

**FACULTY OF ENGINEERING**  
**B.E II-Semester (AICTE) (Main) Examination October, 2021**

**Subject: Engg. Chemistry / Chemistry**

**Time: 2 Hours**

**Max. Marks: 70**

- Note: i) First Question is compulsory and answer any three questions from the remaining six questions.**  
**ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.**  
**iii) Missing data, if any, may suitably be assumed.**

**Answer any four questions from the following**

**(4 x 4 = 16 Marks)**

- 1 (a) Distinguish between electrolytic and electrochemical cells.  
 (b) What do you mean by pitting corrosion?  
 (c) Explain break point chlorination.  
 (d) Define the term 'monomer'. Write its functionality with few example.  
 (e) Write the composition and uses of CNG.  
 (f) What is 'knocking'? Write its significance.  
 (g) Define 'atom economy'.

**(3 x 18 = 54 Marks)**

- 2 (a) What is secondary battery? Explain construction and applications of lead-acid battery.  
 (b) Determine the EMF of the following cell at 25°C with the help of Nernst equation by finding the net reaction.



$$(E^{\circ} Mg^{2+} | Mg = -2.364V \text{ and } E^{\circ} Cu | Cu^{2+} = -0.334V)$$

- 3 (a) How do you estimate the temporary hardness of water by EDTA method?  
 (b) Define corrosion. Discuss the various factors influencing the rate of corrosion.
- 4 (a) Differentiate thermoplastic and thermosetting resins.  
 (b) Explain the preparation, properties and uses of PVC and Nylon 6:6.
- 5 (a) Define Fuel. Describe the requirements of good fuel.  
 (b) Explain proximate and ultimate analysis of coal.
- 6 (a) Describe the properties and significance of biodiesel.  
 (b) Explain the classification of composites based on matrix and reinforcement.
- 7 (a) Discuss the mechanism of conduction in poly-acetylene and its applications.  
 (b) What is hot dipping? Explain surface coating method of galvanizing.

\*\*\*\*

**FACULTY OF ENGINEERING**  
**B.E. II - Semester (AICTE) (Backlog) Examination, October 2021**

**Subject: Chemistry**

**Time: 2 Hours**

**Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 What are Primary and Secondary batteries?
- 2 What is a reference electrode? Give one example with its electrode potential value.
- 3 Explain colloidal conditioning.
- 4 What is sacrificial anodic protection method?
- 5 How is Butyl rubber prepared? Mention its two applications.
- 6 What is Condensation polymerization?
- 7 Define Octane number and what is its significance.
- 8 Mention the composition and uses of CNG.
- 9 Give the classification of composites based on Matrix.
- 10 What is Atom economy in green chemistry and mention its importance?

**PART – B**

**Note: Answer any four questions.**

**(4x15 = 60 Marks)**

- 11 (a) How is ZN-C battery constructed? Explain its functioning with necessary cell reactions.  
 (b) Calculate electrode potential of Copper when it is placed in a Copper solution of 0.1 M Concentration and at a temperature 40°C. Standard reduction electrode potential of Cu is +0.33 Volt.
- 12 (a) Describe the mechanism of electrochemical corrosion with a suitable example.  
 (b) A sample of water contains 16.2 Mg of  $\text{Ca}(\text{HCO}_3)_2$ , 73 Mg of  $\text{Mg}(\text{HCO}_3)_2$ , 48 Mg of  $\text{MgSO}_4$ , 22.2 Mg of  $\text{CaCl}_2$  and 50 Mg of  $\text{Na}_2\text{SO}_4$  per liter. Calculate its temporary permanent and total hardness.
- 13 (a) How are conducting polymers classified? Explain the mechanism of conductance in Polyacetylene.  
 (b) Write the synthesis, properties & applications of Kevlar.
- 14 (a) What are the characteristic features of composite materials? Explain.  
 (b) Explain the following  
 (i) Trans esterification      (ii) Carbon neutrality.
- 15 (a) What is Cracking technique? And describe catalytic cracking by moving bed method.  
 (b) Calculate the volume of air required for complete combustion of 1m<sup>3</sup> of gaseous fuel having the composition  $\text{CO} = 40\%$ ,  $\text{CH}_4 = 10\%$ ,  $\text{H}_2 = 40\%$ ,  $\text{C}_2\text{H}_2 = 4\%$ ,  $\text{N}_2 = 2\%$  and rest is  $\text{CO}_2$ .
- 16 (a) Explain the proximate analysis of coal and give its importance.  
 (b) Discuss knocking and antiknocking property including their relation to chemical composition of Gasoline and Diesel.

