	Hour	Max. Marks per Unit	Questions to be set for (5marks) PART - A			Questions to be set for (10marks) PART - B			Marks weightage (%)
				R	U	A	R	U	A	
1	Introduction and DC circuits	14	40	1	1	-	-	1	2	30
2	Magnetism and magnetic circuits	06	20	1		1	-	1	-	10
3	Electromagnetic Induction	06	15	1	-	-	-	1	-	10
4	AC Principles and Vector Algebra	10	30	1	1	-	-	1	1	20
5	Single-phase AC circuits	10	25	-	1	-	-	1	1	20
6	Poly-phase AC circuits	6	15	-	1	-	-	-	1	10
	Total	**52**	**145**	**9 (45 Marks)**			**10 (100 Marks)**			**100**

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
ELECTRICAL CIRCUITS	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**3**

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
IF ≥40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENTS:

UNIT I

Introduction: Types of circuits- open, closed and short circuit; Linear, non linear circuits, passive active circuits and components, node, unilateral, bilateral circuits.

D.C circuits : Kirchhoff's laws, Ideal Voltage, Ideal Current source & conversion; Star - delta Transformation Network theorems-Thevinin's Theorm, Reciprocity Theorem, Superposition Theorem Maximum power transfer Theorem. Problems on KVL,KCL, star-Delta transformation and Network theorems.

UNIT II

Magnetism and Magnetic circuits: magnetic circuit, mmf, reluctance and mention their units, Absolute permeability and Relative permeability and mention their units, relationship between Flux, MMF and Reluctance ,Compare Electric circuit with magnetic circuit. Problems on magnetic circuits.

UNIT III

Electro Magnetic Induction: Magnetic field around a current carrying conductor, Cork Screw Rule and Right Hand Thumb Rule, Faraday's laws of Electromagnetic Induction, EMF induced in a coil; Types of induced emfs and their application ; Fleming's Right Hand Rule, Lenz's law; Self induced emf and Mutually induced emf and their application, Self inductance and Co-efficient of Self inductance, Mutual inductance and Co-efficient of Mutual inductance.

UNIT IV

A.C. Principles : Generation of Single phase AC voltage , Frequency, Amplitude, Cycle, Time period and their units ; Maximum value, RMS value, Average value, Form factor and Peak factor of a sinusoidal wave, Instantaneous value of Voltage and Current , phase and phase difference, Vectorial representation of AC quantities, Power and Power factor in AC circuits, problems on above.

Vector Algebra: Represent vectors in Rectangular, Trigonometric and Polar forms, Convert Rectangular form into Polar form and vice-versa and problems on R to P and P to R , Arithmetic operations on vectors, problems.

UNIT V

Single Phase AC Circuits : Current and Power in a pure resistive, pure inductive and pure capacitive circuit ; Capacitive reactance , Inductive reactance ,Impedance, Current, Power and Power factor of R-L, R-C, R-L-C series and parallel circuits, problems on R-L, R-C, R-L-C series and parallel circuits. Resonance, resonant frequency and Q-factor.

UNIT VI

Polyphase AC Circuits : Generation of 3-ph voltage, phase sequence, Star and Delta Connection in 3-ph system ,Relation between line voltage and phase voltage in 3-ph Star, Relation between line voltage and phase voltage in 3-ph Delta system. Equation for a 3-ph power, problems on 3 phase star and delta circuits.

REFERENCE BOOKS:

1. Electrical Technology by B.L. Theraja.
2. Electrical Technology by Hughes
3. Principles of Electrical Engineering by B. R. Gupta
4. Basic Electrical Engineering by V.K. Mehta &Rohit Mehta.
4. http://www.facstaff.bucknell.edu/mastascu/elessonshtml/eeindex.html - Welcome to Exploring Electrical Engineering.
5. Fundamentals Hand book of Electrical Science, Module 1, Basic Electrical Theory, Department of Energy, U. S. Department of Energy, June 1992.
6. http://www.freeengineeringbooks.com/Electrical/Basic-Electrical-Engineering.php

Course Delivery:

The Course will be delivered through lectures, classroom interaction, animations, group discussion, exercises and assignments.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks Theory	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continous Internal Evaluation)	I A Tests	Students	Theory: Three IA tests for theory (Average marks of three tests will be computed).	20	Blue Books	1 to 6
		Assignments		Student Activity	05	Log of Activity	1 to 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	100	Answer Scripts	All COs
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course		Feed Back Forms	All COs
	End Of Course Survey			End Of The Course		Questionn-aire	All COs

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Suggested Student Activities:

Each Student has to prepare a self hand written report of 3 pages considering any one of the following topics.

1. Report on different theorems and their practical applications.
2. Report on different materials used for electromagnets with their properties.
3. Applications of Electro Magnetic Induction, statically induced and dynamically induced emf, self and mutual induced emfs.
4. Perform Polar to Rectangular and vice versa operations on Computer package (Excel) and submit a report giving commands and formulae.
5. Practical applications of Single Phase AC Circuits and Three phase AC Circuits with their operating voltages and other electrical parameters.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM		20
	Year:		

Name of Course coordinator : Units:__
CO's:____

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal Choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
1st Test/ 6 th week, 2 Feb 16, 10-11 AM	I SEM, E & E Engg	**Electrical Circuits**	20
	Year: 2015-16	Course code:	

Name of Course coordinator :
Units Covered :1 and 2
Course Outcomes : 1 and 2
Instruction :*(1). Answer all questions (2). Each question carries five marks*

Question No.	Question	CL	CO	PO
1	What are the types of Electrical circuits?	R	1	2,8,10
2	Explain the STAR-DELTA transformation? OR State Maximum Power Transfer theorem and explain.	U A	1	2,8,10
3	Define with SI units permeability, absolute permeability and relative permeability.	R	2	2,8,10
4	Show the relation between mmf, reluctance and flux. OR Compare magnetic circuit with electric circuit.	U A	2	2,8,10

CL: Cognitive Level, R-Remember, U-Understand, A-Application, PO: Program Outcomes

MODEL QUESTION PAPER

Electrical Circuits

Time: 3 Hours] **[Max. Marks: 100**

Instruction: 1) Part – A. Answer any **SIX** questions from a set of 9 Questions.
Each question carries 5 Marks.

2) Part – B. Answer any **SEVEN** questions from a set of 10 Questions.
Each question carries 10 Marks.

PART - A

(Answer any SIX Questions from this Section)

6 x 5 = 30

1. Define closed circuit, open circuit, and short circuit condition in a circuit.
2. State Kirchhoff's Voltage and Current laws.
3. Bring out the differences between magnetic circuit and electric circuit.
4. State Faraday's Laws of Electromagnetic induction.
5. Define mutually induced emf and explain it.
6. Draw a sinusoidal waveform and mark the following (i) max value (ii) instantaneous value (iii) time period (iv) frequency.
7. Differentiate between the terms 'in- phase' and 'out of phase' alternating quantities.
8. Mention the advantages of 3-phase system over single phase system.
9. Prove that line voltage is equal to phase voltage in a 3ph delta connected system.

PART - B

(Answer any SEVEN Questions from this Section) **10 x 7 = 70**

10. a)Define the following:
    i) bi-lateral circuit.
    ii) non-linear circuit.
    b) Explain Kirchhoff's Current Law with an example.

11. a) Define and mention the units :
    i) Reluctance

ii) MMF

b) State the Law relation between flux, mmf & Reluctance. Write the equation.

12. a) State and explain Lenz's law.
b)Compare magnetic circuit with electric circuit

13.a) State and explain Fleming's right hand rule.
b) A current of 5A flowing through a coil of 500 turns produces a flux of 20mWb. Find the co-efficient of self induction and the inductive reactance of the coil at 50Hz frequency.

14. a) Derive an expression for dynamically induced emf.
b) A coil of 500 turns is wound over a magnetic material of relative permeability 500. The length of the coil is 50cms and the diameter of the coil is 1cm. If a current of 5A is passed through the coil , find –(i) inductance of the coil (ii) energy stored in the coil.

15. a) Derive an expression for instantaneous value of voltage and current.
b) Explain power factor.

16.a) Derive the equation for power in a pure inductive circuit.
b) Two impedances Z1=(4+j6) and Z2=(6-j4) are connected in parallel across a 230V, 50Hz supply. Calculate – (i) impedance (ii) current (iii) p.f of the circuit.

17. a) Explain the generation of three phase voltage.
b) Explain STAR connected three phase system.

18 .a) Prove that line voltage is equal to √3 phase voltage in a 3ph star connected system.
b) List the methods of power measurement in a 3 ph system.

19.a) Explain 2-wattmeter method of measuring 3ph power.
b) Explain the meaning of a balanced 3ph system?

---xxx---

Model Question Bank:

UNIT-1

INTRODUCTION AND DC CIRCUITS

Cognitive Level: REMEMBER

1. What do you mean by an Electrical circuit?
2. What are the types of Electrical circuits?
3. Define a DC circuit.
4. Define an AC circuit.
5. Define Direct Current.
6. Define Alternating Current.
7. What do you mean by circuit elements?
8. Define bi-lateral circuit.
9. Define uni-lateral circuit.
10. What do you mean by an active circuit?
11. What do you mean by a passive circuit?
12. What is a Branch?
13. What is a MESH?
14. What is a NODE?

Cognitive Level: UNDERSTAND

15. Mention the types of circuit elements and explain them.
16. Categorise the circuit elements and give examples.
17. Explain the closed circuit, open circuit and short circuit conditions in a circuit with neat circuit diagrams.
18. What is an electrical network?
19. How can you classify the electrical circuits based on the behaviour of the circuit elements with the change in the magnitude or direction of voltage or current ?
20. Define linear circuit.
21. Define non-linear circuit.
22. Explain the STAR-DELTA transformation?
23. Explain the DELTA-STAR transformation?

