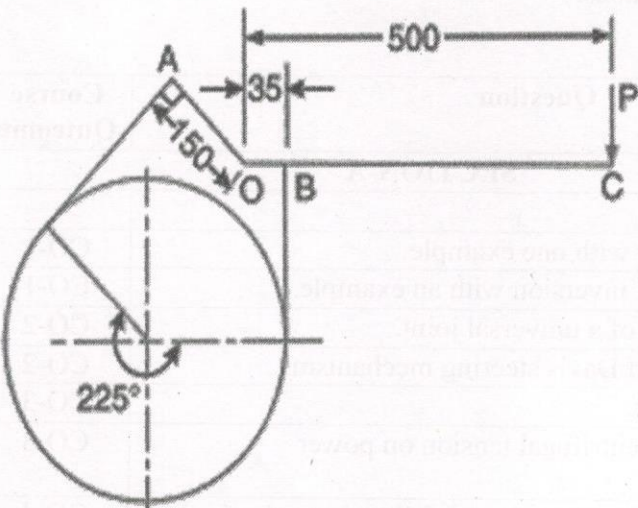




| SECTION-C |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 7.        | Construct different inversions of double-slider chain.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CO-1 | L3 |
| 8.        | Apply the concept of cam and follower motion to draw the displacement diagrams for a follower rising 30 mm in 90°, dwelling for 60°, returning in 90°, and dwelling for the remaining 120°, for both uniform velocity and simple harmonic motion.                                                                                                                                                                                                                                                                                                                                                            | CO-4 | L3 |
| 9.        | <p>A differential band brake, as shown in Figure below, has an angle of contact of 225°. The band has a compressed woven lining and bears against a cast iron drum of 350 mm diameter. The brake is to sustain a torque of 350 N-m and the coefficient of friction between the band and the drum is 0.3. Estimate:</p> <p>(a). The necessary force (P) for the clockwise and anticlockwise rotation of the drum; and</p> <p>(b). The value of 'OA' for the brake to be self-locking, when the drum rotates clockwise.</p>  | CO-5 | L5 |

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**Total No. of Pages: 02**

**Total No. of Questions: 09**

**B.Tech (MECHANICAL ENGINEERING), Semester 3<sup>rd</sup>**

## BASIC THERMODYNAMICS

**Subject Code: BTME305-18**

**M.Code: 76422**

**Date of Examination: 07-05-2025**

**Time: 3 Hrs.****Max. Marks: 60**

### INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                                                                                                                                                        | Course Outcome | Bloom's Level |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                                                                                                                                 |                |               |
| 1.               | Answer briefly:                                                                                                                                                                                                                                                 |                |               |
| a.               | Define thermodynamics.                                                                                                                                                                                                                                          | CO-1           | L1            |
| b.               | Compare point functions and path functions.                                                                                                                                                                                                                     | CO-1           | L2            |
| c.               | Define the First Law of Thermodynamics and write its expression.                                                                                                                                                                                                | CO-2           | L1            |
| d.               | How the constant pressure process can be explained in thermodynamics.                                                                                                                                                                                           | CO-2           | L2            |
| e.               | Define the Second Law of Thermodynamics.                                                                                                                                                                                                                        | CO-3           | L1            |
| f.               | Compare heat engine, heat pump, and refrigerator.                                                                                                                                                                                                               | CO-3           | L2            |
| g.               | Explain the concept of compression ratio.                                                                                                                                                                                                                       | CO-4           | L2            |
| h.               | What is the function of spark plug in SI engine.                                                                                                                                                                                                                | CO-5           | L1            |
| i.               | Summarize the effect of reheating on Rankine cycle efficiency.                                                                                                                                                                                                  | CO-6           | L2            |
| j.               | What is Rankine cycle?                                                                                                                                                                                                                                          | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                                                                                                                                                                 |                |               |
| 2.               | Identify the difference between intensive and extensive properties.                                                                                                                                                                                             | CO-1           | L3            |
| 3.               | Examine the relationship between thermodynamic properties to prove that the stored or internal energy is a state-dependent property of a system, independent of the process path.                                                                               | CO-2           | L4            |
| 4.               | Evaluate relationship between COP of Carnot heat pump and COP of Carnot refrigerator.                                                                                                                                                                           | CO-3           | L5            |
| 5.               | A reversible heat engine operates between 875 K and 310 K and drives a reversible refrigerator operating between 310 K and 255 K. The engine receives 2000 kJ of heat and the net work output from the arrangement equals 350 kJ. Determine the cooling effect. | CO-4           | L5            |
| 6.               | Construct and explain the working of a gas turbine with neat sketch. Classify the different types of gas turbines with suitable example.                                                                                                                        | CO-6           | L3            |

| SECTION-C |                                                                                                                                 |      |    |
|-----------|---------------------------------------------------------------------------------------------------------------------------------|------|----|
| 7.        | Construct and explain the P-V diagram of an isothermal process and develop formula for heat and work transfer for this process. | CO-1 | L3 |
| 8.        | Make use of compression ratio to calculate the efficiency of an Otto Cycle.                                                     | CO-4 | L3 |
| 9.        | Explain the construction and working mechanism of a four-stroke diesel engine with the help of a neat diagram.                  | CO-5 | L5 |

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Roll No.