..2..

- 17 (a) How is the Fractional distillation of crude oil carried out? Mention the composition and uses of various fractions obtained during the process.
- (b) Write a note on Ion exchange process of softening hard water with necessary diagram.

\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING**  
**B.E. (CE/M/P/AE) II-Semester (CBCS)(Backlog) Examination, October 2021**

**Subject: Engineering Mechanics – II**

**Time: 2 hours**

**Max. Marks: 70**

**Note: Missing data, if any, may be suitably assumed.**

**PART – A**

**Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 Define mass moment of inertia.
- 2 Difference between rectilinear motion and curvilinear motion.
- 3 Derive the work energy equation.
- 4 If the stone is dropped into a well of 20m deep when will the sound be heard?
- 5 Explain Dynamic equilibrium.
- 6 Explain principle of virtual work.
- 7 Differentiate between centre of gravity and mass moment of inertia.
- 8 The motion of a particle is defined as  $X = t^3 - 15t^2 - 20$  where X is expressed in meters and 't' is in seconds. Determine the acceleration of the particle at  $t = 4$ sec.
- 9 Discuss the principle of conservation of linear momentum of a particle.
- 10 Differentiate between direct impact and oblique impact.

**PART – B**

**Answer any four questions.**

**(4x15 = 60 Marks)**

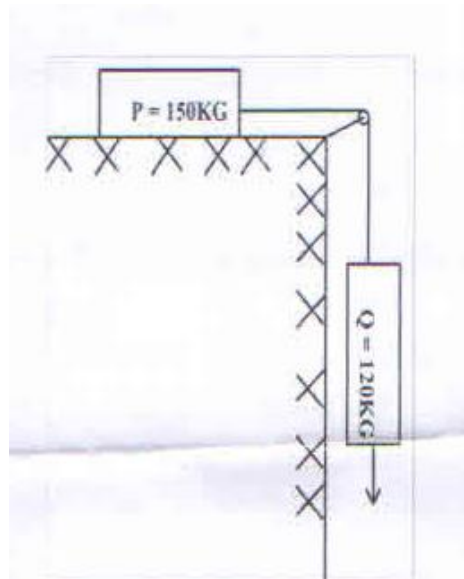
11 A cylinder of diameter 600mm and height 1500mm has mass density of 8000 kg/m<sup>3</sup>, find out mass moment of inertia of cylinder.

- (a) With respect to the axis of the cylinder.
- (b) About a line which coincides with an end face of the cylinder and passing through the centre of the face.

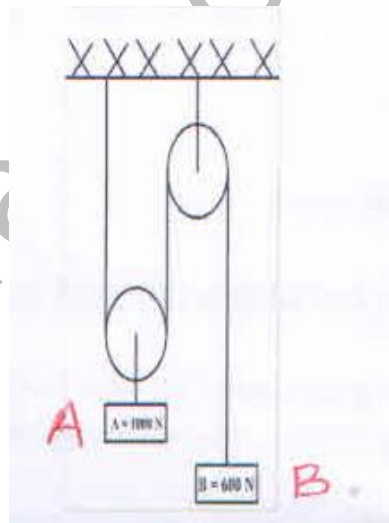
12 A projectile is fired from top of a cliff 100m height with a velocity of 500m/sec directed at 45° to horizontal. Find range on a horizontal plane through base of cliff.

