

Roll No.

3112

B. Tech. 4th Semester (ME)

Examination – May, 2026

APPLIED THERMODYNAMICS

Paper : PCC-ME-202-G

Time : Three Hours] [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) Define stoichiometric Air fuel ratio with its derivation. 2.5
- (ii) How to convert volumetric analysis to weight analysis in case of rating of fuel ? 2.5
- (iii) Discuss about the exergy analysis. 2.5

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P. T. O.

- (iv) Calculate the efficiency of nozzle. 2.5
- (v) Define stagnation temperature and pressure. 2.5
- (vi) What will happen if compressor arranged in series ? 2.5

SECTION - A

- 2. Discuss the working of orsat' apparatus for analysis of exhaust gas. 15
- 3. (a) What is the difference b/w Higher Heating Value (HHV) and lower heating value of the fuel ? 15
- (b) What is enthalpy of formation (ΔH_f) ?

SECTION - B

- 4. Describe the Rankine cycle with super heat case. 15
- 5. Describe the air standard Brayton cycle with effect of reheat and regeneration case. 15

SECTION - C

- 6. Derive the relation for Isentropic flow of a perfect gas through nozzle. 15
- 7. Describe the condition of nozzle for subsonic, supersonic and normal shock condition. 15

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SECTION - D

- 8. Derive the relation of multistage reciprocating compressor. 15
- 9. Discuss the velocity and pressure compounding of steam turbines. 15

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Roll No.

3113

B. Tech. 4th Semester (ME)
Examination – May, 2026

FLUID MECHANICS

Paper : PCC-ME-204-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) Explain viscosity with units of measurements.
- (ii) Define equation of continuity.
- (iii) Explain the principle of Venturimeter with a neat sketch.
- (iv) What do you understand by the terms : Major energy loss and minor energy losses in pipes ?
- (v) What do you mean by separation of boundary layer ?

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P. T. O.

- (vi) How would you distinguish between hydrodynamically smooth and rough boundaries ? 2.5 × 6 = 15

SECTION - A

2. (a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. 10
 (b) Determine the total pressure on a circular plate of diameter 3m which is placed vertically in water in such a way that the centre of the plate is 6m below the free surface of water. Find the position of centre of pressure also. 5
3. (a) Define velocity potential function and stream function with their properties. 10
 (b) What do you mean by equipotential line and a line of constant stream function ? 5

SECTION - B

4. State and derive an expression for Bernaulli's theorem. Also state the assumptions made for such a derivation 15
5. 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 $T = D^5 N^2 \rho \phi \left[\frac{\mu}{D^2 N \rho} \right]$.
 Prove this by the method of dimensions. 15

SECTION - C

6. Derive an expression for Hagen Poiseuille's formula. 15
7. (a) What do you understand by Hydraulic Gradient line and Total Energy line. 5
 (b) Three pipes of length's 800 m, 500 m and 400 m and of diameters 500 mm, 400 mm and 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700m. Find the diameter of the single pipe. 10

SECTION - D

8. Obtain Von Karman momentum integral equation. 15
9. Derive an expression for Prandtl's universal velocity distribution for turbulent flow in pipes. 15

Roll No.

3114

B. Tech. 4th Semester (ME)
Examination – May, 2026

STRENGTH OF MATERIALS

Paper : PCC-ME-206-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define principal stresses and principal planes. 2.5
- (b) Define Mohr's circle. 2.5
- (c) Discuss the point of contraflexure. 2.5
- (d) Define slenderness ratio. 2.5
- (e) Describe Maxwell's reciprocal theorem. 2.5
- (f) Discuss Macaulay's method for slope and deflection. 2.5

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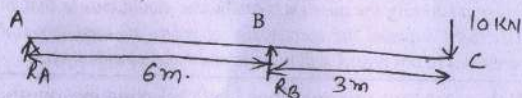
P. T. O.

