B.Tech. (ME.) 4th Semester,
(G-Scheme) Examination, May–2024

APPLIED THERMO DYNAMICS

Paper–PCC-ME-202-G

Time allowed : 3 hour]   [Maximum marks : 75

Note : In this question paper, there are nine number of questions. **Question No. 1 is compulsory.** Candidates are required to attempt five questions and selecting **one** question from each unit. All questions carry equal marks.

1. (i)   Define chemical equilibrium.
    (ii)   Define mean effective pressure for Otto cycle.
    (iii) Define de-humidification.
    (iv)   Explain subsonic and supersonic flows.
    (v)   Define optimal stage pressure ratio.
    (vi)   What do you mean by refrigerants?   2.5×6=15

Unit-I

2. Explain in details first law analysis of combustion reactions.   15

3. Explain the following :   15

    (a)   Adiabatic flame temperature

    (b)   Exhaust gas analyzer.

Unit-II

4. Explain in details Air Standard Diesel cycle. Explain efficiency and mean effective pressure.

5. Explain the different types of refrigerants and the properties.

Unit-III

6. Explain the following :   15

    (a) Choked flow

    (b) Subsonic and supersonic flows

7. Explain various psychrometric properties in details. 15

Unit-IV

8. Explain effect of inter cooling and minimum work for multistage reciprocating compressors.   15

9. Explain the various stages of reciprocating compressors in detail.   15

B. Tech. (ME) 4th Semester (G-Scheme)

Examination, May–2024

FLUID MECHANICS

Paper-PCC-ME-204-G

Time allowed : 3 hours]   [Maximum marks : 75

Note : **Ques. 1 is compulsory.** Students have to attempt at least one question from each section.

1. Write short notes on following :   6×2.5=15

    (i)   Continuum
    (ii) Flow net
    (iii) Isentropic flow
    (iv) Major and minor losses in pipes
    (v)   Reynolds numer
    (vi) Lift and drag

Section-A

2. Two horizontal plates are placed 1.25 cm apart, the space b/w them being filled with oil of viscosity 14 poises. Calculate the Shear stress in oil if upper plate is moved with a velocity of 2.5 m/s.   15

3. Derive a relation of differential equation of continuity in cylindrical Co-ordinates.   15

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Section-B

4. Derive Euler's equation with diagram.

5. A pipe of diameter 400 mm carries water at a velocity of 25 m/s. The pressure at the points A and B are given as 29.43 N/cm² and 22.563N/cm² respectively while the datum head at A and B are 28m and 30 m. Find the loss of head b/w A and B.

15

Section -C

6. Derive the relationship b/w Shear stress and pressure gradient.

15

7. (a) Describe the Hagen-poiseuilli law briefly.   15
   (b) Discuss the Flow regimes.

Section -D

8. Derive the Von-Karman momentum integral equation for boundary flow.

15

9. The frictional torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity μ and density ρ in a turbulent flow is given by $T = D^5 N^2 \rho \phi \left[\dfrac{\mu}{D^2 N \rho} \right]$

Prove this by the method of dimensions.   15

B.Tech. (ME) 4th Semester (G Scheme)

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Strength of Materials

Paper : PCC-ME-206-G

Time allowed : 3hours]   [Maximum marks : 75

Note: **Question No. 1 is compulsory** having six parts and each part is of 2.5 marks. Total of 15 marks and remaining question is of 15 marks and attempt **one** question from each section.

1. (a) Hooke's Law

    (b) Shear Force and Bending Moment

    (c) Moment of interia

    (d) Gordon's Formula

    (e) Hoop Stress

    (f) Slope and Deflection   2.5×6=15

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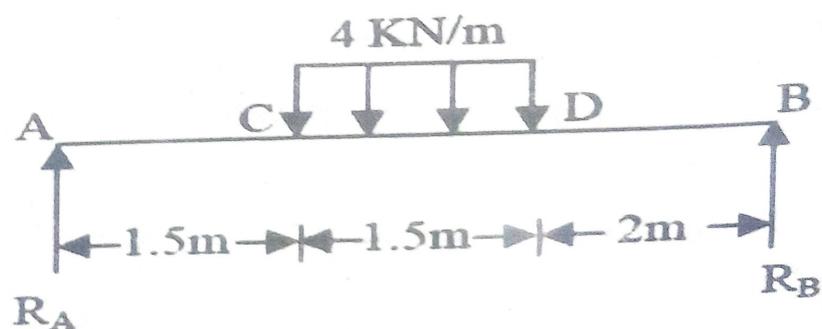
Section–I

2. What do you mean by Elastic constants derive the relation between E, C and K.

3. Derive the expression for stress on oblique pl under Biaxial Loading.

Section–II

4. Draw the Shear force and Bending mom digram for simply supported beam as gi below and position of maximum bend moment.