Cognitive Level: APPLICATION

24. State Kirchhoff's first law or Kirchhoff's current law.

25. State Kirchhoff's second law or Kirchhoff's voltage law.
26. Explain Kirchhoff's Current Law with an example.
27. Explain Kirchhoff's Voltage Law with an example
28. Explain the transformation of STAR-DELTA system to DELTA-STAR system with an example?
29. State Thevenin's theorem.
30. State and explain Thevenin's theorem.
31. State Reciprocity Theorem.
32. State and explain Reciprocity Theorem.
33. State Superposition theorem.
34. State Superposition theorem and explain.
35. State Maximum Power Transfer theorem and explain.

UNIT-II

MAGNETISM AND MAGNETIC CIRCUITS

Cognitive Level: REMEMBER

1. Define magnetic flux(Φ) and mention its SI unit.
2. Define magnetic field.
3. Define flux density, mention its SI unit and write the equation for flux density .
4. Define magnetic field strength or magnetic field intensity or magnetising force (**H**) and mention its SI unit.
5. Define magnetising force and mention its SI unit.
6. Define permeability.
7. Define absolute permeability, mention its unit and write the equation.
8. Define relative permeability, mention its unit and write the equation.
9. Define Magnetic Circuit.
10. Define Magneto motive force (mmf) ,mention its unit and write the equation.
11. Define Reluctance, mention its unit and write the equation.
12. Define Magnetic leakage.
13. Define Permeance (ρ) and write its equation.

Cognitive Level: UNDERSTAND

14. Write the SI units of the following (i) flux (ii) mmf (iii) reluctance.
15. Write the equation for magnetising force or magnetic field strength or magnetic field intensity.

16. State the Law of Reluctance.
17. Show the relation between mmf, reluctance and flux.
18. What is fringing?

Cognitive Level: APPLICATION

19. What is Leakage coefficient or Leakage factor (λ)? Write the equation.
20. Compare magnetic circuit with electric circuit.

UNIT-III

ELECTRO-MAGNETIC INDUCTION

Cognitive Level: REMEMBER

1. Define Electromagnetic Induction.
2. State Maxwell's cork screw rule.
3. State Right Hand Thumb rule.
4. State Faraday's Laws of Electromagnetic induction.
5. Mention the types of emf induced in a conductor.
6. Define dynamically induced emf and explain.
7. Define statically induced emf and explain.
8. Mention the types of statically induced emf's
9. Define self-inductance
10. Define mutual inductance (M).

Cognitive Level: UNDERSTAND

11. Distinguish between dynamically and statically induced emfs.
12. State the application of dynamically and statically induced emfs.
13. State Fleming's right hand rule.
14. State and explain Fleming's right hand rule.
15. State Lenz's law.
16. Define self induced emf and explain.
17. Define mutually induced emf and explain.
18. Distinguish between self-induced emf& mutually induced emf.
19. Define co-efficient of self inductance.
20. Define coefficient of Mutual inductance.
21. Distinguish between self and mutual inductance.

UNIT-IV

AC PRINCIPLES AND VECTOR ALGEBRA

Cognitive Level: REMEMBER

1. Define instantaneous value and write the equation.
2. Define amplitude or peak value or maximum value.
3. Define cycle of an alternating quantity.
4. Define frequency. Mention its unit.
5. Define time period and mention its unit.
6. Define RMS value or effective value of alternating current.
7. Define Form factor and write the equation.
8. Define crest factor and write the equation.
9. Define phase.
10. Define phase angle.
11. Define phase angle difference.

Cognitive Level: UNDERSTAND

12. Explain the generation of alternating voltage or current.
13. Draw a sinusoidal waveform and mark the following (i) maximum value (ii) instantaneous value (iii) Time period (iv) frequency.
14. Define average value of alternating current.
15. Explain the mid ordinate or graphical method of calculating the Average value.
16. Explain the analytical or integral method of calculating the Average value.

Cognitive Level: APPLICATION

17. Explain the mid ordinate or graphical method of calculating the RMS value.
18. Explain the analytical or integral method of calculating the RMS value.
19. Derive an equation for RMS value of alternating voltage and current.
20. Show that the R.M.S. value of a sinusoidal alternating current is 0.707 times the maximum value.
21. Derive an expression for instantaneous value of voltage and current.
22. Differentiate between the terms ‘in- phase’ and ‘out of phase’ alternating quantities.

UNIT-V

SINGLE PHASE AC CIRCUITS

Cognitive Level: UNDERSTAND

1. Define AC circuit.
2. Define resistance. Mention its unit.
3. Define inductive reactance, mention its unit and write its equation.
4. Define capacitive reactance, mention its unit and write its equation.
5. Define power factor.
6. Define leading power factor.
7. Define lagging power factor.
8. Define unity power factor.
9. Define zero power factors.
10. Explain leading and lagging power factor.
11. Write the equation for consumed by R-L series circuit.
12. What is Impedance triangle?
13. Explain power triangle.
14. Define apparent power. Mention its unit.
15. Define true power or useful power. Mention its unit.
16. Define reactive power or wasteful power. Mention its unit.
17. What is an inductive circuit?
18. What is a capacitive circuit?
19. Define impedance. Mention its unit.
20. Define series resonance.
21. Define resonant frequency and write the equation.
22. Define Q-factor.

Cognitive Level: APPLICATION

23. Classify single phase AC circuits.
24. Explain a pure resistive circuit.
25. Derive the equation for power in a pure resistive circuit.
26. Explain a pure inductive circuit.
27. Derive the equation for power in a pure inductive circuit.
28. Explain a pure capacitive circuit.
29. Derive the equation for power in a pure capacitive circuit.
30. Draw the circuit diagram, wave diagram and vector diagram for a pure resistive circuit.

31. Draw the circuit diagram, wave diagram and vector diagram for a pure inductive circuit.
32. Draw the circuit diagram, wave diagram and vector diagram for a pure capacitive circuit.
33. With a neat circuit diagram, wave diagram and vector diagram explain R-L series circuit.
34. With a neat circuit diagram, wave diagram and vector diagram explain R-C series circuit.
35. Write the equation for consumed by R-C series circuit.
36. With a neat circuit diagram, wave diagram and vector diagram explain R-L-C series circuit.
37. Write the equation for power consumed by RLC series circuit.
38. Explain the condition for series resonance.
39. State the condition for the series resonance.
40. Draw the Resonance curve.

UNIT-VI

POLYPHASE AC CIRCUITS

Cognitive Level: UNDERSTAND

1. Define poly phase system.
2. Mention the advantages of 3-phase system over single phase system.
3. Explain the generation of three phase voltage.
4. What is phase sequence?
5. Explain interconnected system.
6. Explain STAR connected three phase system.
7. Define phase voltage in a 3-phase system.
8. Define phase current in a 3-phase system.
9. Define line voltage in a 3-phase system.
10. Define line current in a 3-phase system.
11. State the relation between line voltage and phase voltage in star connected system.
12. State the relation between phase current and line current in star connected system.
13. What is the power consumed or supplied by 3ph star connected system?
14. What is the power consumed by 3ph Star connected system?
15. What is the power consumed by 3ph delta connected system?
16. What do you mean by a balanced 3ph system?
17. What do you mean by an un-balanced 3ph system?

Cognitive Level: APPLICATION

18. Prove that line voltage = √3. Phase voltage in a 3ph star connected system.
19. Prove that line current = phase current in a 3ph star connected system
20. Prove that line voltage = phase voltage in a 3ph delta connected system
21. Prove that line current = √3. phase current in a 3ph delta connected system
22. Explain DELTA connected 3ph system.
23. State the relation between line voltage and phase voltage in delta connected system.
24. State the relation between phase current and line current in delta connected system.
25. State the relation between line voltage and phase voltage in star connected system.
26. State the relation between phase current and line current in star connected system.

---xxx---

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: **ENGINEERING DRAWING**	Course Code: **15ME01D**
Semester **: I / II**	Core/ Elective: **Core**
Teaching Scheme (L:T:P) : **0:2:4**	Credits: **3 Credits**
Type of course: **Lectures & Practice**	Total Contact Hours: **78**
CIE: **25 Marks**	SEE: **100 Marks**

(Common to E&E /MECHATRONICS/ HPT/ WSM/TEXTILE /MINING/CERAMICS/AGRICULTURE ENGG./ AERONAUTICAL ENGG./LEATHER & FASHION TECHNOLOGY Programmes)

Pre-requisites : Zeal to learn the subject.

Course Objectives :

1. The course is aimed at developing Basic Graphic skills.
2. Develop Skills In Preparation Of Basic Drawings.
3. Skills in Reading and Interpretation of Engineering Drawings.

Course Outcomes:

On successful completion of the course, the students will be able to attain CO:

Course Outcome		CL	Linked units	Linked PO	Teaching Hrs
CO1	Usage of the drawing instruments effectively by students	***R/U/A***	1	1,2,3,9,10	**15**
CO2	Interpret and draw the basic engineering drawing skills related to projections of points, straight lines, planes and solids.	***R/U/A***	2,3,4	1,2,3,9,10	**42**
CO3	Draw Orthographic and Isometric views of simple Machine components.	***U/A***	5,6	1,2,3,9,10	**21**
				Total sessions	**78**

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
ENGINEERING DRAWING	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Hour	Questions to be set for SEE/MARKS			Marks weightage	weightage (%)
			R	U	A		
1	DIMENSIONING	15	--	10	20	30	20
2	PROJECTION OF POINTS AND LINES	15	--	10	20	30	20
3	PROJECTION OF PLANE SURFACES	12	--	--	20	20	15
4	PROJECTION OF SOLIDS	15	---	---	20	20	15
5	CONVERTION OF PICTORIAL VIEWS INTO ORTHOGRAPHIC VIEWS	10	---	---	15	15	10
6	ISOMETRIC PROJECTIONS	12	---	---	30	30	20
	Total			20	125	145	100

Legend: R; Remember, U: Understand A: Application

COURSE CONTENT

UNIT:I	DIMENSIONING	CONTACT HOURS: 15 Hours

Introduction to Engineering Drawing-Drawing Instruments – Standard Sizes of Drawing sheets and layout of drawing sheets-Types of lines and their applications-Conventions for various materials-Introduction to Dimensioning-Elements of Dimensioning –Systems of Dimensioning-Methods of arrangements of Dimensioning- Dimensioning of common features like diameters, radii, arc sand chords.