13 Find the acceleration of moving body as shown below take mass of P=150kg and that of Q=120kg the coefficient of friction between the surface of contact is 0.2 also find tension in connected string.

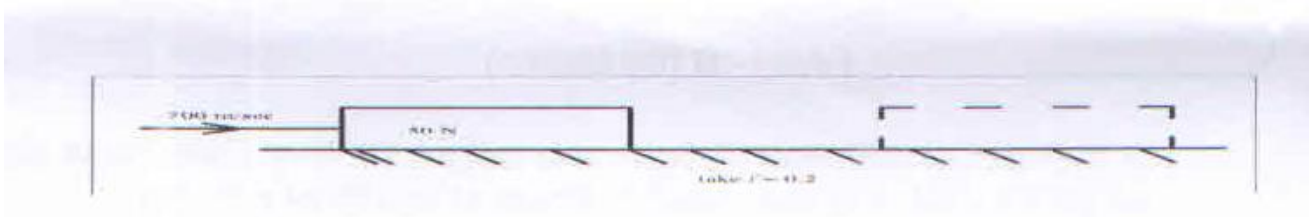
..2..



14 Determine the distance moved by A in changing its velocity from 2m/sec to 4m/sec.

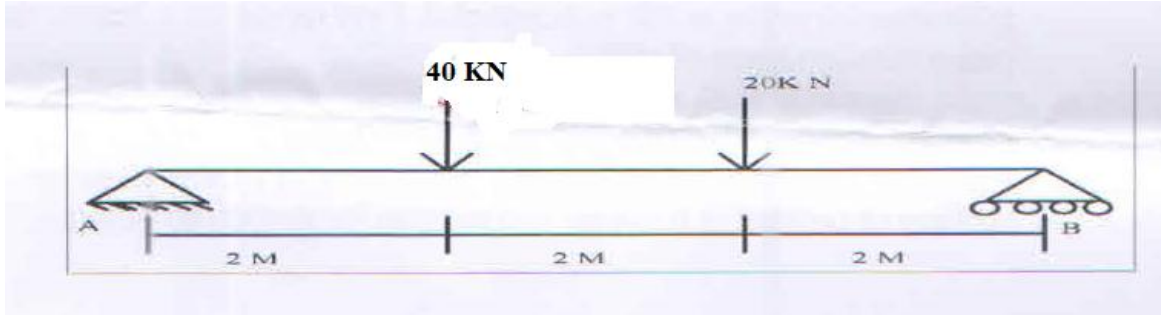


15 A bullet weighing 0.5N and moving at 700m/sec penetrates the 50N body shown in figure and emerges with a velocity of 200m/sec. how far and how long does the body then move. Take  $f = 0.2$ .



..3..

- 16 (a) Determine reaction  $R_A$  and  $R_B$  developed in the beam shown.



- (c) A projectile is fired horizontally from a point 300mm above ground with initial velocity of 108 m/sec. find the range.
- 17 The rectilinear motion of a particle is governed by  $a = -8s^2$  where  $a$  is in  $\text{m/sec}^2$  and ' $s$ ' in mt. when  $t = 1$  sec,  $s = 4\text{m}$  and  $v = 2\text{m/sec}$ . Determine acceleration when  $t = 2\text{sec}$ .

\*\*\*\*\*

**FACULTY OF ENGINEERING**

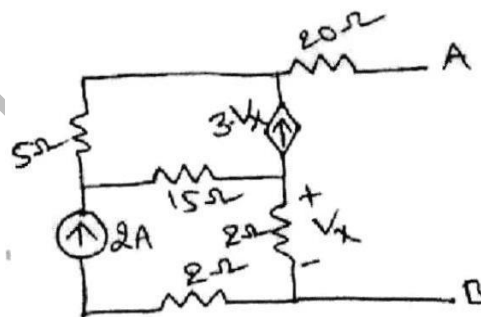
B.E II – Semester (ECE) (CBCS) (Backlog) Examination October, 2021

