Code No. D-3511/CBCS

FACULTY OF ENGINEERING

B.E. (Civil/MECH/PROD/AE) II - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Engineering Mechanics – II

Time: 3 hours **Max. Marks: 70**

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

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1. Principle of virtual work.
2. Differentiate between kinematics and kinetics.
3. Define radius of gyration.
4. Derive work energy principle for rotation.
5. Acceleration of a particle is given by $6\sqrt{v}$ where v is velocity derive the expression for displacement of the particle.
6. Explain the concept of D' Alembert principle.
7. Motion of the particle is given by $s = t^3 – 12t^2 + 40$ find the acceleration of the particle in 10 sec.
8. Differentiate between direct impact and oblique impact.
9. A body is rotating with an angular velocity of 5rad/sec after 5sec the angular velocity of the body become 14rad/sec. determine the angular acceleration of the body.
10. Differentiate between mass moment of inertia and radius of gyration.

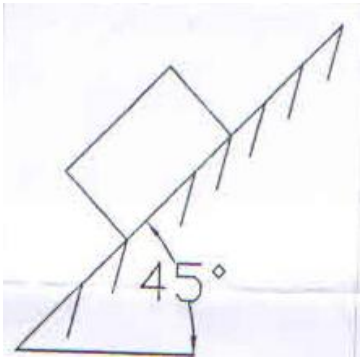
PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 Find mass moment of inertia of solid cone of height 'h' and radius 'r' at base about axis of rotation.

12 The velocity of a particle moving in a straight line is given by the expression $v = 2t^3 – t^2 – 2t + 4$ the particle is found to be at a distance of 10m from station after 2sec determine.
(a) Acceleration
(b) Displacement after 6 second.

13 A 500 N block is initially stationary on a 45^o incline as shown below the coefficient of kinetic friction between block and inclined is 0.5 what distance along the incline must the weight slide before it reaches a speed of 12 mps?



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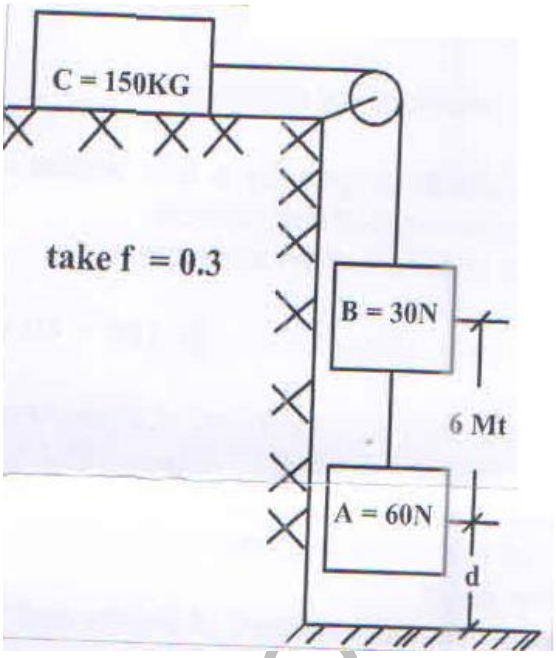
14 The system is connected by flexible inextensible cords. If the system starts from rest, find the distance 'd' between A and the ground so that the system come to rest with body B just touching A.



15 A rigid pile has a mass of 800kg and is driven into the ground using a hammer 'H' that has a mass of 300kg. The hammer fall from rest from a height of 1 mt and strikes the top of pile. Determine the impulse which the hammer impart on the pile if the pile is surrounded entirely by loose sand so that after striking the hammer does not rebound off the pile.

16 An air craft moving horizontally at a speed of 50m/sec at a height of 900mt towards a target on the ground, releases a bomb which hits the target estimate the horizontal distance of the air craft from the target when it released the bomb. Also calculate the velocity with which the bomb hits the target.

17 Write short notes on the following:
(a) Coefficient of restitution
(b) Work energy in plane motion
(c) Types of motions.

