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3E1116

Roll No. _____ Total No of Pages: 4

3E1116

B. Tech. III - Sem. (Main) Exam., Dec. - 2018

ESC Automobile Engineering

3AE3 – 04 Engineering Mechanics

AE, ME

Time: 2 Hours **Maximum Marks: 80**

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What are the necessary conditions to have a body in equilibrium? [2]

Q.2 State Lami's theorem. [2]

Q.3 Define mechanical advantage and velocity ratio of a machine. [2]

Q.4 Define, in short, free and forced vibrations. [2]

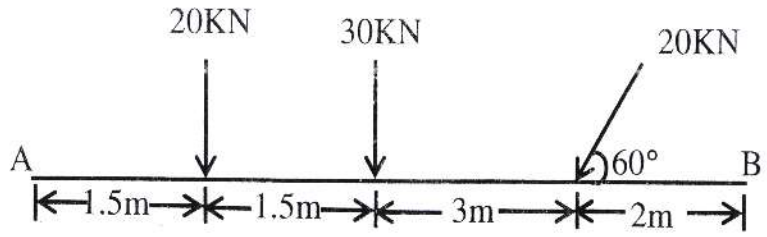
Q.5 What do you mean by center of gravity and moment of inertia of a body? [2]

PART – B

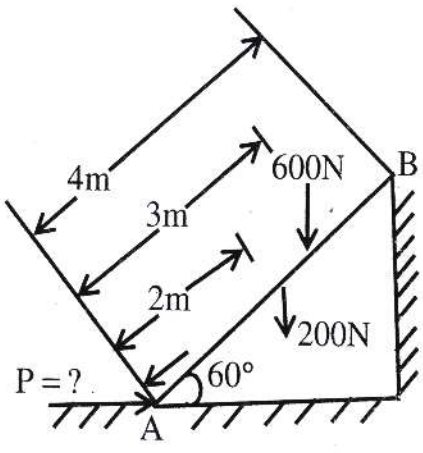
(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 A system of loads acting on a beam is shown in Figure below. Determine the resultant of the loads and its locations. [10]

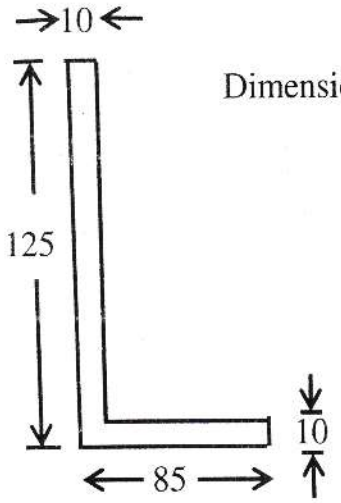


Q.2 A ladder of length 4 m weighing 200 N is placed against a vertical wall as shown below. The coefficient of friction between the wall and the ladder is 0.2 and that between the floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A .Calculate the minimum horizontal force to be applied at A to prevent slipping. [10]



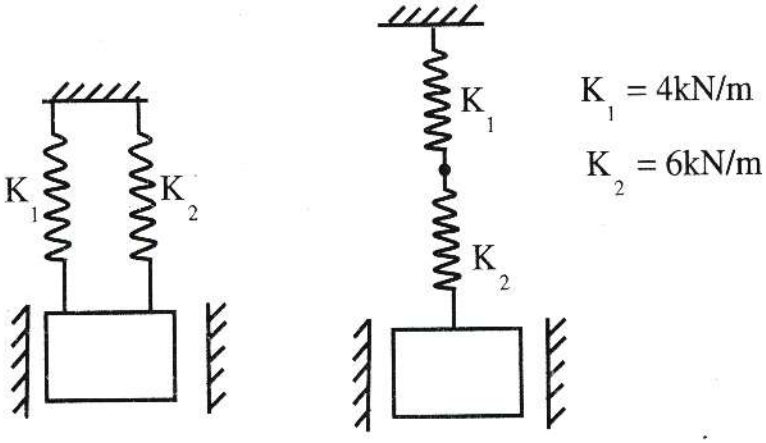
Q.3 Prove that a lifting machine is reversible if its efficiency is greater than 50%. [10]

Q.4 Determine the moment of inertia of the L-section shown in the Figure below about its centroidal axis parallel to the legs. Also find out the polar moment of inertial. [10]



Q.5 A pilot flying his bomber at a height of 2000 m with a uniform horizontal velocity of 600 kmph, wants to strike a target on the earth. At what horizontal distance from the target, he should release the bomb? [10]

Q.6 A 50 kg block moves between vertical guides as shown in Figure. The block is pulled 40 mm down from its equilibrium position and released. For each spring arrangement, determine the period of the vibration, the maximum velocity of the block, and the maximum acceleration of the block. [10]