**Total No. of Pages: 02**

**Total No. of Questions: 09**

**B.Tech (ME), Semester-3<sup>rd</sup>**

## STRENGTH OF MATERIALS-I

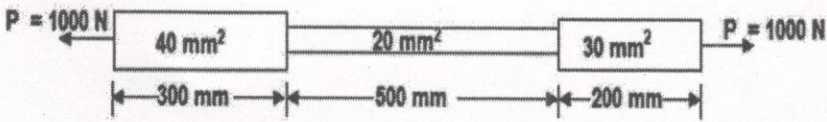
**Subject Code: BTME304-18**

**M.Code: 76421**

**Date of Examination: 16-05-2025**

**Time: 3 Hrs.****Max. Marks: 60****INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                                                                                                                                                                                                                  | Course Outcome | Bloom's Level |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                                                                                                                                                                                           |                |               |
| 1.               | Answer briefly:                                                                                                                                                                                                                                                                                                           |                |               |
| a.               | Define strain and stress.                                                                                                                                                                                                                                                                                                 | CO-1           | L1            |
| b.               | Explain Hooke's law.                                                                                                                                                                                                                                                                                                      | CO-1           | L2            |
| c.               | Define point of contraflexure.                                                                                                                                                                                                                                                                                            | CO-2           | L1            |
| d.               | Show the shear force distribution in a cantilever with a point load at the free end.                                                                                                                                                                                                                                      | CO-2           | L2            |
| e.               | List assumptions in simple bending theory.                                                                                                                                                                                                                                                                                | CO-3           | L1            |
| f.               | Summarize the advantages of composite beams.                                                                                                                                                                                                                                                                              | CO-3           | L2            |
| g.               | Outline the torsion equation.                                                                                                                                                                                                                                                                                             | CO-4           | L2            |
| h.               | Discuss the failure for long and short columns.                                                                                                                                                                                                                                                                           | CO-5           | L2            |
| i.               | Name various methods used to find slope and deflection.                                                                                                                                                                                                                                                                   | CO-6           | L2            |
| j.               | Recall the relationship between moment, slope, and deflection.                                                                                                                                                                                                                                                            | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                                                                                                                                                                                                                           |                |               |
| 2.               | <p>Apply axial deformation relation to compute elongation of a 1000 mm composite rod with cross-sectional areas 40 mm<sup>2</sup>, 30 mm<sup>2</sup>, and 20 mm<sup>2</sup> at different lengths under 1000 N load, E = 200 GPa.</p>  | CO1            | L3            |
| 3.               | Analyze the shear force and bending moment diagrams for a simply supported beam 10 m long with point loads of 40 kN and 60 kN at 3 m and 6 m from the left end.                                                                                                                                                           | CO2            | L4            |
| 4.               | Evaluate the role of section modulus in determining beam strength.                                                                                                                                                                                                                                                        | CO3            | L5            |

|                  |                                                                                                                                                                                                                                                                                                                                               |     |    |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 5.               | Evaluate the power transmitted by a 60 mm diameter shaft running at 150 rpm when the shear stress does not exceed 50 MPa.                                                                                                                                                                                                                     | CO4 | L5 |
| 6.               | Apply the double integration method to calculate slope and deflection of a cantilever beam subjected to a uniformly distributed load.                                                                                                                                                                                                         | CO6 | L3 |
| <b>SECTION-C</b> |                                                                                                                                                                                                                                                                                                                                               |     |    |
| 7.               | Develop and construct a Mohr's circle representation for an elemental cube subjected to tensile stresses of 60 N/mm <sup>2</sup> and 20 N/mm <sup>2</sup> on perpendicular planes with a shear stress of 20 N/mm <sup>2</sup> , and generate the principal stress and maximum shear stress values from your constructed diagram.              | CO1 | L3 |
| 8.               | Apply the theory of torsion to determine the relationship between torque, shear stress, and angle of twist, and derive the expression for shear stress in a circular shaft subjected to torsion based on the stated assumptions.                                                                                                              | CO4 | L3 |
| 9.               | Evaluate the crippling load of a 3 m long, 50 mm diameter solid bar using Euler's theory for the following end conditions: (a) both ends hinged, (b) one end fixed and the other free, and (c) both ends fixed, taking $E = 2 \times 10^5$ N/mm <sup>2</sup> . Compare and assess the effect of end conditions on the load-carrying capacity. | CO5 | L5 |

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Roll No.