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Code No. D-3512/CBCS

FACULTY OF ENGINEERING

B.E. (EEE/EIE) II - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Elements of Mechanical Engineering

Time: 3 hours **Max. Marks: 70**

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

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 State the properties of thermodynamic systems.
2 What is an open thermodynamic system?
3 What are the IC engines roles in industries?
4 State the merits of gas turbines over I.C. engines.
5 State four advantages of heat exchangers.
6 State Newton's Law of cooling.
7 Draw a neat sketch of bevel gear and name its nomenclature.
8 State two conditions on which belt drives is preferred over gear drive in power Transmission.
9 State two critical differences between soldering and brazing.
10 List different parts of a lathe machine.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) Explain macroscopic and microscopic approach of thermodynamics.
(b) Derive the Steady flow energy equation of a system.

12 (a) Derive the specific fuel consumption of the petrol engine.
(b) Derive the work done formulation for the working of single stage compressor with constant clearance volume.

13 (a) Explain the modes of heat transfer in the following:
(i) Metal rod is heated at 50^oC
(ii) Water is boiling at 100^oC
(iii) Furnace wall is maintained at 800^oC.
(b) Derive the expression for the LMTD of a counter flow heat exchanger and also state the assumptions made.

14 (a) Derive the velocity ratio of belt drives.
(b) Explain two applications of each:
(i) Spur (ii) helical gears.

15 (a) Explain with a neat diagram the working of ARC welding system and also mention its engineering applications.
(b) Sketch any one casting process and explain its working.

16 (a) What are different laws of thermodynamics? What is their significance and scope?
(b) Air enters a compressor at 1 bar and $250^{\circ}c$ having a volume of $1.8m^3/kg$ and is compressed to 5 bar isothermally. Determine work done, change in internal energy and heat transferred.

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17 (a) A four cylinder, four stroke gasoline engine operates at 3000 rpm. The bore of each cylinder is 10 cm and the stroke is 2 cm. The clearance volume of each cylinder is 100 CC. The fuel consumption is 20 kg/hr and the torque developed is 150 N –m. Determine (i) B.P. (ii) BMEP (iii) Brake thermal efficiency. Assume CV of fuel as 43000 kJ/kg.

(b) Sketch epicyclic gear train and state five industrial application of it.

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Code No: D-3513/CBCS

FACULTY OF ENGINEERING

B.E. (ECE) II – Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: BASIC CIRCUIT ANALYSIS

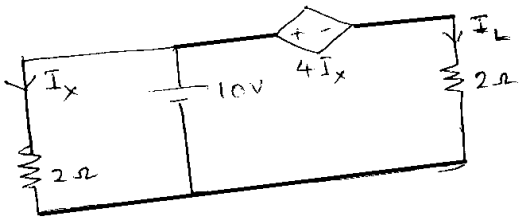
Time: 3 Hours **Max marks: 70**

(Missing data, if any may be suitably assumed)

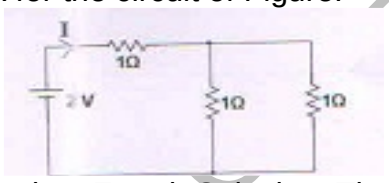
PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1. Find the current IL in the circuit of Figure 1.



2. State and explain Norton theorem.
3. Write the incidence Matrix for the circuit of Figure.

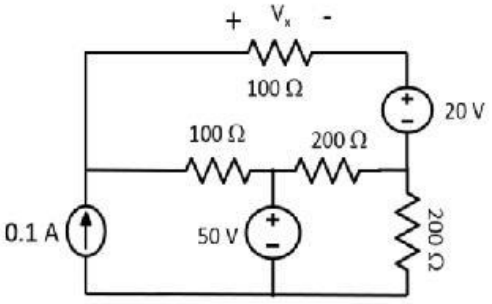


4. Given R=10K ohm, C=10 micro Farad, Calculate Time constant for RC circuit.
5. An AC single v(t) -= Vm sinwt is applied to a series RL circuit. Find reactive power and active power.
6. What is power triangle? Explain
7. Write the parametric equations for
   a) h-parameter b) ABCD parameters for a Two-port network.
8. What is reciprocity theorem derive condition for reciprocity of a two port network.
9. Obtain the poles and zeros for the function H(s) = $\frac{(s+1)}{(s-2)(s-4)}$
10. Define resonance and give expression of resonant frequency for series resonant circuit.

PART - B

Note: Answers any five questions. **(5 x 10 = 50 Marks)**

11. a) State the superposition theorem and calculate the value of Vx in the following circuit using superposition theorem.



b) What is network duality? Mention five components and their duals.