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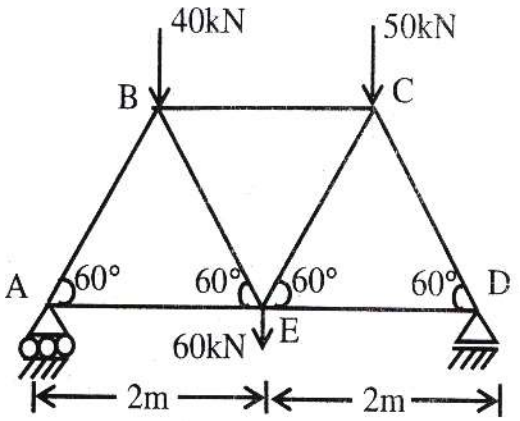
PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=30]

Attempt any two questions

Q.1 Determine the forces in all the members of the truss shown in the figure below and indicate the magnitude and nature of forces on the diagram of the truss. All inclined member are at 60° to horizontal and length of each member is 2 m. [15]



Q.2 An open belt drive connects two pulleys 120 cm and 50cm diameter, on parallel shaft 4 m apart. The maximum tension in the belt is 1855.3 N the coefficient of friction is 0.3. The drive pulley of 120 cm diameter runs at 200 rmp, calculate the power transmitted and the torque exerted on the driven shaft. [15]

Q.3 A 1500 N block is in contact with a level plane, the coefficient of friction between two contact surfaces being 0.1. If the block is acted upon by a horizontal force of 300 N, what time will elapse before the block reaches a velocity of 16 m/s starting from the rest? If 300 N force is then removed, how much longer will the block continue to move? Solve the problem using impulse momentum method. [15]

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3E1117

Roll No. _____ Total No of Pages: 4

3E1117

B. Tech. III - Sem. (Main) Exam., Dec. - 2018
PCC Automobile Engineering
3AE4 – 05 Engineering Thermodynamics
AE, ME

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What do you understand by path function and point function?

Q.2 What is Zeroth law of thermodynamics?

Q.3 What do you understand by the entropy and write its unit?

Q.4 What is available energy and unavailable energy?

Q.5 What do you understand by triple point?

Q.6 Define an ideal gas.

Q.7 Write the various Maxwell's equations.

Q.8 Write the four processes of Brayton Cycle with neat sketch.

Q.9 What are the four basic components of a steam power plant?

Q.10 Define regeneration process.

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PART – B

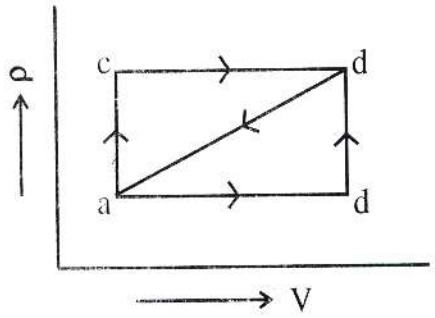
(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 When a system is taken from state a to b in Figure along path acb, 84 kJ of heat flow into the system, and the system does 32 kJ of work.

(a) How much will the heat that flows into the system along path adb be, if the work done is 10.5 kJ?

(b) When the system is returned from b to a along the curved path, the work done on the system is 21 kJ. Does the system absorb or liberate heat, and how much of the heat is absorbed or liberated?



Q.2 What is second law of thermodynamics? Explain in detail.

Q.3 One kg of water at 273 K is brought into contact with a heat reservoir at 373 K. When the water has reached 373 K, find the entropy change of the water, of the heat reservoir, and of the universe. (Take Specific heat of water C = 4.187 kJ/kg K).

Q.4 Show that for an ideal gas the internal energy depends only on its temperature.

Q.5 Derive the first and second TDS equations.

Q.6 A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of the stroke. Find the air standard efficiency. (Take $\Upsilon = 1.4$)

Q.7 A steam power station uses the following cycle:

Steam at boiler outlet – 150 bar, 550°C

Reheat at 40 bar to 550°C

Condenser at 0.1 bar

Using the mollier chart and assuming ideal processes, find the-

(a) Quality at turbine exhaust and

(b) Cycle efficiency.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 (a) What is the First law of the thermodynamics?

(b) Derive the steady flow energy equation for a single stream entering and a single stream leaving a control volume and explain the various terms in it.

Q.2 A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and -20°C. The heat transfer to the heat engine is 2000 kJ and the net work output of the combined engine refrigerator plant is 360 kJ.

(a) Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C.

(b) Reconsider (a) given that the efficiency of the heat engine and the COP of the refrigerator are each 40% of their maximum possible values.

Q.3 A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250°C. The mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy and the internal energy.

Q.4 State the four processes of the Otto cycle with neat sketches. Show that the efficiency of the Otto cycle depends only on the compression ratio.

Q.5 Steam at 20 bar, 360°C is expanded in a steam turbine to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler.

(a) Assuming ideal processes, find per kg of steam the network and the cycle efficiency.