UNIT:II	PROJECTION OF POINTS AND LINES	CONTACT HOURS: 15 Hours

Introduction to orthographic projection- Planes of projection- Four Quadrants- Concept of first & third angle projection method- Projection of points in all the four quadrants.

Projection of lines – Parallel to both HP and VP - parallel to one plane and Perpendicular to other- parallel to one plane and Inclined to the other.

(First angle projection should be followed).

UNIT:III	PROJECTION OF PLANE SURFACES	CONTACT HOURS: 12 Hours

Construction of polygons-Projection of plane Surfaces–Planes parallel to one plane and Perpendicular to other two - Planes Perpendicular to one plane and inclined to the other.

UNIT:IV	PROJECTION OF SOLIDS	CONTACT HOURS: 15 Hours

Positioning of solids – lying with base on HP-Base or Axis inclined to HP-lying one of their lateral faces on HP- lying one of their lateral edges on HP.

UNIT:V	CONVERTION OF PICTORIAL VIEWS INTO ORTHOGRAPHIC VIEWS	CONTACT HOURS:09 Hours

Introduction –Guidelines for Conversion of pictorial views into Orthographic Views

UNIT:VI	ISOMETRIC PROJECTIONS	CONTACT HOURS: 12 Hours

Principles of isometric projection – isometric scale – isometric views of simple solids – cube, prisms, pyramids, cylinder and cone - Conversion of orthographic views into isometric View of Simple M/C Components.

TOTAL: 78 Hours

TEXT BOOK

1. K.R.Gopalakrishna"*FundamentalsofDrawing"*Subhas Publications, 2010.
2. K.R.Gopalakrishna*"Engineering Drawing" (Vol. I & II),* Subhas Publications, 2014.

REFERENCES

1. BasantAgarwal and Agarwal.C.M., *"Engineering Drawing",* McGraw Hill Publishing Company Limited, New Delhi, 2012
2. DhananjayA.Jolhe, "*Engineering Drawing with an Introduction to AutoCAD",*McGrawHill Publishing Company Ltd., 2008.
3. P.I.Varghese,*"Engineering Graphics" ,*McGrawHill Publishing Company Ltd. 2013.
4. R.K. Dhawan, *"A text book of Engineering Drawing",*S.ChandPublishers, Delhi,2010.
5. G.S. Phull and H.S.Sandhu, *"Engineering Graphics",*Wiley Publications, 2014.
6. K.Venugopal and V.Prabhu Raja, *"Engineering Graphics",* New Age International PrivateLimited, 2008.
7. M.B.Shah and B.C.Rana, *"Engineering Drawing",* Pearson Education, 2005

Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	*CIE	IA	Students	Graded Exercises (Average marks allotted for each graded exercise)	25	Drawing Sheets	1,2,3
	*SEE	End Exam		End of the course	100	Answer scripts at BTE	1,2,3
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3 Effectiveness of Delivery of instructions & Assessment Methods

***CIE –** Continuous Internal Evaluation ***SEE** – Semester End Examination

NOTE:THIS SUBJECT SHOULD THOUGHT IN A BATCH OF 15 TO 20 STUDENTS,TEACHER ALOTTED PER BATCH HAS TO MONITER, EVALUATE OR ASSESS THE STUDENTS.

MODEL QUESTION PAPER

Code:**15ME01D**

First / Second Semester Diploma Examination

ENGINEERING DRAWING(Conventional)

(Common to E & E / MECHATRONICS/ HPT/ WSM / TEXTILE Programmes)

Time; 4 Hours] **[Max. Marks: 100**

Note: i) **Part –A** is compulsory.
ii) Answer any **FIVE** questions from **Part-B** and **TWO** questions from **Part-C**.

PART –A

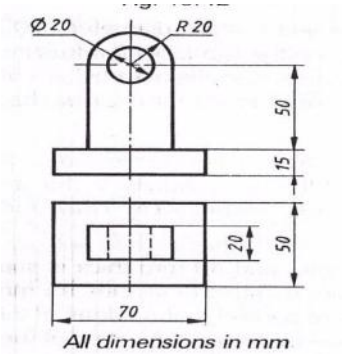
1. List the standard sizes of the drawing sheets. 05
2. Mention the types of lines and their applications. 05
3. Draw the projections of the following points: 2 x 5=10
   a) Point P is 25mm above the HP and 40mm behind the VP
   b) Point Q is 30mm below the HP and 40mm behind the VP

PART –B

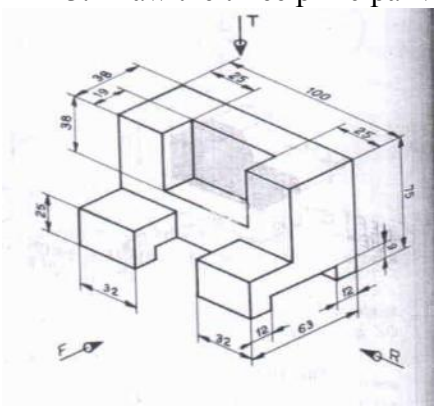
4. Copy the given sketch to 1: 1 scale and dimension it adopting aligned system with chain dimensioning.
5. Illustrate the dimensioning of the given common features: diameters, radii, arcs and chords. 10
6. A line 70 mm long inclined at 30° to HP and parallel to VP. The line is 80 mm in front of VP. The lower end is 35 mm in front of HP and 110 mm in front of right PP and is away from it than the higher end. Draw the three views of the line. 10
7. A line 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30 mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three views of the line. 10
8. A regular pentagonal lamina of 30 mm side rests on HP with one of its edge perpendicular To VP. The surface of the lamina is inclined at an angle of 45° to HP. Draw its Top and front views. 10
9. A circular lamina 60 mm diameter rests on HP such that the surface of the lamina is Inclined at 30° to HP. Draw its Top and front views. 10
10. A hexagonal pyramid 25 mm side of base and height 60 mm rests with one of its base edges on HP such that the base is inclined at 45° to HP and the axis is parallel to VP. Draw its Top and front views. 10
11. Draw the top and front views of a cone 60 mm diameter base and axis 80 mm long lying on HP with its axis inclined at 45° to it parallel to VP. Draw its Top and front views 10

PART –C

12. Draw the isometric view of the machine component whose orthographic views are given below: 15



13. Draw the three principal views of the component as shown in the figure. 15



14. Draw the isometric projection of a frustum of a cone of 40 mm top diameter, and 80 mm bottom diameter and 60 mm height. 15

MODEL QUESTION BANK

First /Second Semester Diploma Examination

Course: ENGINEERING DRAWING Code: 15ME01D

(Common to MECHATRONICS/ HPT/E&E/WSM/TEXTTILE Programmes)

CO 1:USAGE OF THE DRAWING INSTRUMENTS EFFECTIVELY BY STUDENTS

LEVEL: UNDERSTANDING

1.List the standard sizes of drawing sheets.

2. Mention the types of lines and their applications.

3.Illustrate the elements of dimensioning with the help of a sketch.

4.Illustrate the dimensioning of given common features: diameter, radius, chord, Arc and angle.

5. Mention the uses of the following drawing instruments.

i) T-square ii) Set square iii) Bow compass iv) Clinograph v) Minidrafter

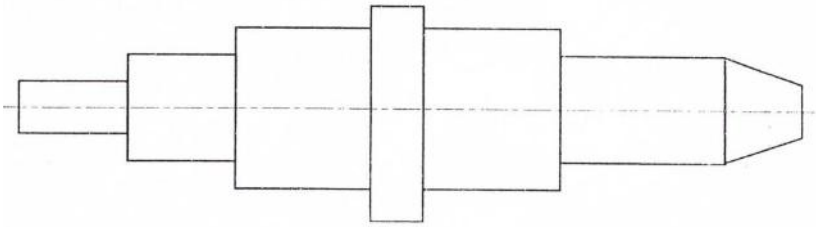
6. Mention the uses of the following drawing instruments.

i) French curves ii) Protractor iii) Clips iv)Erasing Shield v) Drafting machine

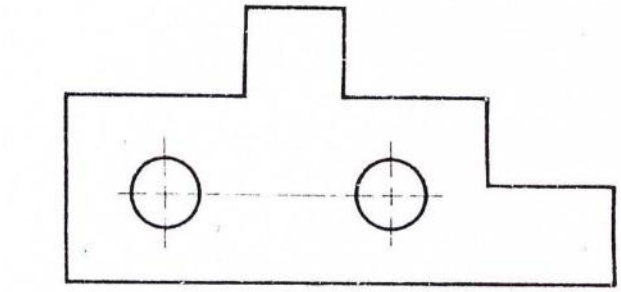
LEVEL: APPLICATION

7.Draw the standard layout of aA2 size drawing sheet

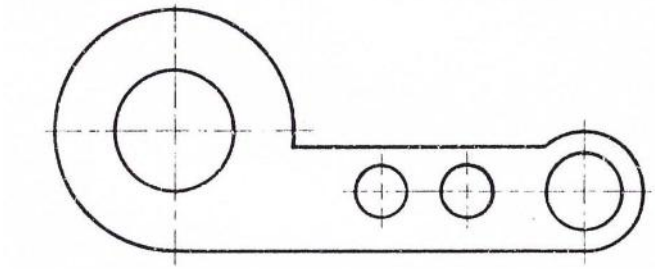
8. Copy the given sketch to 1:1 scale and dimension adopting aligned system with paralleldimensioning method.