Total No. of Pages: 2

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 3<sup>rd</sup>  
BASIC ELECTRONICS ENGINEERING

Subject Code: BTEC-305-18

M.Code:76420

Date of Examination: 06/06/2026

Time: 3 Hrs.

Max. Marks: 60

#### INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| SECTION-C |                                                                                                                               |      |    |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|------|----|
| 7.        | Examine the working of MOSFET along with suitable diagram.                                                                    | CO-2 | L4 |
| 8.        | Analyze the concept of feedback along with its various types.                                                                 | CO-3 | L4 |
| 9.        | Explain<br>a. Input offset voltage.<br>b. Input offset current.<br>c. Open loop gain.<br>d. Gain bandwidth product<br>e. PSRR | CO-1 | L5 |

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2IM-76420

| Q. No.    | Question                                                                               | Course Outcome | Bloom's Level |
|-----------|----------------------------------------------------------------------------------------|----------------|---------------|
| SECTION-A |                                                                                        |                |               |
| 1.        | Answer briefly:                                                                        |                |               |
| a.        | Define an insulator.                                                                   | CO-1           | L1            |
| b.        | Outline two applications of a diode.                                                   | CO-1           | L2            |
| c.        | Explain the importance of drift current in semiconductor.                              | CO-1           | L1            |
| d.        | List various applications of operational amplifier.                                    | CO-2           | L2            |
| e.        | Illustrate the function of pinch off voltage in FET.                                   | CO-2           | L1            |
| f.        | Explain unity gain amplifier.                                                          | CO-2           | L2            |
| g.        | What is CMRR in an op-amp?                                                             | CO-3           | L1            |
| h.        | Interpret the concept of biasing in inverting and non-inverting operational amplifier. | CO-3           | L2            |
| i.        | Label SR flip flop using Block diagram.                                                | CO-4           | L1            |
| j.        | Show T-flip flop using block diagram.                                                  | CO-4           | L2            |
| SECTION-B |                                                                                        |                |               |
| 2.        | Derive an expression for output voltage of Operational amplifier as integrator.        | CO-1           | L3            |
| 3.        | Apply the concept of semiconductor to explain working of Full Wave Rectifier.          | CO-2           | L3            |
| 4.        | Determine the working of op amp as summing amplifier.                                  | CO-3           | L5            |
| 5.        | Apply the concept of k-maps for min terms 6,7,9,12,16 +d(1,3,5)                        | CO-4           | L3            |
| 6.        | Compare square wave and triangular wave generators.                                    | CO-3           | L4            |