(b) If the turbine and the pump have each 80% efficiency, find the percentage reduction in the network and cycle efficiency.

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3E1118

Roll No. _____ Total No of Pages: 3

3E1118

B. Tech. III - Sem. (Main) Exam., Dec. - 2018
PCC Automobile Engineering
3AE4 – 06 Materials Science and Engineering
AE, ME

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define space lattice. What are its important characteristics?

Q.2 Define a crystalline substance. How does it differ from an amorphous material?

Q.3 Define Allotropy, give some examples.

Q.4 What are slip system and easy slip directions?

Q.5 What do you understand by phase diagram?

Q.6 What an alloy steel is? What are the alloying elements for steel?

Q.7 What is elastomer? How do they differ from plastics?

Q.8 How would you achieve a good combination of strength and ductility in medium carbon steel?

Q.9 Why is the family of ceramic materials exceptionally large?

Q.10 Discuss the general effects of tempering the steel.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Assuming that the length of the side of a cube in the FCC lattice equals one, what is the distance between closest atoms?

Q.2 What are the changes that take place in iron and steels at the following critical points? A_0, A_2, A_4, and A_{cm}?

Q.3 What information is made available by the Isothermal transformation diagram (TTT-Curve) that was lacking in iron carbon equilibrium diagram?

Q.4 Certain defects can be expected following heat treatment processes. What are three defects? Explain the reasons of their developments.

Q.5 What is contribution of light metal and their alloys for solving the problems related to corrosion? Give a few examples?

Q.6 Describe the nature of bonding of atoms in ceramics materials and discuss the main features of the ceramic crystal structures.

Q.7 Give names only of the various crystal imperfections and also differentiate between strain hardening and recrystallization.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 Describe Gibb's Phase Rule. How this rule is applied to pure metals and binary alloys? Explain with the help of examples.

Q.2 Mark the silent points on iron carbide diagram and explain the various reactions that occur during cooling from high temperature.

Q.3 What do you understand by tempering of steel? What properties can be acquired by steel after tempering process? Classify various tempering processes.

Q.4 Explain the mechanism of polymerization of the polymers. Describe the properties and applications of PE, PVC, PP and PMMA.

Q.5 Distinguish between fibre & particulate reinforced composite. Discuss the properties and applications of AI203, Si3N and SiC.

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3E1119

Roll No. _____ Total No of Pages: 4

3E1119

B. Tech. III - Sem. (Main) Exam., Dec. - 2018
PCC Automobile Engineering
3AE4 – 07 Mechanics of Solids
AE, ME

Time: 3 Hours **Maximum Marks: 160**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×3=30]**

All questions are compulsory

Q.1 Define the following –

(i) Ductility

(ii) Toughness

(iii) Malleability

Q.2 Discuss stress – strain diagram for ductile materials.

Q.3 What do you understand by Poisson's ratio.

Q.4 Define modulus of Elasticity (E) & modulus of Rigidity (G).

Q.5 Distinguish between simply supported beam and fixed beam.

Q.6 Define bending moment & its sign convention.

Q.7 What do you understand by torsion. Write the equation of torsion.

Q.8 Distinguish between principal stress and principal strain.

Q.9 Define maximum principal stress theory along with its graphical representation.

Q.10 What is the difference between a column and a strut?

PART – B

(Analytical/Problem solving questions) **[5×10=50]**

Attempt any five questions

Q.1 Derive an expression showing relation between modulus of elasticity and modulus of rigidity. [10]

Q.2 Derive the following relation – [10]

$$M = E I \frac{d^2 y}{d x^2}$$

Q.3 What is the use of theories of failure? Name them & discuss in brief. [10]

Q.4 A circular rod of steel 10 mm diameter is tested for tension and it was observed that when tension was 11 kN, the total extension on a 300 mm length was 0.20 mm. Find the value of E. [10]

Q.5 Explain the different methods of determining the deflection of statically indeterminate beams. [10]

Q.6 Explain the stresses in thin walled pressure vessels. [10]

Q.7 What is area moment method? Where is it used? [10]