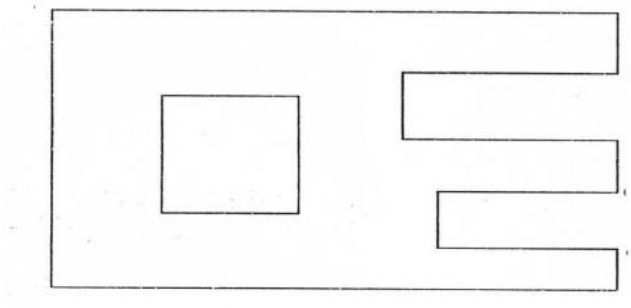
9. Copy the given sketch to 1:1 scale and dimension adopting aligned system with progressive dimensioning method.



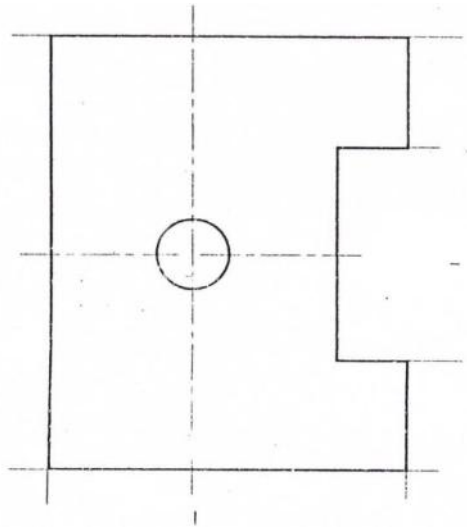
10. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with chain dimensioning method.



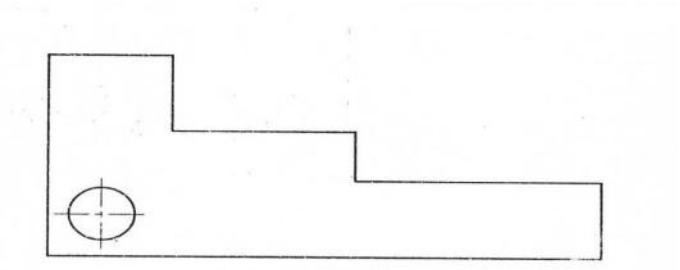
11. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with combined dimensioning method.



12. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with parallel dimensioning method.



13. Copy the given sketch to 1:1 scale and dimension adopting aligned system with chain dimensioning method.



CO 2:INTERPRET AND DRAW THE BASIC ENGINEERING DRAWING SKILLS RELATED TO PROJECTIONS OF POINTS.

LEVEL: UNDERSTANDING

1. Draw the symbolic representation of First angle projection method.
2. Draw the symbolic representation of Third angle projection method.

LEVEL: APPLICATION

3. A point P is 40 mm in front of VP, 50 mm above HP and 30 mm in front of left PP. Draw the three principal views of the point.
4. A point P is 30 mm above HP, 50 mm behind VP and 45 mm in front of left PP. Draw the three principal views of the point
5. Draw the three principal views of a point P lying 40 mm behind VP, 60 mm below HP and 30 mm behind the right PP
6. Draw the three principal views of a point P lying 60 mm below HP, 50 mm in front of VP and 45 mm in front of the left PP.

(10Marks Questions)

1. Draw the projections of the following points:
   i) P is 25mm below the HP and in the VP
   ii) Q is 40mm behind the VP and in the HP
   iii) R is 30mm below the HP and 30mm in front of the VP
   iv) S is 25mm above the HP and 25mm behind the VP

2. Draw the projections of the following points:
   i) T is 25mm above the HP and 30mm in front of the VP.
   ii) U is in both the VP and HP
   iii) V is 35mm below the HP and 30mmm behind the VP
   iv) W is 30mm above the HP and 35mm behind the VP

3. Draw the projections of the following points:
   i)A is 25mm above the HP and 35mm in front of the VP
   ii)B is 25mm above the HP and 40mm behind the VP
   iii)C is 30mm below the HP and 40mm behind the VP
   iv)D is 30mm below the HP and 35mm in front of the VP
4. Draw the projections of the following points:
   i)E is 25mm above the HP and in the VP.
   ii) F is 30mm below the HP and in the VP
   iii)G is 35mm in front of the VP and in the HP
   iv)H is 40mm behind the VP and in the HP
5. Draw the three principal views of a line 80 mm long placed parallel to VP and perpendicular to HP. The line is 70mm in front of VP and 60mm in front of right PP. The lower end of the line is 30mm above HP.
6. Draw the three principal views of a line 80 mm long when it is placed parallel to both HP & VP. One of the ends of the line is 70 mm above HP, 60 mm in front of VP and 30mm in front of the right PP.

7. A line AB 80 mm long is inclined at 30° to HP and parallel to VP. The line is 90 mm in front of VP. The lower end A is 35 mm above HP, 110 mm in front of the right PP and is away from it than the higher end. Draw the three principal views of the line.
8. A line AB 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three principal views of the line.
9. Draw the projections of a line AB, 80 mm long inclined at 30° to HP and parallel to VP. The line is 40 mm in front of VP. The lower end A is 20 mm above HP.
10. The length of a line is 100 mm long and is inclined at 45° to VP and parallel to HP. The line is 15 mm above HP and one end of the line is 10 mm in front of VP. Draw the projections of the line and measure top and front views.
11. The length of top view of a line which is parallel to VP and inclined at 45° to HP is 50 mm. One end of the line is 12 mm above HP and 25 mm in front of 45° to VP. Draw the projections of the line and determine its true length.
12. Draw the projections of a line 70 mm long lying in VP and inclined at 45° to HP. The lower end of the line is 10 mm above HP

CO 2: INTERPRET AND DRAW THE BASIC ENGINEERING DRAWING SKILLS RELATED TO PROJECTIONS OF STRAIGHT LINES

LEVEL: APPLICATION

(10 MARKS QUESTIONS)

1. An equilateral triangular lamina of side 40mm rests with one its sides on HP so that the surface of the lamina is inclined at 30° to HP. Draw the projections of the lamina.
2. An equilateral triangular lamina of sides 30mm is resting with one of its corners on HP, The surface of the lamina is inclined at 45° to HP. which the lamina rests is inclined at Draw the projections of the lamina.
3. A square lamina of 40mm side rests with one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. Draw the top and front views of the square lamina in this position.
4. A square lamina of 40mm sides rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to HP .Draw its projections.
5. A square lamina of side 40mm rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to HP .Draw its projections.
6. A regular pentagonal lamina has its sides as 30mm. It is resting with one of its corners on HP. The plane surface of the lamina is inclined at 30° to HP. Draw its projections
7. A hexagonal lamina of sides 30mm rests on one of its sides on HP so that the surface of the lamina is inclined at 45° to HP. Draw the top and front views of the lamina.
8. A hexagonal lamina of side 30mm is resting with one of its corner on HP so that the diagonal passing through that corner is inclined at an angle of 45° to HP. Draw the top and front views of the lamina.
9. A pentagonal plane lamina of edges 20mm is resting on HP with one of its corner touching it such that plane surface makes an angle of 60° with HP. to this corner makes Draw the top and front views of the plane lamina in this position.
10. A hexagonal lamina of 30mm sides rests on HP on one of its sides. The side which is on HP is perpendicular to VP and the surface of the lamina is inclined to HP at 45°. Draw the front view and the top view of the lamina.
11. A circular lamina of 60mm diameter rests on HP such that the surface of the lamina is inclined at 30° to HP. Obtain its projections

12. A Circular plane of diameter 50mm has its surface parallel to HP and perpendicular to VP. Its Centre is 20mm above HP and 30mm in front of VP. Draw its projections.

13. A Pentagonal lamina of side 30mm is placed with one side on HP and the surface inclined at 50° to HP and perpendicular to VP. Draw its projections.

14. A Hexagonal plane of side 30mm is placed with a side on VP and the surface inclined at 45° to VP and perpendicular to HP. Draw its projections.

CO 2: INTERPRET AND DRAW THE BASIC ENGINEERING DRAWING SKILLS RELATED TO PROJECTIONS OF SOLIDS.

LEVEL: APPLICATION

(10Marks Questions)

1. A triangular prism of base edge 40mm and height 65mm rests with one of its base edges on HP so that the axis of the prim is inclined at 30° with HP. Draw the projections when the axis of the prism is parallel to VP.
2. A square prism of base edge 40mm and height 65mm rests with one of its base edges on HP. The axis of the prism is inclined at 45° to HP and parallel to VP. Draw the top and the front views of the prism.
3. A pentagonal prism of base 35mm and height 60mm has its base edge on HP. Draw the projections if the base of the prism is inclined at 30° to the HP. The axis of the prism is parallel to the VP.
4. A Hexagonal prism of base 35mm and height 60mm is resting with its base edge on HP so that the axis is inclined at 45° and parallel to VP. Draw its projections.
5. The axis of the square prism of base edge 40mm and height 60mm is inclined at 30° to HP and parallel to the VP. Draw the projections when the prism is placed with one of its corners on HP. The two adjacent base edges containing this corner are equally inclined to HP.
6. A pentagonal prism of base 35mm and axis height 60mm is resting with one of its base corners on HP such that the axis is inclined at 30° to the HP. Draw the projections when the axis of the prism is parallel to VP.
7. A triangular pyramid of base edge 40mm and height 65mm is resting with one of its base edges on HP so that the axis of the pyramid is parallel to VP and inclined at 45° to HP. Draw the projections.
8. Draw the projections of a hexagonal pyramid resting with one of its base edges on HP such that the axis of the pyramid is inclined at 30° to HP. The hexagonal pyramid has its base edges as 35mm and axis height as 60mm.
9. A pentagonal pyramid of base edge 35mm and axis height 65mm rests with one of its base corners on HP so that the axis of the pyramid is inclined at 45° to the HP. Draw the projections if the axis of the pyramid is parallel to the VP.
10. A square pyramid of base 40mm and axis height 65mm rests with its triangular lateral surfaces on HP so that the axis of the pyramid is parallel to the VP. Draw the projections.
11. A hexagonal pyramid is resting with one of its triangular lateral surfaces on HP. Draw the projections if its base edges are 40mm and the axis height is 65mm.
12. A pentagonal pyramid of base edge 40mm and axis 65mm rests with its slant edge on HP so that its axis is parallel to the VP. Draw the projections.
13. A cylinder of 40mm diameter and axis height 65mm rests with its points of the circumference on HP so that the axis is inclined at 45° to the HP and parallel to the VP. Draw the projections.