**Subject: Basic Circuit Analysis****Time: 2 Hours****Max. Marks: 70****(Missing data, if any, may be suitable assumed)****PART-A****Note: Answer any five questions****(5x2=10 Marks)**

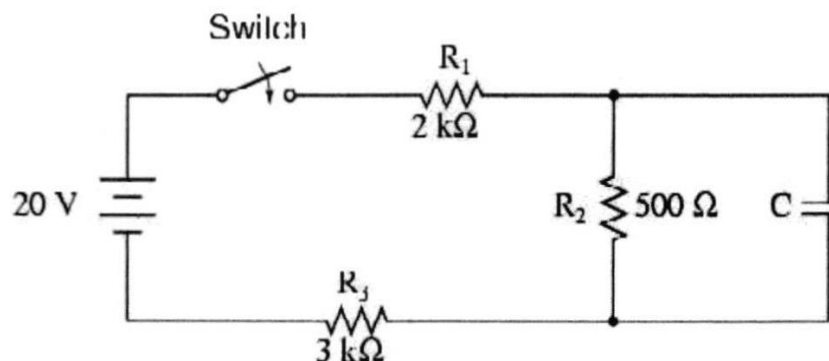
- 1 State the superposition theorem.
- 2 Give  $C_1=5\text{nF}$  and  $C_2=10\text{nF}$ . Calculate effective capacitance in parallel and series combination.
- 3 Differentiate between Zero state response and Zero input response.
- 4 Given time constant 1 sec. Calculate the value of capacitance given  $R=1\text{ K ohm}$ .
- 5 Give  $Z=3+ j5$ . Express  $Z$  in terms of phasor form and calculate the power factor.
- 6 Explain the concept of coupling co-efficient in magnetically coupled circuits.
- 7 Give the two port network model for  $Z$  parameters.
- 8 What is principal of transformer?
- 9 Define Bandwidth of resonant circuit.
- 10 Obtain impedance function  $Z(s)$  given  $V(s) = S+3$  and  $I(S) = S^2+5s+6$ .

**PART-B****Note: Answer any four questions****(4x15=60 Marks)**

- 11 Determine Norton equivalent across A and B



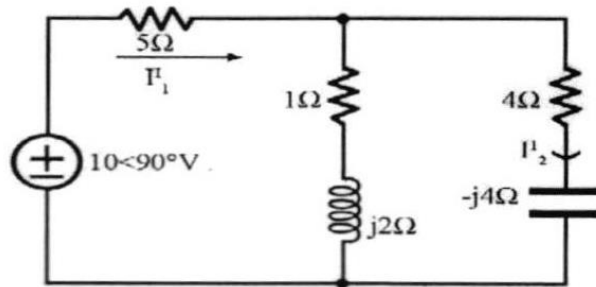
- 12 (a) Obtain the capacitor current and voltage in the following transient circuit.



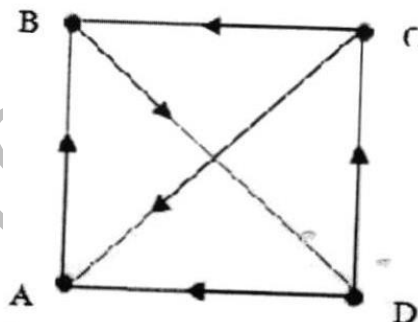
- (b) Define natural response, forced response and complete response.

..2..

- 13 (a) Obtain Thevenin's equivalent of the following circuit considering  $(1+j2)$  ohm as load impedance.



- (b) Define impedance and Admittance and explain the meaning of their real and imaginary parts.
- 14 (a) Obtain the equations required to express Y parameters into Z parameters.  
 (b) Define symmetric network and give condition for symmetry in terms of z parameters.
- 15 (a) Derive the relationship between resonant frequencies, bandwidth and quality factor for a series resonant circuit.  
 (b) Calculate cutoff frequencies for series resonant circuit given  $F_0 = 200$  KHz and  $BW = 60$  KHz.
- 16 (a) Obtain the incidence matrix and reduced incidence matrix for the following graph.