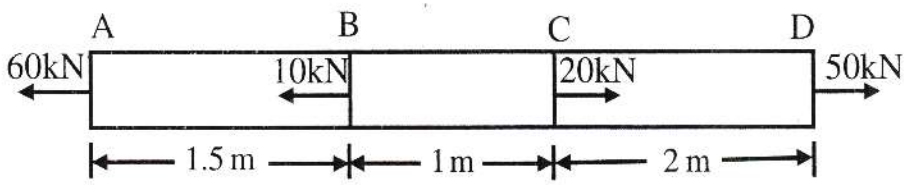
PART – C

(Descriptive/Analytical/Problem Solving/Design Question) **[4×20=80]**

Attempt any four questions

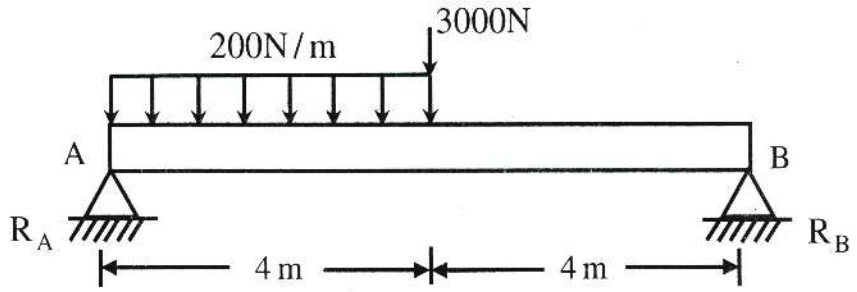
Q.1 (a) Explain the concept of free body diagram taking a suitable example. [10]

(b) A steel bar of 25 mm diameter is acted upon by forces as shown in figure. Determine the total elongation of the bar. [10]



Q.2 (a) Explain the various types of static loading and support conditions in beams. [10]

(b) Draw the SFD & BMD of a loaded beam as shown in figure – [10]



Q.3 (a) Explain and compare the different theories of elastic failures. [10]

(b) If the principal stresses at a point in an elastic material are 2f tensile, f tensile and $\frac{1}{2}$ f compressive, calculate the value of 'f' at failure according to five different theories for failure to just take place. The elastic limit in simple tension is 200 N/mm^2 and Poisson's ratio = 0.3. [10]

Q.4 (a) Define torsion and torsion rigidity. [6]

(b) Two shafts of same material & lengths are subjected to save torque. If the first shaft is a solid circular section & second shaft is of hallow section whose internal dia. is 2/3 of outer dia. & the maximum shear stress developed in each shaft is same. Compare the weight of shaft. [14]

Q.5 A thin cylinder shell 120 cm dia 1.5 cm thick 6 m long is subjected to internal fluid pressure 2.5 N/mm^2 of the value $E = 2 \times 10^5$ N/mm^2, $\mu = 0.3$. [20]

Find –

(i) Change in dia.

(ii) Change in length

(iii) Change in volume

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3E1631

Roll No. _____ Total No of Pages: 4

3E1631

B. Tech. III - Sem. (Mercy Back) Exam., Dec. - 2018
Automobile Engineering
3AE1A Mechanics of Solids – I
AE, ME, PI, AN

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Derive the Expression for the Elongation of a Bar clue to its own weight. [6]

(b) A steel tube of 30 mm external diameter and 25 mm internal diameter encloses a gun metal rod of 20 mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 140°C & the nuts of the rods are screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30° C. The value of E for steel & gun metal is 2.1×10^5 N/mm^2 and 1×10^5 N/mm^2 respectively. The linear coefficient of expansion for steel and gun metal is 12×10^{-6} per° C and 2.1×10^{-6} per °C. [10]

OR

Q.1 (a) Prove that "a set of shear stresses across a plane is always accompanied by a set of balancing shear stresses of same intensity across the plane and normal to it". [8]

(b) Explain the following- [4×2=8]