14. A cone of 40mm diameter and axis height 65mm is resting with points of the circumference on HP. Draw the projections if the axis of the cone is inclined at 30° with HP and parallel to VP.
15. A cone of 45mm diameter and axis height 60mm is resting with its end slant generator on HP so that the axis of the cone is parallel to VP. Draw the projections of the cone.
16. A pentagonal prism of 30mm side of base and height 60mm rests with one of its edges of the base on HP such that the axis is inclined at 30° to HP and parallel to VP. Draw the top and front views.
17. A hexagonal pyramid of 25mm side of base and height 60mm rests with one of its base edges on HP such that the base is inclined at 45° to HP, and the axis parallel to VP. Draw the top and front views.
18. A hexagonal pyramid of 25mm edge of base and height 60mm rests with one of its corners of the base on HP such that the base is inclined at 30° to it and the axis parallel to VP. The two of the base edges containing the corner on which the pyramid rests make equal inclinations with HP. Draw the projections.
19. A pentagonal prim of 30mm side of base and height 55mm rests with one of its rectangular faces on HP and the axis parallel to VP. Draw its projections.
20. Draw the top and front views of a triangular prism of 35mm side of triangular faces and height 60mm rest with one of its longer edges on HP such that the axis is parallel to VP and the rectangular face opposite to the slant edge on which the prism rests in perpendicular to VP.
21. Draw the top and front views of a pentagonal pyramid of side of base 30mm and height 60mm rests with one of its slant edges on HP and the axis parallel to VP.

CO 3: DRAW ORTHOGRAPHIC VIEWS OF SIMPLE MACHINE COMPONENTS.

LEVEL: APPLICATION

(15 MARKS QUESTION)

.Draw the three principal views of the component as shown in the figure.

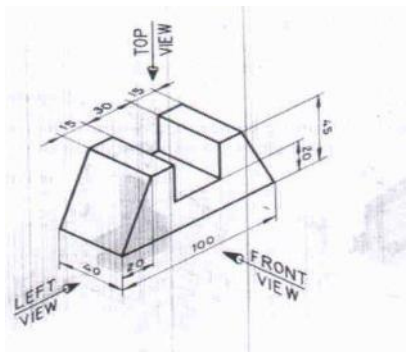


FIG-1

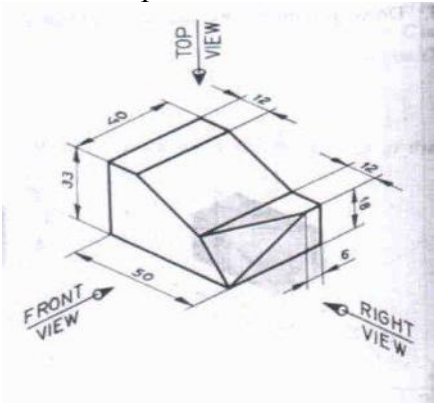


FIG-2

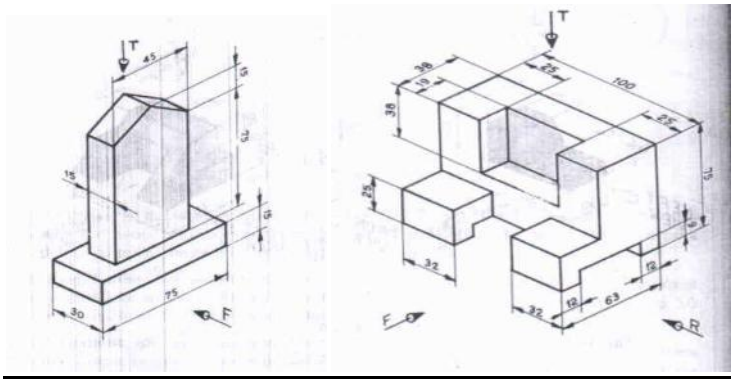


FIG-3 **FIG-4**

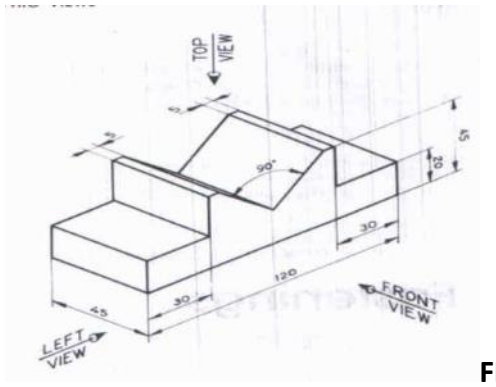


FIG-5

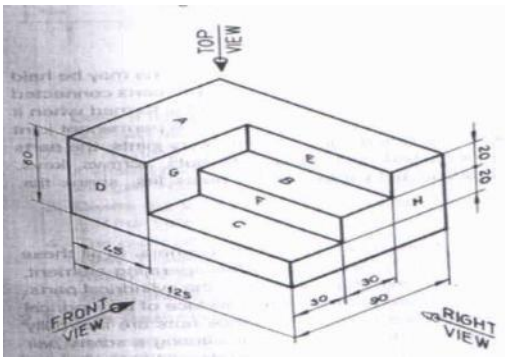


FIG-6

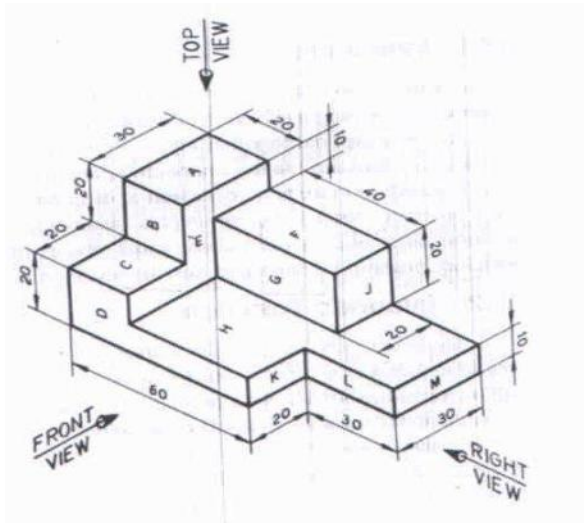


FIG-7

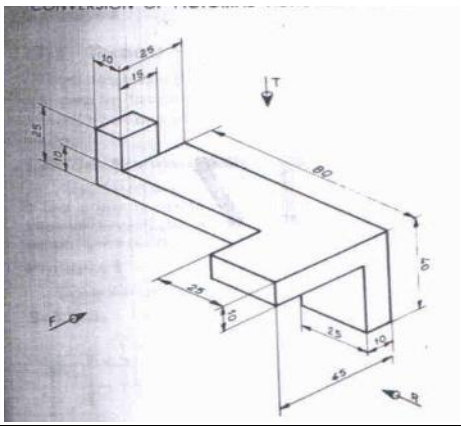


FIG-8

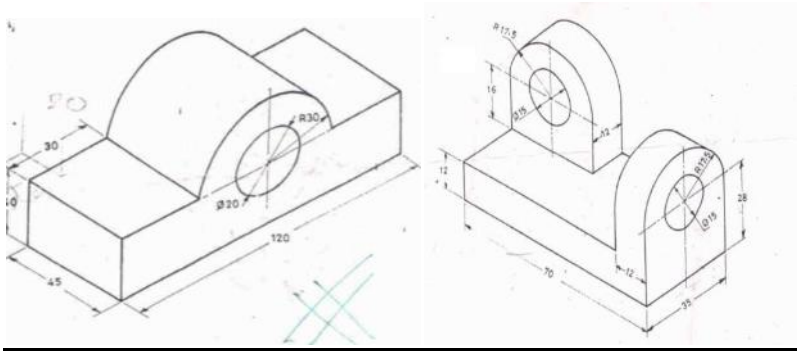


FIG-9FIG-10

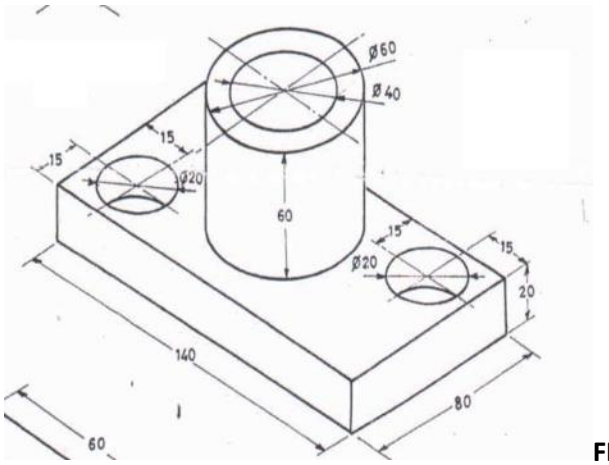


FIG-11

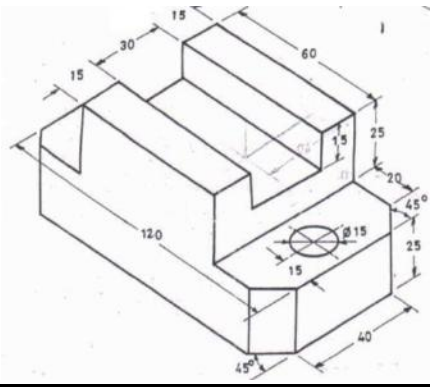


FIG-12

ALL DIMENSIONS ARE IN MM

CO 3: DRAW ISOMETRIC VIEWS OF SIMPLE MACHINE COMPONENTS.