SECTION - A

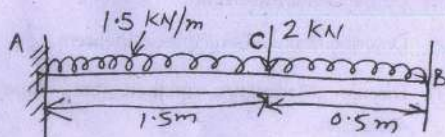
2. Derive the relationship in between E, C and K. 15
3. Derive the relation for Mohr's circle. 15

SECTION - B

4. An over hanging beam ABC is loaded as shown in fig. Find the slopes over each support end at the right end. Find also the maximum upward deflection between the supports and the deflection at the right end. $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 5 \times 10^8 \text{ mm}^4$. 15

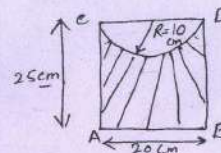


5. A cantilever of length 2m carries a uniformly distributed load of 1.5 kN/m over the whole length and a point load of 2 kN at a distance of 0.5 m from the free end. Draw the S.F. and B.M. diagrams for the cantilever. 15



SECTION - C

6. Find the moment of inertia of the area shown shaded in Fig. about edge AB. 15



7. Derive an expression for crippling load when one end of the column is fixed and the other end is free. 15

SECTION - D

8. A leaf spring carries a central load of 3000N. The leaf spring is to be made of 10 steel plates 5 cm wide and 6 mm thick. If the bending stress is limited to 150 N/mm². Determine : (i) Length of the spring (ii) Deflection at the centre of the spring if $E = 2 \times 10^5 \text{ N/mm}^2$. 15
9. A hollow circular shaft 20 mm thick transmits 300 kw power at 200 r. p. m. Determine the external diameter of the shaft if the shear strain due to torsion is not to exceed 0.00086. Take modulus of rigidity = $0.8 \times 10^5 \text{ N/mm}^2$. 15

Roll No.

3115

B. Tech. 4th Semester (ME)

Examination – May, 2026

MATERIALS ENGINEERING

Paper : PCC-ME-208-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Write short notes on following : $2.5 \times 6 = 15$

- (a) Plasma hardening
- (b) Substitutional solid solution
- (c) Fatigue Test
- (d) Resilience
- (e) Fracture
- (f) Creep

3115-2256-(P-2)(Q-9)(26)

P. T. O.

SECTION - A

2. What is imperfection in solids ? Explain point line and volume defects. 15
3. How Tensile test, compression and torsion test are carried out, explain with diagram ? 15

SECTION - B

4. Describe the Tresca and Von-mises theory of failure. 15
5. What is NDT ? Explain different types of NDT. 15

SECTION - C

6. Explain different phase of Fe-C diagram in detail. 15
7. Explain TTT diagram in detail. 15

SECTION - D

8. Explain continuous cooling curves and interpretation of final microstructures. 15
9. Write short notes on following : 15
 - (a) Carbo-nitriding
 - (b) Martempering
 - (c) Flame hardening

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3116

B. Tech. 4th Semester (ME)

Examination – May, 2026

INSTRUMENTATION & CONTROL

Paper : PCC-ME-210-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What do you understand by resolution ?

2.5 × 6 = 15

(b) What is Piezoelectric transducer ?

(c) What are compensators ?

(d) Define Amplifier.

(e) What is electronic flow meter ?

(f) Write about low pressure measurement.

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P. T. O.

UNIT - I

2. Write in detail about Instrumentation system elements? 15
3. Write in detail about functional elements of a measurement system. 15

UNIT - II

4. (a) What are digital transducers? 8
- (b) Write about Binary Codes. 7
5. (a) Write about photo-volatic transducers. 10
- (b) What are digital encoders? 5

UNIT - III

6. (a) Explain Hydraulic load cell. 8
- (b) Write about Seismic devices. 7
7. Write short notes on following :
- (a) Bimetallic Thermometer. 8
- (b) Selective radiation pyrometer. 7

UNIT - IV

8. Discuss in detail about system models, transfer function and system response related with control systems. 15

9. Write about :

- (a) Quantity Meters. 8
- (b) Turbine flow meter. 7