1IM-76420





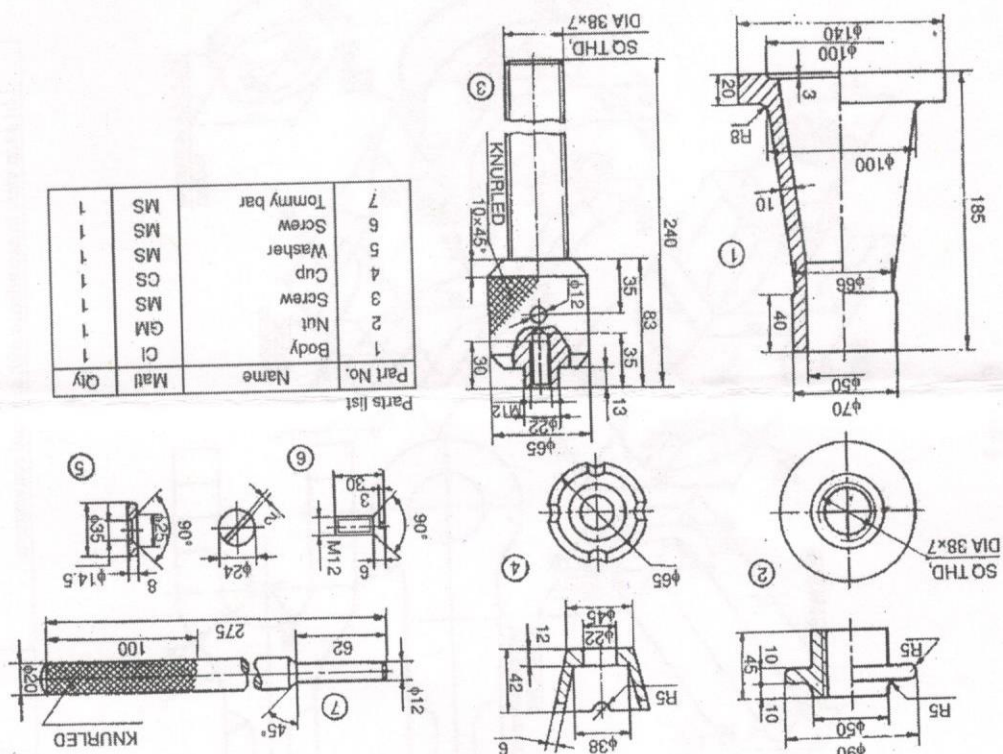


Figure 2

Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 3rd

FLUID MECHANICS

Subject Code: BTME 301-18

M.Code: 76417

Date of Examination: 20.05.2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                                                                                                    | Course Outcome | Bloom's Level |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                                                                             |                |               |
| 1.               | Answer briefly:                                                                                                                                                                                             |                |               |
| a.               | Define density and specific volume of a fluid.                                                                                                                                                              | CO-1           | L1            |
| b.               | Outline the difference between fluid statics, fluid kinematics and fluid dynamics.                                                                                                                          | CO-1           | L2            |
| c.               | Show the relation between pressure and depth in a static fluid.                                                                                                                                             | CO-2           | L1            |
| d.               | Explain metacentric height with a neat sketch.                                                                                                                                                              | CO-2           | L2            |
| e.               | Define steady and unsteady flow.                                                                                                                                                                            | CO-3           | L1            |
| f.               | Demonstrate the one-dimensional continuity equation.                                                                                                                                                        | CO-3           | L2            |
| g.               | Define fluid dynamics and discuss its few applications.                                                                                                                                                     | CO-4           | L2            |
| h.               | Compare Rayleigh's and Buckingham's method.                                                                                                                                                                 | CO-5           | L2            |
| i.               | Illustrate the working principle of a Pitot tube with neat sketch.                                                                                                                                          | CO-6           | L2            |
| j.               | Define manometer. Write its applications.                                                                                                                                                                   | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                                                                                                             |                |               |
| 2.               | Write the various properties of fluid. Also write their units.                                                                                                                                              | CO-1           | L3            |
| 3.               | A block of wood of specific gravity 0.7 floats in water. Calculate the meta-centric height of the block if its size is $2\text{ m} \times 1\text{ m} \times 0.8\text{ m}$ .                                 | CO-2           | L3            |
| 4.               | The diameters of a pipe at the sections 1 and 2 are 20 cm and 25 cm respectively. Find the discharge through the pipe if velocity of water at section 1 is 5 m/s. Determine also the velocity at section 2. | CO-3           | L5            |

11M-76417

|                  |                                                                                                                                                                                                                                            |      |    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 5.               | Develop Euler's equation of motion along a streamline. Also write the assumption                                                                                                                                                           | CO-4 | L6 |
| 6.               | Figure out the neat labelled diagram of venturimeter and explain its construction and working principle.                                                                                                                                   | CO-6 | L4 |
| <b>SECTION-C</b> |                                                                                                                                                                                                                                            |      |    |
| 7.               | Calculate the total pressure and depth of centre of pressure on a plane rectangular surface of 1 m wide and 3 m deep when its upper edge is horizontal and (a) coincides with water surface (b) 2 m below the free water surface.          | CO-2 | L3 |
| 8.               | Analyze Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's equation from first principle and state the assumptions made for such a derivation.                                           | CO-4 | L4 |
| 9.               | Develop an expression for pressure difference by using Buckingham's pi theorem. The pressure difference in a pipe of diameter D and length l due to turbulent flow depends upon the velocity $V$ , viscosity, density, and roughness $k$ . | CO-5 | L6 |

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21M-76417



Roll No. 

Total No. of Questions: 9

Date : 14-05-2026  
Total No. of Pages: 2B.TECH(ME), Semester-4TH  
Subject Name: FLUID MACHINES  
Subject Code: BTME402-18  
M. Code: 77547