(i) Bulk Modulus

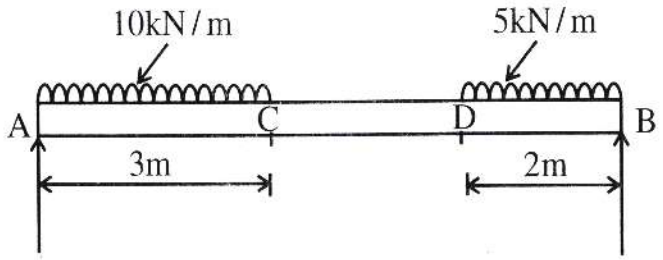
(ii) Volumetric Strain

(iii) Hooke's law

(iv) Poisson's Ratio

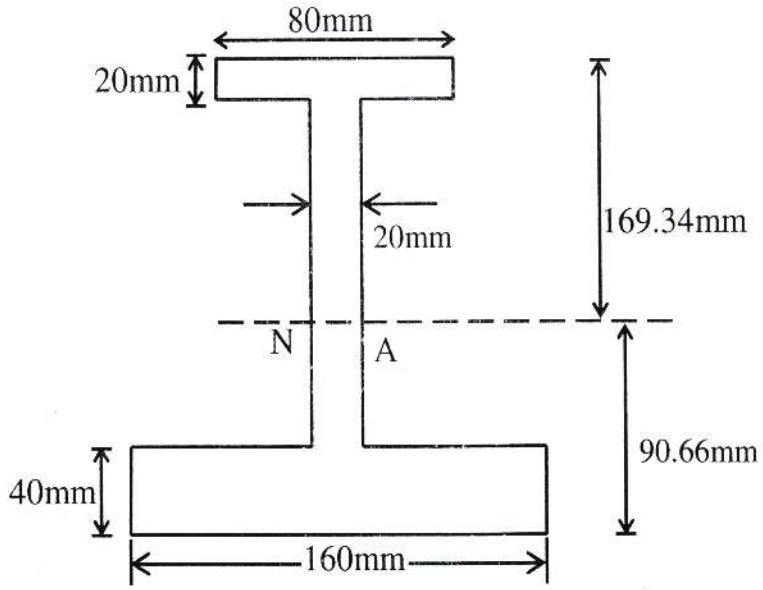
UNIT- II

Q.2 Draw the shear force & Bending Moment Diagram of a simply supported Beam of length 7 m. Carring uniformly distributed load as shown. [16]



OR

Q.2 A Cast Iron Beam is of I section as shown in figure. The beam is simply supported on a span of 5 m. If the tensile stress is not exceed 20 N/ mm^2, find the safe uniformly load which the beam can carry. Find also the maximum compressive stress. [16]



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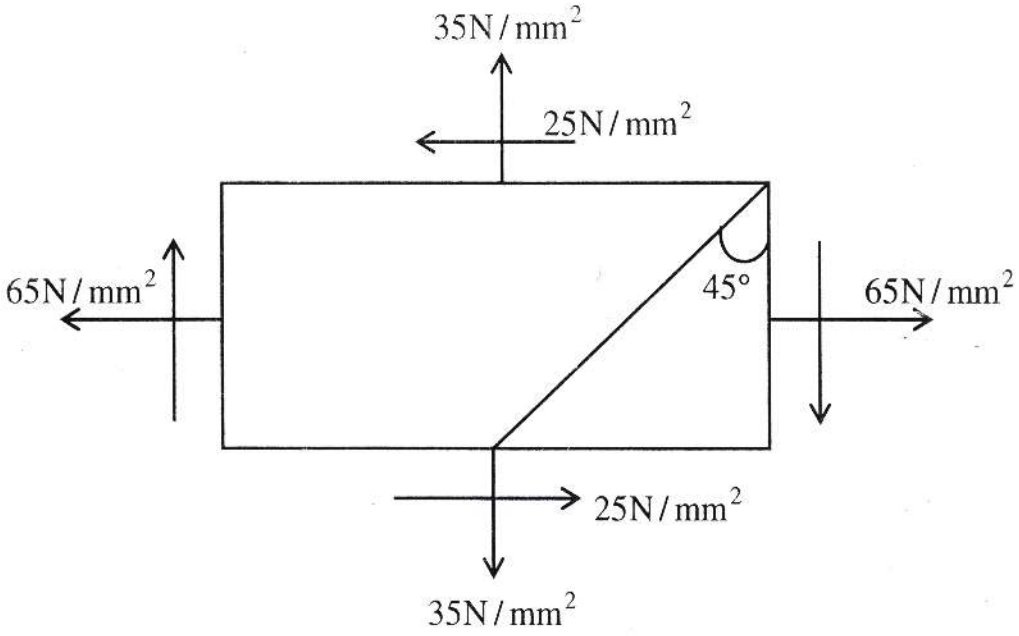
UNIT- III

Q.3 A point in a strained material is subjected to stresses shown in fig. using Mohr's Circle method determine the normal & tangential stresses across the oblique plane. Check the answer analytically. [16]



OR

Q.3 Elaborate the significance of theories of Elastic failure by explaining each theory. [16]

UNIT- IV

Q.4 Derive the expression for-

(a) Torque transmitted by a hollow circular shaft. [8]

(b) Strain Energy due to torsion. [8]

OR

Q.4 A strut length ℓ, moment of Inertia of cross – section I uniform throughout and modulus of material E, is fixed at its lower end, and its upper end is elastically supported laterally by a spring of stiffness k. Show from the first principles that the crippling load P is given by $\frac{\tan \alpha \ell}{\alpha \ell} = 1 - \frac{P}{k\ell}$ where $\alpha^2 = \frac{P}{EI}$ [16]

UNIT- V

Q.5 (a) A cantilever of length 2 m carries a uniformly varying load of 25 kN/m at the free end to 75 kN/m at the fixed end. If $E = 1\times10^5$ N/mm^2 & $I = 10^8$ mm^4, determine the slope & deflection of the cantilever at the free end. [8]

(b) Derive the expression for deflection of a cantilever with UDL for a distance x form the fixed end. [8]

OR

Q.5 Write short notes on-

(a) Stresses in cylindrical vessels [4]

(b) Shafts under static loading [4]

(c) Relation between deflection and shear force [4]

(d) Stresses in spherical vessels [4]

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3E1632

Roll No. _____ Total No of Pages: 3

3E1632

B. Tech. III - Sem. (Mercy Back) Exam., Dec. - 2018

Automobile Engineering

3AE2A Material Science and Engineering

AE, ME, PI

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What do you understand by dislocation? Explain Elastic & Plastic modes of deformation. [10]