LEVEL: APPLICATION

(15 MARKS QUESTION)

.Draw the isometric view of the machine component whose orthographic views are given below:

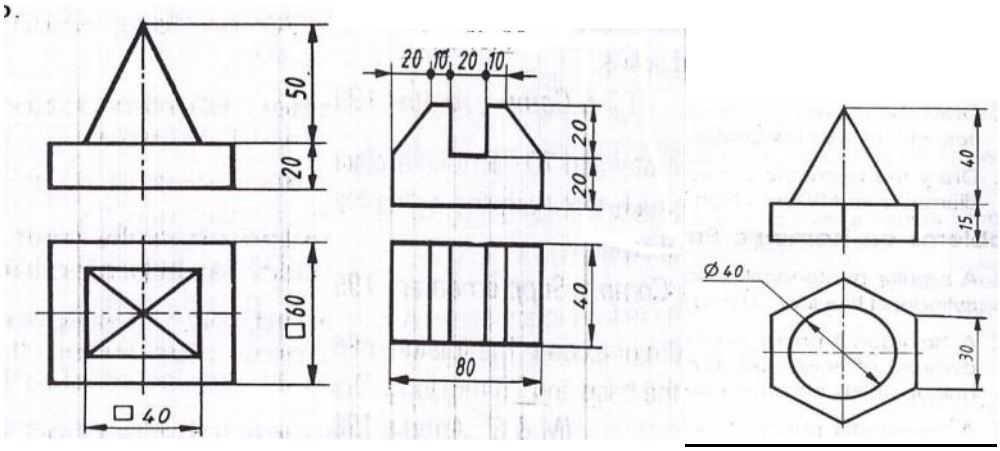
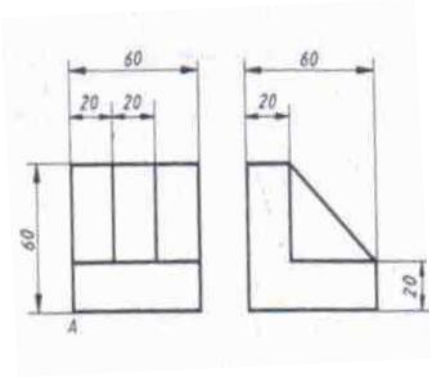
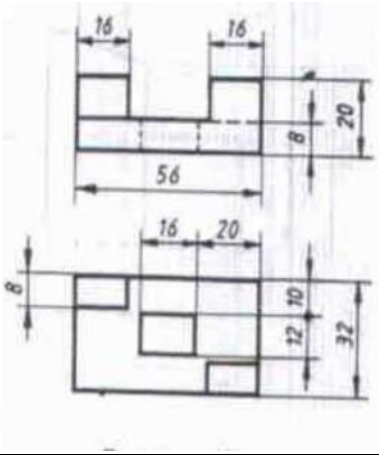
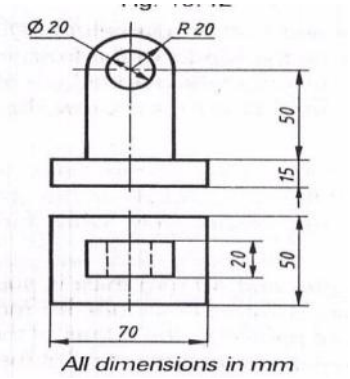


FIG-1 **FIG-2** **FIG-3**







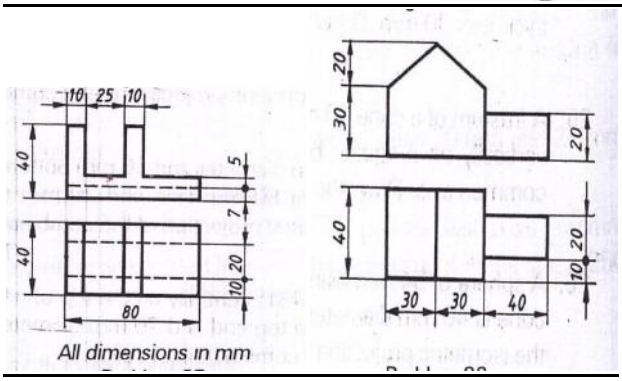
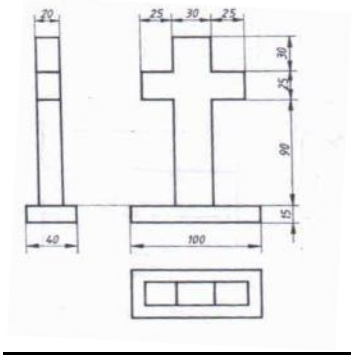


FIG-4 **FIG-5** **FIG-6**



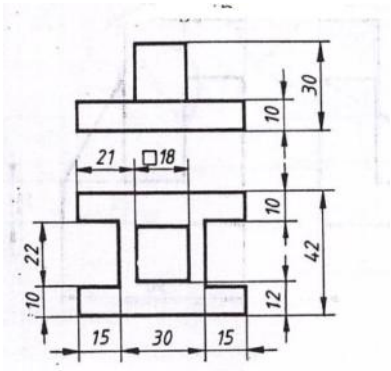


FIG-7 **FIG-8**

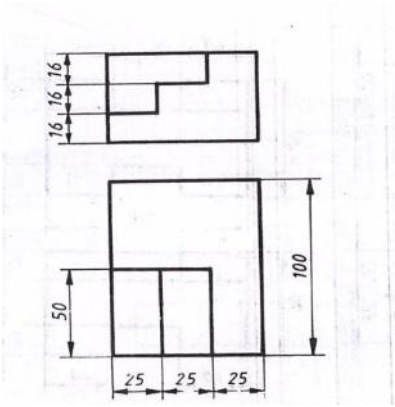


FIG-09

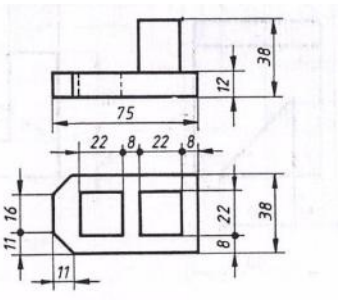
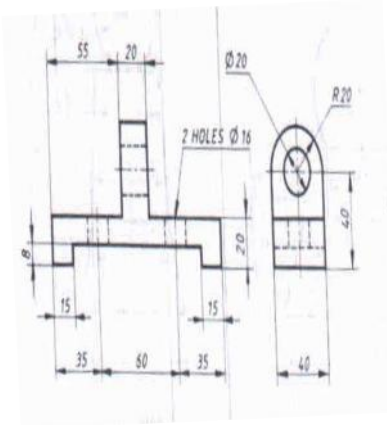


FIG-10



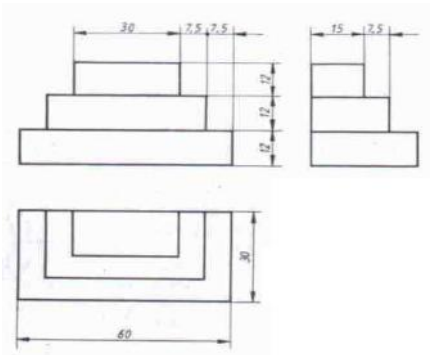
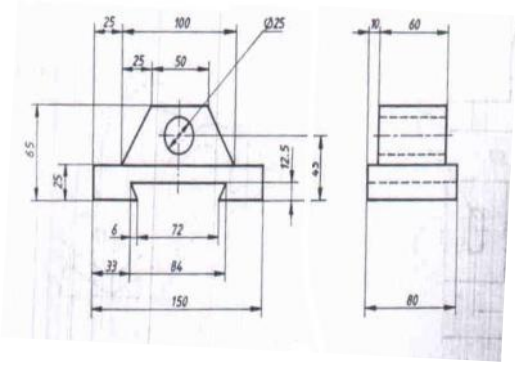


FIG-11FIG-12



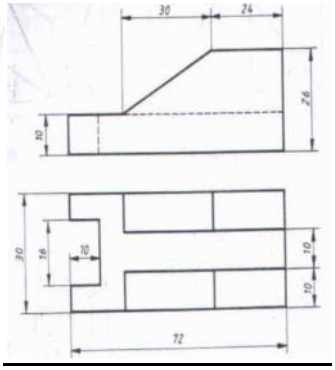


FIG-13FIG-14

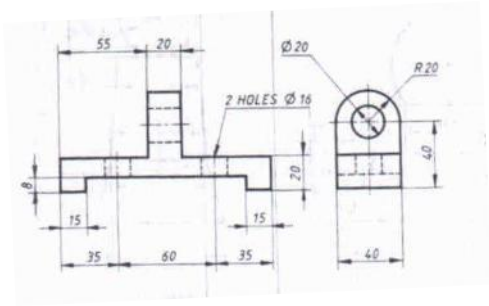


FIG-15

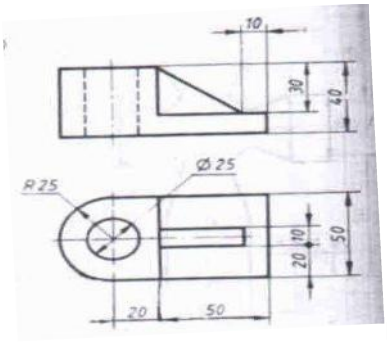


FIG-16

21. Draw the isometric view of a frustum of a cone of 40 mm top diameter, 80 mm bottom diameter and 60 mm height.
22. A cube of side 30 mm rests centrally on the top of another cube of side 60 mm. Draw the isometric view of the solid.
23. A square pyramid of base edge 50 mm and height 80 mm rests on the top of the cube of side 100 mm. Two sides of the base of the pyramid are parallel to the top edges of the cube. Draw the isometric view of the solid.
24. A cylindrical block of 40 mm diameter and length 50 mm is resting vertically on the centre of the cube of 70 mm side. Draw the isometric view of the combination of solids.
25. A square pyramid of base side 22 mm and height 20 mm rests centrally on the top of a cylinder of base diameter 40 mm and height 30 mm.