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                                                                                                                                                                                                                                                                 | CO   | BL | Marks |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                                                                                                                                                                                                                                                             |      |    | 20    |
| a.        | The head of water at the central hole is 125 m. Find the actual velocity of jet. Take $C_v=0.98$                                                                                                                                                                                                                                                                                                            | CO-1 | L1 | 2     |
| b.        | Illustrate the formula for force exerted by the jet on a fixed plate.                                                                                                                                                                                                                                                                                                                                       | CO-1 | L2 | 2     |
| c.        | Illustrate the function of the nozzle in a Pelton turbine with a suitable sketch.                                                                                                                                                                                                                                                                                                                           | CO-2 | L2 | 2     |
| d.        | What is the purpose of the spear (needle) in a Pelton wheel?                                                                                                                                                                                                                                                                                                                                                | CO-2 | L1 | 2     |
| e.        | List the main components of a reaction turbine.                                                                                                                                                                                                                                                                                                                                                             | CO-3 | L1 | 2     |
| f.        | Explain the degree of reaction of a turbine.                                                                                                                                                                                                                                                                                                                                                                | CO-3 | L2 | 2     |
| g.        | What do you understand by the term "multistage pump"?                                                                                                                                                                                                                                                                                                                                                       | CO-4 | L1 | 2     |
| h.        | What is scale effect?                                                                                                                                                                                                                                                                                                                                                                                       | CO-4 | L1 | 2     |
| i.        | Differentiate between turbine and pump.                                                                                                                                                                                                                                                                                                                                                                     | CO-5 | L2 | 2     |
| j.        | Obtain the length of stroke for an accumulator having a displacement of 115 litres. The diameter of the plunger is 350 mm.                                                                                                                                                                                                                                                                                  | CO-6 | L2 | 2     |
| SECTION B |                                                                                                                                                                                                                                                                                                                                                                                                             |      |    | 20    |
| 2.        | Make use of principle of moment to find the force exerted by a jet of water of diameter 100 mm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 30 m/s.                                                                                                                                                                                                               | CO-1 | L3 | 5     |
| 3.        | A reaction turbine works at 450 rpm under a head of 120 metres. Its diameter at inlet is 120 cm and the flow area is $0.4\text{m}^2$ . The angles made by absolute and relative velocities at inlet are $20^\circ$ and $60^\circ$ respectively with the tangential velocity. Determine: (a) The volume flow rate, (b) The power developed, and (c) Hydraulic efficiency. Assume whirl at outlet to be zero. | CO-3 | L5 | 5     |
| 4.        | A turbine develops 9000 kW when running at 100 r.p.m. The head on the turbine is 30 m. If the head on the turbine is reduced to 18 m, determine the speed and power developed by the turbine.                                                                                                                                                                                                               | CO-4 | L5 | 5     |
| 5.        | Compare single-acting and double-acting reciprocating pump and explain with a suitable labelled diagram.                                                                                                                                                                                                                                                                                                    | CO-5 | L5 | 5     |
| 6.        | With the help of a neat sketch, examine the working of a hydraulic ram. Also, state any two practical applications of the device.                                                                                                                                                                                                                                                                           | CO-6 | L4 | 5     |
| SECTION C |                                                                                                                                                                                                                                                                                                                                                                                                             |      |    | 20    |



| Q No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CO   | BL | Marks |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| 7.    | A Pelton wheel is to be designed for the following specifications: Shaft power = 11,772 kW; Head = 380 metres; Speed = 750 r.p.m.; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Analyze: (i) The wheel diameter, (ii) The number of jets required, and (iii) Diameter of the jet. Take $C_v=0.985$ and speed ratio $K_u=0.45$                                                                                                                                                                                                             | CO-2 | L4 | 10    |
| 8.    | Utilize the centrifugal force principle and explain the constructional features and working of each components used in a pump . Support your answer with a neat labeled diagram.                                                                                                                                                                                                                                                                                                                                                                                                      | CO-4 | L3 | 10    |
| 9.    | An irrigation system uses a single-acting reciprocating pump to supply water to agricultural fields. The pump has a cylinder diameter of 180 mm and a stroke length of 320 mm. It operates at a speed of 50 rpm. During operation, the actual discharge measured at the outlet is 0.012 m <sup>3</sup> /s due to leakage and valve losses. Based on this information: (i) determine the theoretical discharge of the pump. (ii) Determine the slip of the pump. (iii) Evaluate the percentage slip. (iv) Analyze whether the pump performance indicates normal slip or negative slip, | CO-5 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 18-05-2026  
Total No. of Pages: 1B.TECH(ME), Semester-4TH  
Subject Name: THEORY OF MACHINES-II  
Subject Code: BTME405-18  
M. Code: 77550