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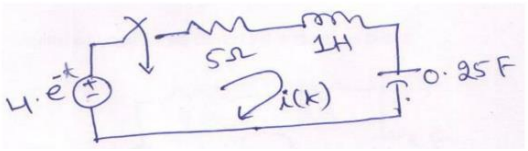
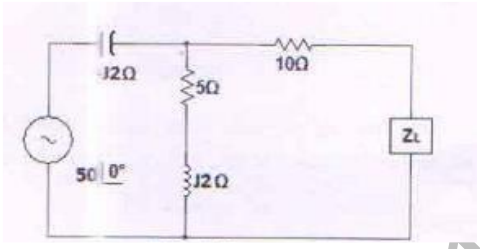
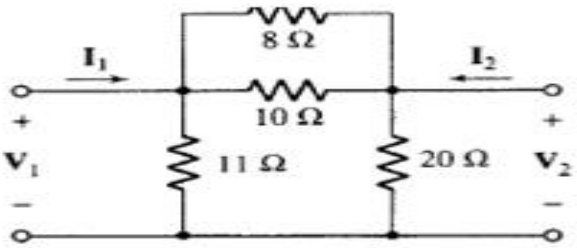
12. For the network shown below the switch is closed at t=0, determine current i(t) assuming zero initial conditions in the network elements.



13. In the circuit of Figure Find Z_L which draws maximum power. Find the Maximum power.

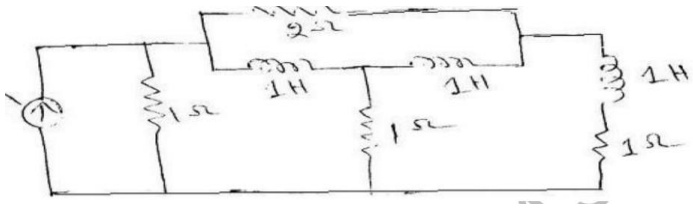


14. Calculate the Z parameter of the two port network given below and obtain hence calculate its h parameters using Z to h conversion expressions.



15. a) Obtain the relationship between f_0, Bandwidth and quality factor for a resonant circuit.
    b) For the tank circuit calculate the resonant frequency given C=0.5 micro Farad, L_{coil} =2 Henry, and R_{coil} = 1 Ω.

16. For the network shown below draw its graph and write
    a) Incidence matrix b) tie-set matrix c) cut-set matrix



17. Write short notes on following
    i) DOT CONVENTION in magnetically coupled circuits
    ii) 3 types of damping in RLC transient circuit.
    iii) Q-factor and Band width

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Code No. D-3514/CBCS

FACULTY OF ENGINEERING

B.E. (CSE/IT) II - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Object Oriented Programming using C++

Time: 3 hours **Max. Marks: 70**

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

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 What are the basic concepts of OOPs?
2 Write short notes on operator precedence and associativity.
3 What is an Object?
4 Define abstract data type.
5 What is the importance of using static variable?
6 What is destructor and when it is invoked?
7 Explain friend function.
8 What is the purpose of virtual function?
9 Write short note on function template.
10 Define queue.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) List and explain programming paradigm.
(b) Explain the advantages of object oriented programming.

12 (a) What is procedural abstraction? Explain.
(b) Write a program to implement matrix multiplication using class.

13 (a) Explain copy constructor with suitable example.
(b) Explain types of inheritance.

14 (a) Write a program to add two complex numbers using operator overloading.
(b) What are exceptions? Explain how they can be handled.

15 (a) Write a program to implement stack using Array.
(b) Discuss operations on linked list.

16 (a) Considering suitable example explain passing arrays to functions.
(b) Explain constructor overloading with suitable example.

17 (a) Overload a function to find the area of square, rectangle and triangle.
(b) Explain class template with an example.

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Code No: D-2337/N/AICTE

FACULTY OF MANAGEMENT

BE (ECE/MECH/PROD/AE/AI&ML/AI&DS/IoT/IT) II – Semester (AICTE) (Backlog) Examination, March / April 2022

Subject: Engineering Chemistry

Time: 3 Hours **Max. Marks: 70**

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.
(ii) Answer 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 be suitably assumed.