(b) What is Miller Indices? Explain. [6]

OR

Q.1 Explain in detail. [8×2=16]

(a) Banshinger's Effect

(b) Re- crystallization

UNIT- II

Q.2 Draw and Explain Iron Carbon equilibrium diagram with Phase Transformation. [16]

OR

Q.2 Write short notes on - [4×4=16]

(a) Phase Transformation in alloys

(b) Phase Rule

(c) Hume-Rothery Rule

(b) Crystallization Mechanism

UNIT- III

Q.3 Explain the following in detail- [8×2=16]

(a) Transformation of Anstenite into Pearlite

(b) Formation of Anstenite from Pearlite

OR

Q.3 (a) What do you understand by Annealing? Explain. [8]

(b) Explain Case Hardening, Carburising and Carbonitriding in detail. [8]

UNIT- IV

Q.4 (a) What are Polymers? What is the use of Polymers? [6]

(b) What Properties should a Polymer have to safely use it in a product? [10]

OR

Q.4 Write Short Notes on – [4×4=16]

(a) PMMA

(b) PPO

(c) PEEK

(d) PTFE

UNIT- V

Q.5 (a) Differentiate between Creep & Fatigue. [6]

(b) What are nano materials? What advantages nano materials have over other materials? [10]

OR

Q.5 Write Short Notes on – [4×4=16]

(a) Izod Test

(b) Brinell Hardness Test

(c) Rockwell Hardness Test

(d) Charpy Test

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3E1633

Roll No. _____ Total No of Pages: 4

3E1633

B. Tech. III - Sem. (Main / Back) Exam., Dec. - 2018
Mechanical Engineering
3ME3A Engineering Thermodynamics

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Steam Table 2. NIL

UNIT- I

Q.1 (a) List the important process for closed system & drive the equation for work done of polytrophic process. [8]

(b) The specific neat capacity of the system during a certain process is given by [8]

$C_n = (0.4 + 0.004T)$ kJ/kg°C.

If the mass of the gas is 6kg and its temperature changes from 25°C+ 125°C find :

(i) Heat transferred

(ii) Mean specific heat of gas

OR

Q.1 (a) Explain the following - [6]

(i) State (ii) Process (iii) Cycle

(b) An air receiver of volume 5.5m^{3}contains air at 16 bar and 42°C. A valve is opened and some air is allowed to blow out to atmosphere. The pressure of air in the receiver drops rapidly to 12 bar when the valve is then closed. Calculate the mass of air which has left the receiver. [10]

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UNIT- II

Q.2 (a) Given the following statements of second law of thermodynamics. [6]

(i) Clausius statement

(ii) Kelvin Planck Statement

(b) An iron cube at a temperature of 400°C is dropped into an insulated bath containing 10 kg water at 25°C. The water finally reaches a temperature of 50°C at steady state. Given that the specific heat of water is equal to 4186 J/kg K. Find the entropy changes for the iron cube and the water. Is the process reversible? If so why? [10]

OR

Q.2 (a) Drive an expression for the efficiency of the reversible heat engine. [8]

(b) 8kg of air at 650 K and 5.5 bar pressure is enclosed in a closed system. If the atmosphere temperature and pressure are 300K and 1 bar respectively. [8]

(i) Determine the availability if the system goes through the ideal work producing process.

UNIT- III

Q.3 (a) (i) What is a PvT surface? Draw a portion of such a surface. [4]

(ii) What is the difference between ideal and a perfect gas? [4]

(b) A vessel of capacity $3m^3$ contains 1kg mole of N_2 at 90°C. [8]

(i) Calculate pressure and the specific volume of gas.

(ii) If the ratio of specific heats is 1.4, evaluate the value of C_P and C_V.

(iii) Subsequently, the gas cools to the atmospheric temperature of 20°C, evaluate the final pressure of gas.

OR

Q.3 (a) Explain briefly Dalton's law & Gibbs Dalton law. [8]

(b) A perfect gas mixture consists of 4kg of N_2 and 6kg of CO_2 at a pressure of 4 bar and a temperature of 25°C. Calculate C_V and C_P of the mixture.

If the mixture is heated at constant volume of 50°C, find the change in Internal energy.