5. Derive the expression for Theory of simp Bending of beam.

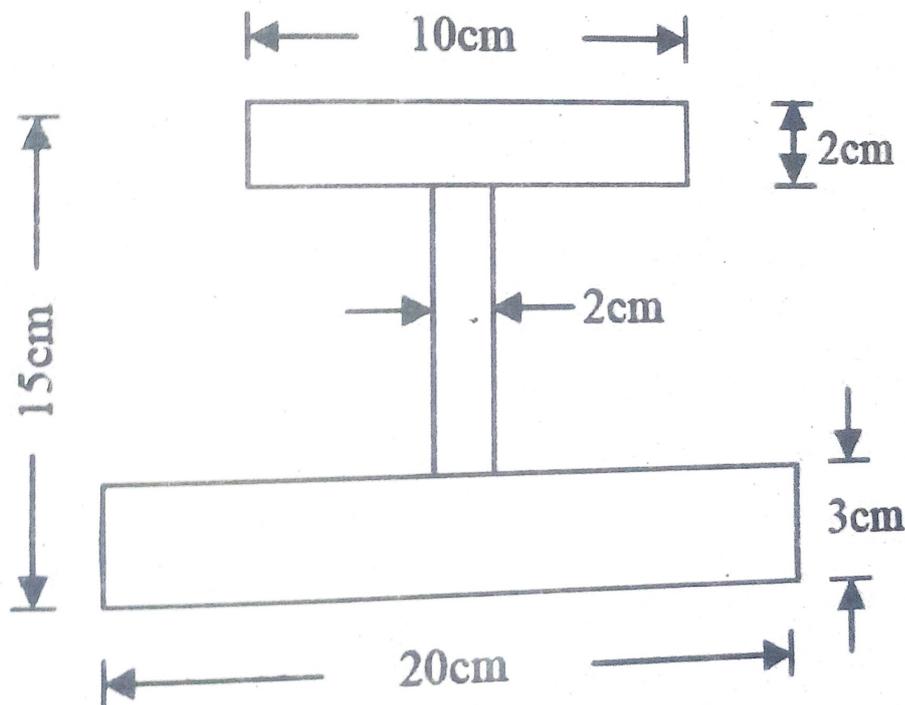## Section–III

6. The Cross-section of a cast iron beam as given below. This beam is simply supported at the ends and carries a uniformly distributed load of 20 Kn/m. If the beam span is 3m, determine the maximum tensile and compressive stress in the beam. 15

7. Explain Euler's theory of Bucking of columns. Derive the expression of hinged at both ends. 15

[P.T.O.

Section–IV

8. Derive the torsion formula for shaft of circular cross-section.

15

9. Explain Moment area method. Derive the expression for calculation of simply supported beam carrying a concentrated load at the centre.

15

B.Tech. (ME.) 4th Semester, (G-Scheme)
Examination, May–2024
MATERIALS ENGINEERING
Paper–PCC-ME-208-G

Time allowed : 3 hours]   [Maximum marks : 75

Note : *Question No. 1 is compulsory. Students have to attempt five questions in total selecting at least one question from each unit.*

1. (a) Define unit cell.

    (b) What is Young's modulus?

    (c) What is SN curve?

    (d) What do you understand by interstitial solid solution?

    (e) Write about Induction hardening.

    (f) What is nitriding?   2.5×6=15

Unit-I

2. Explain point defects and line defects with neat diagrams.
                                                15

3. Write about :

    (a) Generalized Hook's law.   8

    (b) Elastic recovery.   7

Unit-II

4. Write about :

 (a) Modified Mohr-Coulomb.

 (b) High cycle fatigue.

5. Write in detail about non-destructive testing.

Unit-III

6. What do you understand by phase diagram? Explain wi neat sketch Iron-carbide phase diagram.

7. Write in detail about micro-structural aspects Ledeburite and austenite.

Unit-IV

8. Explain the principles, classification and purpose of he treatment processes.

9. Write about :

 (a) Properties of Stainless Steel

 (b) Titanium Alloys

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INSTRUMENTATION & CONTROL
Paper–PCC-ME-210-G

Time allowed : 3 hours]   [Maximum marks : 75

Note : **Question 1 is compulsory.** Students have to attempt **one** question from each section.

1. Write short notes on the followings :
   (i)   Standards and Calibration
   (ii)   Strain Gauge
   (iii) Torque Meter
   (iv) PID
   (v)   Turbine Flow Meter
   (vii) Thermo-Electric Sensors

Section-A

2. Enumerate the main static characteristics of measuring instruments in contrast with static calibration.   15

3. Describe signal to noise ratio and what is the significance of "Error Calibration curve."   15

Section-B

. What is Piezo-electric transducers? List the advantage and disadvantage of Piezo-electric transducers.   15

5. Explain briefly LVDT with diagram.

Section-C

6. Explain the working of Hydraulic load cell a pneumatic load cell.

7. (a) How selective radiation pyrometer works.

(b) What are the methods to measure temperatu using non-electric method.

Section-D

8. Explain the working of Hot wire Anemometer wit diagram.

9. Discuss the Nyquist diagram and their use.