****

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: **ELECTRICAL CIRCUITS LAB**		Course Code	: **15EE22P**
Semester	: **II**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **0:2:4**	Credits	**: 3 Credits**
Type of course	: **Tutorial + Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	: **50 Marks**

Pre-requisites	**:**Brief knowledge of circuit elements and magnetism
Course Objectives	**:**Prepare the student to understand the working of Electric Circuits

Course Outcomes:

On successful completion of the course the student will be able to -

1: Understand the measurement of Resistance, voltage and current.

2. Test and Verify the Ohm's, KVL, and KCL laws.

3: Understand measurement of Resistance and temperature coefficient of resistance.

4: Test and Verify cells in series, parallel and series-parallel.

5: Test and Verify Superposition, Reciprocity and Thevenin's theorems.

6: Understand measurement of Power and power factor in single phase ac circuit.

Course Contents:

Staff-in-charge must teach one hour tutorial for each Lab. The Contents to be taught in the one hour tutorial are

Tutorial 1:

1. Mention circuit elements as per I.S.
2. Use an analog multimeter to record different readings.
3. Connect analog voltmeter and analog ammeter in circuit and record the readings.
4. Identify different measuring instruments.

Tutorial 2:

1. Identify standard symbols of load and protective devices.
2. Identify AC/DC supply terminals and tabulate measured voltage between terminals.
3. Explain Ohm's law.

Tutorial 3:

1. Explain KCL.

Tutorial 4:

1. Explain KVL.

Tutorial 5:

1. Explain resistance.
2. Explain specific resistance.

Tutorial 6:

1. Study different types of rheostats, like wire wound, water rheostat.

Tutorial 7:

1. Explain secondary cells
2. Explain voltage variation when cells are connected in series.

Tutorial 8:

1. Explain current variation when cells are connected in parallel.

Tutorial 9:

1. Explain voltage and current variation when cells are connected series and parallel combination.

Tutorial 10:

1. Explain the conditions of fully charged battery.

Tutorial 11:

1. Connect wattmeter and calculate wattmeter constant.
2. Differentiate UPF and LPF wattmeter's and mention their uses.
3. Explain power and power factor and how power factor varies on different types of loads (resistive load or inductive load).

Tutorial 12:

1. Explain super position theorem.

Tutorial 13:

1. Explain reciprocity theorem.

Tutorial 14:

1. Explain Thevenin's theorem

PERFORMING EXPERIMENTS: 52hrs

1. Use a multimeter to measure -The voltage across the terminals, the current flowing in the circuit and the resistance of the load.
2. Verify Ohm's law experimentally.
3. Verify Kirchhoff's current law experimentally.
4. Verify Kirchhoff's voltage law experimentally.
5. Measure the resistance of a given material by using ammeter and voltmeter method and calculate the specific resistance of Copper.
6. Measure the temperature coefficient of resistance of a resistive material using calorimeter.
7. Measure voltage and current when secondary cells are in series.
8. Measure voltage and current when secondary cells are in parallel.
9. Measure voltage and current when secondary cells are in series- parallel.
10. Test and report the condition of car battery of 12 V rating .
11. Measure power in a single phase AC circuit using ammeter, voltmeter, Wattmeter and calculate p.f.
12. Verify experimentally super position theorem.
13. Verify experimentally reciprocity theorem.
14. Verify experimentally Thevenin's theorem

References:

1. Electrical Lab Manual by CCTEK, S. J. (GOVT.) POLYTECHNIC,BANGALORE.
2. Experiments in Electrical Engg by Soni, Gupta and Bhatnagar

e-Resources

1. http://www.facstaff.bucknell.edu
2. http://www.electronics-tutorials
3. http://electrical4u.com/
4. https://www.safaribooksonline.com/
5. http://www.allaboutcircuits.com/

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	30
2	Understanding	30
3	Application/ Analysis	40
Total		**100**

Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome		Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Understand the measurement of Resistance, voltage and current.	1	2, 3, 8, 9, 10	R/U/A	3
CO2	Test and Verify the Ohm's, KVL, and KCL laws.	2,3,4	2, 3, 8, 9, 10	U/A	9
CO3	Understand measurement of Resistance and temperature coefficient of resistance.	5,6	2, 3, 8, 9, 10	R/U/A	6
CO4	Test and Verify cells in series, parallel , series-parallel and report condition car battery	7,8,9,10	2, 3, 8, 9, 10	U/A	12
CO5	Test and Verify Superposition, Reciprocity and Thevenin's theorems.	12,13,14	2, 3, 8, 9, 10	U/A	15
CO6	Understand measurement of Power and power factor in single phase ac circuit.	11	2, 3, 8, 9, 10	R/U/A	3

R-Remember, U-Understanding; A-Application/ Analysis;

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Electrical Circuits Lab	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Delivery:

The laboratory Course will be delivered through Tutorial, laboratory interaction, group discussion, practical exercises, instructions, assignments and viva voice.

Tutorial - 1Hr:

Staff-in-charge will;

1. Explain the concept and working of experiment to be conducted.
2. Impart/ discuss required selection of components/ devices/ meters /equipment / suitable accessories for the experiment to be conducted.
3. Ask students to draw the circuit diagram, tabular column and truth table if any.
4. Give clear instructions about safety precautions to be followed while conducting the experiment.

Conduction/ Execution- 2 Hr:

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

Course Assessment and Evaluation:

Method	What		To Whom	Frequency	Max Marks Practical	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continous Internal Evaluation)	I A Tests	Students	Practical: Two IA tests (Average of IA test marks will be computed)	10	Blue Books	1 to 6
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Lab Record	1 to 6
				Assignments or Mini Program Project	5	Blue Books	1 to 6
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	50	Answer Scripts	ALL COs
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course		Feed Back Forms	ALL COs
	End Of Course Survey			End Of The Course		Questionn-aire	ALL COs

*CIE – Continuous Internal Evaluation *SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Suggested Student Activity (any one to be submitted with 3 pages report):

1. Visit nearby Battery charging shop or show room and prepare a report of the visit.
2. Identify the faulty battery and service the same using standard tools.
3. Identify the faults in the Rheostats in the Laboratory and service the same.
4. Prepare a report of the conditions of batteries available in the Polytechnic.
5. Mini project on measurement methods of Resistance, Inductance and Capacitance.
6. For given voltage, current, Ah ratings of individual cell, and required voltage and current rating of battery, prepare a report of calculations for number of cells and their method of connections.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

QUESTION BANK

1. Conduct an experiment to Verify Ohm's law by applying to a simple circuit.
2. Conduct an experiment to Verify Kirchhoff's current law.
3. Conduct an experiment to Verify Kirchhoff's voltage law
4. Conduct an experiment to Measure the resistance of a given material by using ammeter and voltmeter method and calculate the specific resistance of Copper or Nichrome or Eureka.
5. Conduct an experiment to measure the temperature coefficient of resistance like Copper or Nichrome or Eureka etc
6. Conduct an experiment to Connect secondary cells in series and measure emf and current.
7. Conduct an experiment to Connect secondary cells in parallel and measure total emf and current
8. Conduct an experiment to Connect secondary cells in Series - Parallel and measure emf and current.
9. Conduct an experiment to Test and report the condition of car battery of 12 V and 24 V rating
10. Conduct an experiment to measure current, power and p.ffor a given single phase load.
11. Conduct an experiment to Verify super position theorem.
12. Conduct an experiment to Verify reciprocity theorem.
13. Conduct an experiment to Verify Thevinin's theorem.

Scheme of Valuation:

Sl. no.	Performance	Max.Marks
1	Writing circuit diagram and Procedure(for One)	10
2	Conduction of Experiment	25
3	Calculation and Result	5
5	Viva voce	10
	TOTAL	**50**

List of materials for Electrical Circuits lab

	RPS 0-30V/60V,5/10A	10
1	Wire wound rheostats range-assorted	30
3	Portable DC Moving coil ammeter –multirange (0-1-2-5-10A)	30
4	Portable DC Moving coil Voltmeters –multirange (0-2-10-15-30-75-150-300V)	20
5	Portable Moving iron ammeter –multirange (0-1-2-5-10A)	20
6	Portable Moving iron Voltmeters –multirange (0-5-10-15-30-75-150-300-600V)	20
7	Multimeters analog and digital	06
8	Dynamometer type UPF Wattmeter75/300/600V,5/10A	04
9	Knife switches SPST,DPST,DPDT,TPST,TPDT etc.	20
10	Galvanometers centre zero type	10
11	Electric heater 1kw 230v	02
12	Thermometer industrial range	02
13	Standard screw gauge	02
14	Cells 1.5 v	20
15	Batteries 6v,12v,24v	05 each
16	Decade resistance boxes	03
17	Decade condenser boxes	03
18	Decade inductor boxes	03
19	Rheostats assorted	20
20	Soldering iron 25W-10,60w-05	15
21	0-15 V at 2/1A continuously variable power supply with current limit.	10
22	230v,40Watts choke	5
23	230v, 100 W bulbs	10
24	230v,fan capacitor.	5
25	0-30V at 2/1A continuously variable power supply with current limit	10

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title:	**C PROGRAMMING LAB**	Course Code	: **15EE23P**
Semester	: **II**	Course Group	: **Core**
Teaching Scheme in Hrs (L:T:P)	: **0:2:4**	Credits	: **3 Credits**
Type of course	: **Tutorial + Practical**	Total Contact Hours	: **78**
CIE	: **25 Marks**	SEE	: **50 Marks**

Pre-requisites	**:** Mathematics and Science in secondary education, Basic computer skills lab.
Course Objectives	**:**To develop programming skills using computer languages bylearning programming concepts in C.