Take

$$C_{V(N_2)} = 0.745 \text{ kJ/ kg K}, C_{V(CO_2)} = 0.653 \text{ kJ/ kg K}.$$

$$C_{P(N_2)} = 1.041 \text{ kJ/ kg K}, C_{P(CO_2)} = 0.842 \text{ kJ/ kg K}.$$

UNIT- IV

Q.4 (a) Explain Maxwell relations and explain their importance in thermodynamics. [8]

(b) An oil engine working on the dual combustion cycle has a compression ratio 14 and the explosion ratio obtained from an indicator card is 1.4. If the cut off occurs at 6% of stroke, find the ideal efficiency. Take γ for air = 1.4. [8]

OR

Q.4 (a) Derive the Joule – Thomson coefficient equation. [8]

(b) The stroke and cylinder diameter of a compression ignition engine are 250mm and 150mm respectively. If the clearance volume is 0.0004m^3 and full injection takes place at constant pressure for 5% of the stroke determine the efficiency of the engine. Assume the engine working on the diesel cycle. [8]

UNIT- V

Q.5 (a) Explain with neat sketch the Rankine cycle. [8]

(b) A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150 bar, 55°C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 55°C and expands through law pressure turbine to G condenser at 0.1 bar. Draw T-S and h-s diagram Find. [8]

(i) Quality of steam at turbine exhaust

(ii) Cycle efficiency

(iii) Steam rate in kg/ kWh.

OR

Q.5 (a) Explain the Reheat cycle and its advantage. Draw T-S and schematic diagram for reheat cycle. [8]

(b) In a single – heater regenerative cycle the steam enters the turbine at 30 bar, 400°C and the exhaust pressure is 0.10 bar. The feed water heater is a direct contact type which operates at 5 bar, find :

The efficiency and the steam rate of the cycle. [8]

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3E1634

Roll No. _____ Total No of Pages: 3

3E1634

B. Tech. III - Sem. (Main / Back) Exam., Dec. - 2018
Mechanical Engineering
3ME4A Manufacturing Processes

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Steam Table 2. NIL

UNIT- I

Q.1 (a) What is pattern? Explain different types of pattern and Pattern Allowances. [1+3+4=8]

(b) What is moulding sands? Discuss moulding sand properties and testing. [1+3+4=8]

OR

Q.1 (a) Explain following casting processes with the help of neat sketch- [5+5=10]

(i) Centrifugal Casting

(ii) Die Casting

(b) Explain different types of casting defects with their causes and remedy. [6]

UNIT- II

Q.2 (a) Explain different types of Forging Processes and their uses. [6+2=8]

(b) Explain Hot working and Cold working process, with their principle, advantages, disadvantages and applications. [2+2+2+2=8]

OR

Q.2 (a) Explain basic principles and applications of following operations- (any three)

(i) Trimming [2+2+2=6]

(ii) Blanking

(iii) Parting

(iv) Notching

(b) Explain different metal working defects. [4]

(c) Discuss coining, Embossing and spinning processes. [2+2+2=6]

UNIT- III

Q.3 (a) Distinguish between Welding, Brazing and Soldering with respect to temperature generated, quality of joining, application and cost. [8]

(b) Explain the following welding techniques with the help of neat sketches- [4+4=8]

(i) TIG welding

(ii) Resistance welding

OR

Q.3 (a) Write short notes on following welding processes- [4+4=8]

(i) Ultrasonic welding

(ii) Explosive welding

(b) Explain different types of welding defects with their causes, effects and remedy. [8]

UNIT- IV

Q.4 (a) Explain powder metallurgy process with their advantages and application. [4+2+2=8]

(b) Explain following powder metallurgy processes- [4×2=8]

(i) Sintering

(ii) Electrolytic Process

(iii) Atomization

(iv) Chemical Reduction

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OR

Q.4 (a) Write short notes on following- [4+4=8]

(i) Subtractive Process

(ii) Additive Process

(b) What is Rapid Prototyping? Explain virtual prototyping and their applications. [2+4+2=8]

UNIT- V

Q.5 (a) What are plastics? Explain types and properties of plastics. [2+4+2=8]

(b) Describe with the help of neat sketches the following plastic processing methods stating their advantages and applications. [4+4=8]

(i) Compression moulding

(ii) Injection moulding

OR

Q.5 Write short notes on following processes- [4×4=16]

(i) Transfer moulding

(ii) Laminating

(iii) Calendaring

(iv) Blow moulding

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3E1635

Roll No. _____ Total No of Pages: 2

3E1635

B. Tech. III - Sem. (Back) Exam., Dec. - 2018
Automobile Engineering
3AE5A Object Oriented Programming in C++
AE, ME, AN

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Explain different features of Object Oriented Programming. [8]

(b) What is inheritance? Differentiate multiple and multilevel inheritance. [8]

OR

Q.1 Write short note on (any two) - [2×8=16]

(a) Message passing

(b) Inheritance

(c) Encapsulation

(d) Polymorphism

UNIT- II

Q.2 (a) What is Pointer? How array elements can be accessed using Pointers? Explain.[8]

(b) Explain memory management in C++ with new and delete operator. [8]

OR

Q.2 (a) Write a C++ program to concatenate two strings by (+) operator which uses concept of operator overloading. [8]

(b) Explain about pointers to pointers. [8]