- (b) What is different between idea and practical transformer?
- 17 Write notes on following:  
 (a) Complex power  
 (b) Quality factor  
 (c) Maximum Power transfer theorem.

\*\*\*\*



**FACULTY OF ENGINEERING**

**B.E. II-Semester (EEE/EIE) (CBCS) (Backlog) Examination, October 2021**

**Subject: Elements of Mechanical Engineering**

**Time: 2 hours**

**Max. Marks: 70**

**Note: Missing data, if any, may be suitably assumed.**

**PART – A**

**Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 List out the deficiencies of first law of thermodynamics.
- 2 What is Clausius inequality?
- 3 Compare S.I. and C.I. engine.
- 4 Derive the expression for the Isothermal compression process.
- 5 Distinguish between Natural convection and forced convection heat transfer.
- 6 Write the classification of heat exchangers.
- 7 Define velocity ratio of a compound belt drive and slip of it.
- 8 Compare gear trains with belt drives.
- 9 Compare sand casting system with die casting system.
- 10 Sketch any one drilling machine and mention important components.

**PART – B**

**Answer any four questions.**

**(4x15 = 60 Marks)**

- 11 (a) Explain macroscopic and microscopic approach of thermodynamics.  
(b) Derive the steady state Energy equation of a system.
- 12 (a) Explain with neat sketches working of four-stroke diesel engine.  
(b) Air is compressed in a single-stage reciprocating compressor from 1.013 bar and 150°C to 7 bar. Calculate the indicated power required for air delivery of 0.3 m<sup>3</sup>/min. When the compression process is isentropic.
- 13 (a) Derive the thermal conduction of a material using Fourier's Law of conduction.  
(b) Derive the methods of classification of Heat Exchangers.
- 14 (a) Compare compound gear train and Reverted gear train.  
(b) Derive an expression for length of belt in cross belt drive.
- 15 (a) Compare up milling and down milling.  
(b) Explain with a neat sketch the die casting process.
- 16 (a) Explain the concept of entropy in thermodynamics with an example.  
(b) Differentiate between Mechanical and thermal efficiencies of IC engines.
- 17 (a) Explain the valve timing diagram of four stroke SI engine.  
(b) Describe the three types of flames used in gas welding and give their fields of application.

**FACULTY OF ENGINEERING**  
**B.E. (CSE / I.T.) II-Semester (CBCS) (Backlog) Examination, October 2021**

**Subject: Object Oriented Programming Using C++**

**Time: 2 hours**

**Max. Marks: 70**

**Note: Missing data, if any, may be suitably assumed.**

**PART – A**

**Answer any five questions.**

**(5x2 = 10 Marks)**

- 1 Write short notes on assignment operators giving examples.
- 2 Differentiate Procedural programming and OOPs.
- 3 What is the difference between call by value and call by reference?
- 4 Define class.
- 5 Write short note on copy constructor.
- 6 What is a virtual base class?
- 7 What is inline function?
- 8 List operators that cannot be overloaded.
- 9 Write short note on function template.
- 10 Define stack.

**PART – B**

**Answer any four questions.**

**(4x15 = 60 Marks)**

- 11 (a) Explain briefly about object oriented programming concepts.  
(b) Explain control structures with syntax and example for each.
- 12 (a) Write a program to implement matrix addition using class.  
(b) Considering an example explain default arguments in functions.
- 13 (a) Explain constructor overloading with suitable example.  
(b) Differentiate function overloading and function overriding.
- 14 (a) Write a program to add two complex numbers using operator overloading.  
(b) What is runtime polymorphism? Explain with suitable example.
- 15 (a) Write a program to implement queue using array.  
(b) List and explain linked list operations.
- 16 (a) Differentiate structure and class.  
(b) Explain types of inheritance.
- 17 (a) Overload a function to find the area of square, rectangle and triangle.  
(b) Explain class template considering an example.