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

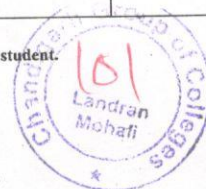
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| Q No.     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CO   | BL | Marks |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |    | 20    |
| a.        | Define static equilibrium.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CO-1 | L1 | 2     |
| b.        | Summarize force conventions for free body diagram                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | CO-1 | L2 | 2     |
| c.        | Describe 3 conditions by which two-mass system can represent a dynamically equivalent system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CO-2 | L2 | 2     |
| d.        | Label the parts of a slider crank mechanism.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CO-2 | L1 | 2     |
| e.        | What is swaying couple? Explain its effect in locomotives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CO-3 | L1 | 2     |
| f.        | Explain the purpose of balancing in engines and its effect on performance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CO-3 | L2 | 2     |
| g.        | Define pitch circle in a gear.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CO-4 | L1 | 2     |
| h.        | Define gyroscopic couple and give its relation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | CO-5 | L1 | 2     |
| i.        | Describe dimensional synthesis in mechanism design.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | CO-6 | L2 | 2     |
| j.        | Explain type synthesis in mechanism design.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CO-6 | L2 | 2     |
| SECTION B |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |    | 20    |
| 2.        | Apply polygon law of forces and explain equilibrium conditions for 2 force and 3 force system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CO-1 | L3 | 5     |
| 3.        | Examine a connecting rod having a mass moment of inertia of $2.25 \text{ kg-m}^2$ about its centre of gravity. The centre of gravity is located 500 mm from the small end centre. If the radius of gyration about the centre of gravity is 0.25 m, first determine the mass of the connecting rod and then find the values and positions of the two masses that will form the dynamically equivalent two-mass system when one mass is located at the small end centre.                                                                                                                                                             | CO-2 | L4 | 5     |
| 4.        | Evaluate the equations governing primary and secondary unbalanced forces in reciprocating engines by deriving them.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | CO-3 | L5 | 5     |
| 5.        | Evaluate the speed of the driven gear in a compound gear train deriving suitable relations of velocity ratio.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CO-4 | L5 | 5     |
| 6.        | Evaluate the relationship between link lengths in Freudenstein equation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CO-6 | L5 | 5     |
| SECTION C |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |    | 20    |
| 7.        | Analyze the dynamically equivalent two-mass system for a connecting rod and explain the procedure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CO-2 | L4 | 10    |
| 8.        | Examine the contact characteristics of a pair of involute spur gears where a pinion with 24 teeth drives a gear with 60 teeth, having a pressure angle of $20^\circ$ , module 10 mm, and addendum of 10 mm. Determine the length of path of approach, length of path of recess, total length of path of contact, arc of contact.                                                                                                                                                                                                                                                                                                   | CO-4 | L4 | 10    |
| 9.        | Determine the gyroscopic effects on a ship propelled by a turbine rotor of mass 5 tonnes, radius of gyration 0.5 m, and speed 2100 r.p.m. rotating clockwise when viewed from the stern, under the following conditions: 1. When the ship sails at a speed of 30 km/h and steers to the left along a curve of 60 m radius. 2. When the ship pitches $6^\circ$ above and $6^\circ$ below the horizontal position, with the bow descending at maximum velocity, and the pitching motion is simple harmonic with a period of 20 seconds. Also explain how the direction of motion due to gyroscopic effect is determined in each case | CO-5 | L5 | 10    |

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Roll No.

Total No. of Questions: 9

Date : 11-05-2026  
Total No. of Pages: 2

B.TECH(ME), Semester-4TH  
Subject Name: STRENGTH OF MATERIALS-II  
Subject Code: BTME403-18  
M. Code: 77548

Time: 03:00 Hrs.