UNIT- III

Q.3 (a) What do you mean by Constructor in C++? How many types of Constructors used in C++? Explain. [8]

(b) Write short note on Virtual Base Class. [8]

OR

Q.3 (a) What is Friend Function? Explain it with the help of an example. [8]

(b) Differentiate Public, Private and Protected Class. [8]

UNIT- IV

Q.4 (a) What is template? Explain different types of template. [8]

(b) Write short note on string stream. [8]

OR

Q.4 (a) Explain file processing in detail. [8]

(b) What is function template? What are the advantages of function template? [8]

UNIT- V

Q.5 (a) Write short note on "singly linked list" with example. [8]

(b) Explain "doubly linked list" with example. [8]

OR

Q.5 (a) What is stack? Explain different operation of stack. [8]

(b) Explain priority queue with the help of example. [8]

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3E1636

Roll No. _____ Total No of Pages: 4

3E1636

B. Tech. III - Sem. (Back) Exam., Dec. - 2018

Automobile Engineering

3AE6A Advanced Engineering Mathematics

AE, ME, PI

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Non programmable scientific calculator 2. Table of Normal curves

UNIT- I

Q.1 (a) Find the inverse Discrete Fourier transform of the sequence- [8]

$\{d_k\} = \{1,2,3,4\}$

(b) Find the Fourier sine and cosine transform of $f(x)=$ $\begin{cases} 1 & , \quad 0 < x < a \\ 0 & , \quad x > a \end{cases}$ [8]

OR

Q.1 (a) Find the Fourier sine transform of $f(x)= \frac{e^{-ax}}{x}$. [8]

(b) Solve: $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$, $-\infty < x < \infty$, $t \geq 0$

Given that-

(i) $u = f(x)$, when $t = 0$ [8]

(ii) $\frac{\partial u}{\partial t} = 0$, when $t = 0$

(iii) $u(x,t)$, $\frac{\partial u}{\partial x}$ both tends to zero as $x \to \pm\infty$.

UNIT- II

Q.2 (a) Find the Laplace transform of:

(i) $te^{at}\sin at$ [4]

(ii) $\frac{1}{t}(\cos at - \cos bt)$ [4]

(b) Apply convolution theorem to evaluate: [8]

$$L^{-1}\left[\frac{1}{s^2(s+1)^2}\right]$$

OR

Q.2 (a) Find the Laplace transform of $\sin\sqrt{t}$ and hence evaluate $L\left\{\frac{\cos\sqrt{t}}{\sqrt{t}}\right\}$. [8]

(b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $u(x,0) = 3\sin 2\pi x$ [8]

$u(0,t) = 0$, $u(1,t) = 0$, where $0 < x < 1$, $t > 0$

UNIT- III

Q.3 (a) A bag contains 3 white and 2 black balls and another bag contain 5 white and 3 black balls. If a bag is selected at random and a ball is drawn from it. Find the probability that it is white. [8]

(b) Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or a six. [8]

OR

Q.3 (a) If on an average 2% of the bulbs are fused in a lot of 200, find the probability of having-

(i) At most 5 defective bulbs. [8]

(ii) At least 2 defective bulbs.

Given $(e^{-1} = 0.3678)$

(b) State and prove Bayes' theorem. [8]

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UNIT- IV

Q.4 (a) The ordinates of the normal curve are given by the following table: [8]

x	0.0	0.2	0.4	0.6	0.8
y	0.3989	0.3910	0.3683	0.3332	0.2897

Evaluate:

(i) $y(0.25)$

(ii) $y(0.62)$

(b) Use Lagrange's interpolation formula to find y when x = 2, given that- [8]

x	0	1	3	4
y	5	6	50	105

OR

Q.4 (a) Prove that:

$$u_o + \frac{xu_1}{1!} + \frac{x^2u_2}{2!} + \frac{x^3u_3}{3!} + \ldots\ldots\ldots \quad [8]$$

$$= e^x \left[u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + \ldots\right]$$

(b) Use Stirling formula, to find y_{28}, given that- [8]

$y_{20}= 49225$, $y_{25}= 48316$, $y_{30}= 47236$, $y_{35}=45926$, $y_{40}=44306$

UNIT- V

Q.5 (a) Evaluate: $\int_0^6 \frac{dx}{1+x^2}$ by using :

(i) Trapezoidal Rule.

(ii) Simpson's $\frac{1}{3}$ Rule. [4+4=8]

(b) Use Euler's method with h = 0.1, to find the solution of the equation $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 0$, in the range $0 \leq x \leq 0.5$. [8]

OR

Q.5 (a) Evaluate: $\int_0^4 \sqrt{x^2 + 3x}\ dx$ by using Simpson's rule. [8]

(b) Using Runge-Kutta method, find approximate value of y for x = 0.2, if $\frac{dy}{dx} = x + y^2$, given that y = 1 when x = 0. [8]