Course Contents

Unit No.	Topics	Tutorial Hours	Practical Hours
1	Introduction to programming.	02	04
2	Keywords, constants, variables, Data types.	03	06
3	Operators and Expressions, Library functions	03	06
4	Formatted Input-output operations	04	08
5	Decision control statement	02	04
6	Loop control statements	03	06
7	Switch case statement	02	04
8	Arrays	04	08
9	Strings	03	06
Total		**26**	**52**

Course Outcome:

On successful completion of the course, the students will be able to:

1. Learn the basic concepts of C programming.
2. Distinguish different programming approaches.
3. Write C programs and execute.
4. Debug different types of errors.

Course Contents:

Staff-in-charge must teach one hour tutorial for each Lab. The Contents to be taught in the one hour tutorial are

Note:
i. Tutorial – 1Hour and Practice -2 Hours
ii. Write flow chart for all the programs.

Tutorial 1

Steps involved in problem solving using Algorithms and Flowcharts.
Basic structure of C program, Steps to be followed for–Creation, Compilation and Execution of a C program, use of simple scanf( ) and printf( ) functions.

Program 1

1. Write a Program to print the text "Welcome to C programming"

Tutorial2

Character set, keywords and identifiers, constants, variables, data types.

Program 2

2. Write a program to find the area and circumference of a circle.

Tutorial3

Operators and expressions, Library functions.

Program 3, 4

3.Write a program to calculate the instantaneous value of an AC quantity like $v=V_m \sin\omega t$

4. Write a program using ternary operator to find the minimum of two resistor values.

Tutorial 4

Managing input-output operations – using functions like getchar( ) – reading a character, putchar( ) – writing a character, scanf( ) – formatted input and printf( ) – formatted output.

Program 5, 6, 7, 8

5. Write a program to display the electrical units in the following format:

Electrical quantity	Unit
Resistance	Ohm
Current	Ampere
Voltage	Volt
Power	Watt

6. Write a program to find equivalent resistance when resistors are connected in series, equivalent capacitance when capacitors are connected in parallel.

7. Write a program to calculate the total cost of 2 Laptops and 1 Printer, assuming cost price and discount offer.

8. Write a program to find impedance in series RLC circuit.

Tutorial 5

Decision making and branching using **if**, **if -else**, multi branch if, nested if statements.

Program 9

9. Write a program to generate the electricity bill according to the units consumed for AEH and lighting installation as per present KPTCL tariff.

Tutorials6

Switch –case statement

Program 10

10. Write a program using **switch – case** to calculate
    i. Power dissipated in resistance
    ii. Energy stored in capacitor
    iii. Energy stored in inductor

Tutorial 7

Looping - while, do-while & for statements

Program 11, 12, 13

11. Using for loop find the current through a resistor, for voltage varying from 5V to 20V in steps of 5V, using Ohm's Law.

12. Using **while** loop find the current through a resistor, for voltage varying from 50V to 100V in steps of 10V, using Ohm's Law.

13. Using **do….While** loop find the current through a resistor, for voltage varying from 16V to 8V in steps of 4V, using Ohm's Law.

Tutorial 8

Arrays – Syntax, reading and writing of one dimensional array.

Practical 8

14. Write a program to input 10 numbers to an array and display the greatest number.

Tutorial 9

Strings - Initializing String, Manipulating strings of characters

Program 15, 16

15. Accept any electrical quantity as a string in lower case. Convert and display it in upper case.
16. Accept any 10 words and display the same.

Resources

1. Programming with C – Byron S Gottfried
2. Programming in ANSI C – Balaguruswamy
3. Programming in C Language _ M A Jayaram. Sapna Publications.
4. Let us C – YaswanthKanetkar
5. Programming in C – V.Rajaraman

Web Resources

1. http://fresh2refresh.com/cprogramming
2. http://www.learn-c.org
3. http://www.learnconline.com/

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering	30
2	Understanding	30
3	Application/ Analysis	40
Total		**100**

Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome		Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Learn the basic concepts of C programming.	Tutorials 1 to 9 Expt. 1 to 4	2, 3, 8, 9, 10	R/U/A	17
CO2	Distinguish different programming approaches.	5 to 16	2, 3, 8, 9, 10	U/A	36
CO3	Write C programs and execute.	1 to 16	2, 3, 8, 9, 10	R/U/A	32
CO4	Debug different types of errors.	1 to 16	2, 3, 8, 9, 10	U/A	32

R-Remember, U-Understanding; A-Application/ Analysis;

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
C Programming Lab	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.
IF ≥40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Delivery:

The Course will be delivered through Tutorials, Demonstration, Exercises and Assignments.

Tutorial - 1Hr:

Staff-in-charge will;

1. Explain the concepts and Programing skills of C language.
2. Impart/ discuss required selection of commands for the program to be executed.
3. Ask students to write and execute the program.
4. Explain how to debug the errors.

Conduction/ Execution- 2 Hr:

Student will enter and execute the C program individually under the supervision of the staff-in-charge.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (Continous Internal Evaluation)	I A Tests	Students	Two IA tests (Average of two IA test marks will be computed)	10	Blue Books	1 to 4
		Class room Assignments		Assignments or Mini Program Project	5	Assignment papers or Program hardcopy	1 to 4
		Record Writing		Record Writing (Average of marks allotted for each expt.)	10	Record	1 to 4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End Of the Course	50	Answer Scripts at BTE	ALL COs
Indirect Assessment	Student Feedback on course		Students	Middle Of The Course			Feed Back Forms
	End Of Course Survey			End Of The Course			Questionnaire

*CIE – Continuous Internal Evaluation *SEE – Semester End Examination

Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Suggested Student Activity (any one to be submitted with 3 pages report):

1. Develop flow chart for a given Process industry/ office automation/ salary slip, etc.
2. Mini project on Applications of C language in Engineering field.
3. Mini project on C language.
4. Report on C programs to solve an electrical circuit for currents (using KVL).
5. Report on C programs to solve an electrical circuit for voltages (using KCL).
6. Mini project on C language commands, keywords, arrays, etc.

MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY (Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks **One activity on any one CO (course outcome) may be given to a group of FIVE students** **Grand Average/Total**						14/4 =3.5 ≈4				

Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-
Task given- Industrial visit and report writing

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1.Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3.Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4.Conversions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
					Total marks	14/4=3.5 ≈4				

Scheme of Valuation

Sl.No.	Particulars	Marks
1.	Write one program for the assigned question	10
2.	Enter, execute and obtain output for the assigned question	25
3.	Obtain the printout of the assigned program	05
4.	Viva-voce	10
Total		**50**

MODEL QUESTION BANK

C PROGRAMMING LAB Code:**15EE23P**

1. Write a program to find the sum and average of three integers.
   [sum = a+b+c , average = sum/3]

2. Write a program to find the area and perimeter of a rectangle when length and breadth are given. [hint: area = length x breadth, perimeter = 2(length + breadth)]

3. Write a program to find the area of a triangle when base and altitude are given
   [hint: area $=\frac{1}{2} * base * altitude$]

4. Write a program to find equivalent resistance of3 resistors when connected in series, and when connected in parallel.

5. Write a program to find equivalent capacitanceof3 capacitors when connected in series, and when connected in parallel.

6. Write a program to find simple interest [SI] when Principal [P], Term [T] and Rate of Interest[R] are given.

Simple interest $\mathbf{SI} = \frac{\mathbf{PTR}}{\mathbf{100}}$

7. A computer manufacturing company announces a special offer to their customers on purchasing laptops and printers accordingly:
   On laptop the discount is 15%
   On printers the discount is10%
   Write a program to calculate the discount if a customer purchases a laptop and a printer.

8. Write a program to calculate the value of the following expression.
   P=VIcosφ

9. Write a program to calculate the value of following expression.
   $I = I_m \sin\omega t$
10. Write a program to calculate the value of following expression.
    $P = \sqrt{3} VI \cos\varphi$

11. Write a program to find inductive reactance and capacitive reactance.
    (Hint: $X_L = 2\pi fLXc = \frac{1}{2\pi fC}$)

12. Write a program to find impedance of a series RLC circuit.
    (Hint: $Z = \sqrt{R^2 + (X_L - X_C)^2}$ $X_L = 2\pi fLXc = \frac{1}{2\pi fC}$

13. Write a program to calculate real power, apparent power, reactive power and power factor in a single phase AC system (Hint: Apparent power S=EI , real power P=EIcosφ, Reactive power Q=EI sinφ)

14. Write a program to find the maximum of two resistor values using ternary operator.

15. Write a program using **switch – case** statement to find and display
    1. Area of a circle. (hint: $A = \pi r^2$)
    2. Area of a square. ($A = S*S$)
    3. Area of a triangle. ($A = \frac{1}{2} * B * H$)

16. Write a program using **switch – case** statement to find and display:
    1. Sum of two numbers
    2. Difference of two numbers
    3. Product of two numbers
    4. Division of two numbers

17. Write a program using **switch – case** statement to calculate
    1. Power dissipated in resistance. (hint: $P = VI$)
    2. Energy stored in capacitor. ($E = \frac{1}{2} CV^2$)
    3. Energy stored in inductor. ($E = \frac{1}{2} LI^2$)

18. Write a program to generate the electricity bill according to the units consumed as per the given tariff:

Units consumed	Charge
Up to 100 units	` 2.70 paisa/unit
More than 100 and up to 200 units	` 3.50/unit
More than 200 units	` 6/unit

    In addition to the above every consumer has to pay service charge of ` 50.

19. Accept a string in lower case. Convert and display it in upper case.

20. Write a program to display the electrical units in the following format:

Electrical quantity	Unit
current	Ampere
voltage	volts
power	watts
energy	KWH

21. Write a program to assign 10 numbers to an array and calculate the sum of even numbers and display them
22. Write a program to accept ten numbers and calculate the sum of odd numbers and display them.
23. Write a program to assign10 numbers to an array and display the greatest number.
24. Write a program to assign 10 numbers to an array and display the smallest number.
25. Program to enter your name (first line), address1 (second line), address2 (third line)andaddress3 (fourth line) and display them. Use gets( ) and puts( ) string functions.