Max. Marks: 60

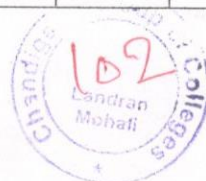
**INSTRUCTIONS TO CANDIDATES:**

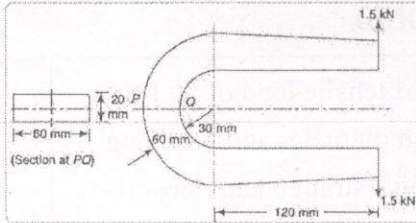
SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.            | Description                                                                                                                                                                                                                                                 | CO   | BL | Marks     |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-----------|
| <b>SECTION A</b> |                                                                                                                                                                                                                                                             |      |    | <b>20</b> |
| a.               | List the factors affecting strain energy in a member.                                                                                                                                                                                                       | CO-1 | L1 | 2         |
| b.               | Compare energy of dilation and energy of distortion.                                                                                                                                                                                                        | CO-1 | L2 | 2         |
| c.               | Obtain the equivalent stress in a shaft subjected to a bending stress of 80 MPa and shear stress of 40 MPa using von Mises theory.                                                                                                                          | CO-2 | L2 | 2         |
| d.               | What is meant by failure of a material?                                                                                                                                                                                                                     | CO-2 | L1 | 2         |
| e.               | What type of stress is induced in a close-coiled helical spring?                                                                                                                                                                                            | CO-3 | L1 | 2         |
| f.               | Compare open-coiled and close-coiled helical springs.                                                                                                                                                                                                       | CO-3 | L2 | 2         |
| g.               | Define a thin cylindrical shell and state the condition used to classify a cylinder as thin.                                                                                                                                                                | CO-4 | L1 | 2         |
| h.               | List the assumptions made in the analysis of thick cylindrical shells.                                                                                                                                                                                      | CO-4 | L1 | 2         |
| i.               | Explain the role of radius of curvature in stress distribution.                                                                                                                                                                                             | CO-5 | L2 | 2         |
| j.               | Define neutral axis in the context of shear stress distribution.                                                                                                                                                                                            | CO-6 | L1 | 2         |
| <b>SECTION B</b> |                                                                                                                                                                                                                                                             |      |    | <b>20</b> |
| 2.               | Solve the following when a tensile load of tensile load of 60 kN is gradually applied to a circular bar of 4 cm diameter and 5 m long.<br>(i) stretch in the bar (ii) stress in the bar (iii) strain energy absorbed by the rod. Take $E = 200\text{GPa}$ . | CO-1 | L3 | 5         |
| 3.               | List all the theories of failure and explain any two of them.                                                                                                                                                                                               | CO-2 | L4 | 5         |



| Q No.            | Description                                                                                                                                                                                                                                                                                                                                                                                                            | CO   | BL | Marks     |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-----------|
| 4.               | Determine the Strain Energy stored, Axial deflection and maximum shear stress induced in the wire of a close coiled helical spring subjected to an axial load of 200 N having 10 coils of wire of diameter 18 mm and made with coil diameter of 200 cm. Take $G = 80 \text{ GPa}$                                                                                                                                      | CO-3 | L5 | 5         |
| 5.               | Create an approach to determine the thickness required so that the hoop stress at the inner surface of a thick cylinder does not exceed 160 MPa. Given: internal pressure = 80 MPa, inner radius = 85 mm.                                                                                                                                                                                                              | CO-4 | L6 | 5         |
| 6.               | Evaluate the safe number of revolutions per minute for a thin ring of 2 m diameter such that the induced stress does not exceed 150 N/mm <sup>2</sup> , given that the material has a weight density of 7800 Kg/m <sup>3</sup> .                                                                                                                                                                                       | CO-6 | L5 | 5         |
| <b>SECTION C</b> |                                                                                                                                                                                                                                                                                                                                                                                                                        |      |    | <b>20</b> |
| 7.               | Analyze a machine part under biaxial loading where $\sigma_x = 200 \text{ MPa}$ , $\sigma_y = 100 \text{ MPa}$ , and $\tau_{xy} = 0$ , and determine the factor of safety using Maximum Principal Stress Theory and Maximum Shear Stress Theory. Take yield stress = 400 MPa.                                                                                                                                          | CO-2 | L4 | 10        |
| 8.               | Calculate the final stresses developed in the compound cylinder if it is formed by shrinking one tube onto another is subjected to an internal pressure of 160 MN/m <sup>2</sup> . Before the fluid is admitted, the internal and external diameters of the compound cylinder are 120 mm and 200 mm and the diameter at the junction is 160 mm. After shrinking on the radial pressure at the common surface is 8 MPa. | CO-4 | L3 | 10        |
| 9.               | <p>Solve the stresses at point P and Q of the frame shown in figure. Also find the location of neutral axis.</p>                                                                                                                                                                                                                    | CO-5 | L6 | 10        |

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Roll No. 

Total No. of Questions: 9

Date : 07-05-2026  
Total No. of Pages: 2B.TECH(ME), Semester-4TH  
Subject Name: MATERIALS ENGINEERING  
Subject Code: BTME404-18 e2