1. a) Describe a glass electrode
   b) What is Pitting corrosion?
   c) Give the specifications of potable water
   d) What are thermosetting polymers?
   e) Discuss the preparation of Kevlar.
   f) A sample of coal has the following composition by mass Carbon 75%, Hydrogen 6%, Oxygen 8%, Nitrogen 2.5%, Sulphur 1.5% and Ash 7%. Calculate the higher calorific value of fuel per Kg.
   g) What is biodiesel?

2. a) Explain how pH is determined using quinhydrone electrode. The emf of the cell $\varnothing Pt\ |SCE|\ |weak\ acid, Quinhydrone|\ Pt^{\oplus}$ at 25°C is 0.282 volt. Calculate pH of the weak acid. Standard oxidation potential of saturated of saturated calomel and Quinhydrone are given as -0.242 V and 0.6997 V respectively.
   b) Discuss the working and applications of Li-ion battery.

3. a) What is alkalinity of water and how is it estimated? During alkalinity determination for a sample (pH 9), 50mL of 0.02N H_2SO_4 was used till phenolphthalein end point and 100mL total of same acid till bromocresol green end point from start of the titration. What are the hydroxide, carbonate and bicarbonate alkalinities of the sample?
   b) What is the difference between dry and wet corrosion? Explain the mechanism of electrochemical corrosion.

4. a) Discuss the mechanism of free radical polymerization.
   b) Give a note on (i) Conducting polymers (ii) Biodegradable polymers

5. a) Discuss about ranking of coal and its proximate and ultimate analysis.
   b) A producer gas has the following composition by volume: H2 – 15%; CH4 – 2%; CO – 20%; CO_2 – 6%; O2 = 3%; N2 – 54%. If 50% excess air is supplied for combustion, calculate the volume of air supplied per m3 of gas and the analysis by volume of the dry products of combustion.

6. a) Explain the significance of cracking and catalytic cracking by moving bed method.
   b) Discuss about i) composition and uses of Diesel ii) Octane and Cetane numbers.

7. a) Explain the principles of Green chemistry with examples.
   b) Classify the composites based on the matrix and mention some of their applications.

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FACULTY OF ENGINEERING

B.E. (ECE/MECH/PROD/AE/CSE/CME/IT) II - Semester (AICTE) (Backlog)
Examination, March / April 2022
Subject: Chemistry

Time: 3 Hours **Max. Marks: 70**

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

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 Write the cell notation, reaction and Nernst equation for Galvanic cell.
2 What are fuel cells? Discuss the advantages of fuel cells.
3 Explain how many mg. of $FeSO_4$ dissolved per liter 100 ppm of hardness.
4 What are the various factors effecting rate of corrosion?
5 Give the structure of monomer and polymer of polyethylene (PE), polystyrene (PS).
6 Calculate the degree of polymerization of a polyethylene chain with 11,200 g molecular mass.
7 Define and classify fuels.
8 Give the composition and uses of CNG.
9 With an example explain how clean technology can be achieved through green methods.
10 Define a composite. Give composition and characteristic properties of any one composites.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) Classify electrodes into different types. Give the cell reactions with an example.
(b) At 25°C, E$^\circ$ = 1.36 V for the cell

$$P(t)|H_2(g)|HCI(aq)|Cl_2(g)Pt(s)|$$

Given ΔS = -241.212 J/mol. Calculate the standard enthalpy changes for the reaction.

12 (a) Explain how alkalinity of water can be determined.
(b) What are the various types of corrosion? Give the mechanism involved in electrochemical Theory of corrosion.

13 (a) Define polymerization. Explain the mechanism involved in free radical polymerization.
(b) Explain preparation and properties of a biodegradable polymer with an example.

14 (a) Define cracking of petroleum by moving bed method.
(b) About 1g of a fuel containing 80% carbon when burnt in a bomb calorimeter, increased the temperature of water from 27˚C to 29˚C. If the calorimeter contains 500g of water and the water equivalent is 300g. Calculate the HCV of the fuel in kJ/kg.

15 (a) Discuss the applicability of principals of green chemistry in catalysis.
(b) Classify composites. Given an example for each type.

16 (a) Define cracking. Explain various methods adopted in cracking of petroleum.
(b) Write about the preparation, and uses of polyacetic acid.

17 (a) Explain softening of water by ion exchange method.
(b) Write a detailed note on corrosion control methods.

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