M.Code - 77549

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                  | CO   | BL | Marks |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                              |      |    | 20    |
| a.        | Define polymorphism in crystal structure.                                                                                                                    | CO-1 | L1 | 2     |
| b.        | Illustrate the concept of Miller indices.                                                                                                                    | CO-1 | L2 | 2     |
| c.        | State Fick's First Law of diffusion.                                                                                                                         | CO-2 | L1 | 2     |
| d.        | Describe the concept of diffusion in solids.                                                                                                                 | CO-2 | L2 | 2     |
| e.        | Why is Fe-C diagram considered partial phase diagram?                                                                                                        | CO-3 | L1 | 2     |
| f.        | Outline the interpretations by equilibrium phase diagram.                                                                                                    | CO-3 | L2 | 2     |
| g.        | Why is tempering treatment done after quenching?                                                                                                             | CO-4 | L1 | 2     |
| h.        | Explain the fundamentals of heat treatment.                                                                                                                  | CO-4 | L2 | 2     |
| i.        | What are the types of alloy steel based on alloy content?                                                                                                    | CO-5 | L1 | 2     |
| j.        | Classify the various alloy steels used for engineering purposes.                                                                                             | CO-5 | L2 | 2     |
| SECTION B |                                                                                                                                                              |      |    | 20    |
| 2.        | Choose appropriate methods to measure hardness and explain thoroughly the concept of hardness.                                                               | CO-1 | L3 | 5     |
| 3.        | Compare recovery and recrystallization processes in cold-worked metals.                                                                                      | CO-2 | L4 | 5     |
| 4.        | Validate the significance of lower and upper critical temperature lines in Fe-C equilibrium diagram for manufacturing industry.                              | CO-3 | L5 | 5     |
| 5.        | Recommend the process steps involved in carburizing and nitriding and explain how they improve surface properties of steel.                                  | CO-4 | L5 | 5     |
| 6.        | Evaluate the effect of combined alloying elements on the microstructure and properties of engineering steels.                                                | CO-5 | L5 | 5     |
| SECTION C |                                                                                                                                                              |      |    | 20    |
| 7.        | Organize steady-state and non-steady-state diffusion behavior with respect to temperature and concentration gradients.                                       | CO-2 | L3 | 10    |
| 8.        | Differentiate the phase transformation behavior of steels using TTT and equilibrium diagrams under varying cooling conditions.                               | CO-3 | L4 | 10    |
| 9.        | Apply suitable heat treatment processes to obtain improved strength and ductility in a medium-carbon steel component and justify the sequence of operations. | CO-4 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 05-05-2026

Total No. of Pages: 2

B.TECH(ME), Semester-6TH  
 Subject Name: NON-CONVENTIONAL ENERGY RESOURCES  
 Subject Code: BTME615-18  
 M Code : 79660

Time: 03:00 Hrs.

INSTRUCTIONS TO CANDIDATES:

Max. Marks: 60

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                                | CO   | BL | Marks |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                            |      |    | 20    |
| a.        | List the modes of heat transfer from solar energy.                                                                                                                         | CO-1 | L1 | 2     |
| b.        | Explain the need of sun tracking systems in focusing collectors.                                                                                                           | CO-1 | L2 | 2     |
| c.        | Describe thermal efficiency of flat plate collector.                                                                                                                       | CO-1 | L2 | 2     |
| d.        | Why is a salinity gradient maintained in a solar pond?                                                                                                                     | CO-2 | L1 | 2     |
| e.        | Explain solar greenhouses used for controlled environmental heating.                                                                                                       | CO-2 | L2 | 2     |
| f.        | Explain the purpose of thermal energy storage in solar power systems.                                                                                                      | CO-2 | L2 | 2     |
| g.        | What do you mean by local and planetary winds?                                                                                                                             | CO-3 | L1 | 2     |
| h.        | Describe the utilization aspects of wind energy.                                                                                                                           | CO-3 | L2 | 2     |
| i.        | State any two properties of hydrogen as a fuel.                                                                                                                            | CO-4 | L2 | 2     |
| j.        | Write a short note on Biodiesel.                                                                                                                                           | CO-4 | L1 | 2     |
| SECTION B |                                                                                                                                                                            |      |    | 20    |
| 2.        | Identify suitable focusing type collector for medium temperature applications.                                                                                             | CO-1 | L3 | 5     |
| 3.        | Examine the process of solar distillation and desalination.                                                                                                                | CO-2 | L4 | 5     |
| 4.        | Determine the factors governing suitable site selection for tidal power plant installation.                                                                                | CO-3 | L5 | 5     |
| 5.        | Compare Fixed Dome type plant and movable drum type biogas plant.                                                                                                          | CO-4 | L5 | 5     |
| 6.        | Compare the different types of fuel cells on the basis of design and operating principles.                                                                                 | CO-4 | L5 | 5     |
| SECTION C |                                                                                                                                                                            |      |    | 20    |
| 7.        | Select a suitable solar cooker from box type or parabolic type for different cooking conditions and justify your choice.                                                   | CO-2 | L3 | 10    |
| 8.        | Examine the functional relationships among the components of a wind energy conversion system and analyze their contribution to system operation.                           | CO-3 | L4 | 10    |
| 9.        | Explain the methods employed for transportation of hydrogen in detail. Also discuss the safety precautions involved in production, storage and transportation of hydrogen. | CO-4 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 04-05-2026

Total No. of Pages: 2

B.TECH.(ME), Semester-4th  
Subject Name: APPLIED THERMODYNAMICS

Subject Code: BTME401-18 E2

M-Code: 77546

Time: 03:00 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

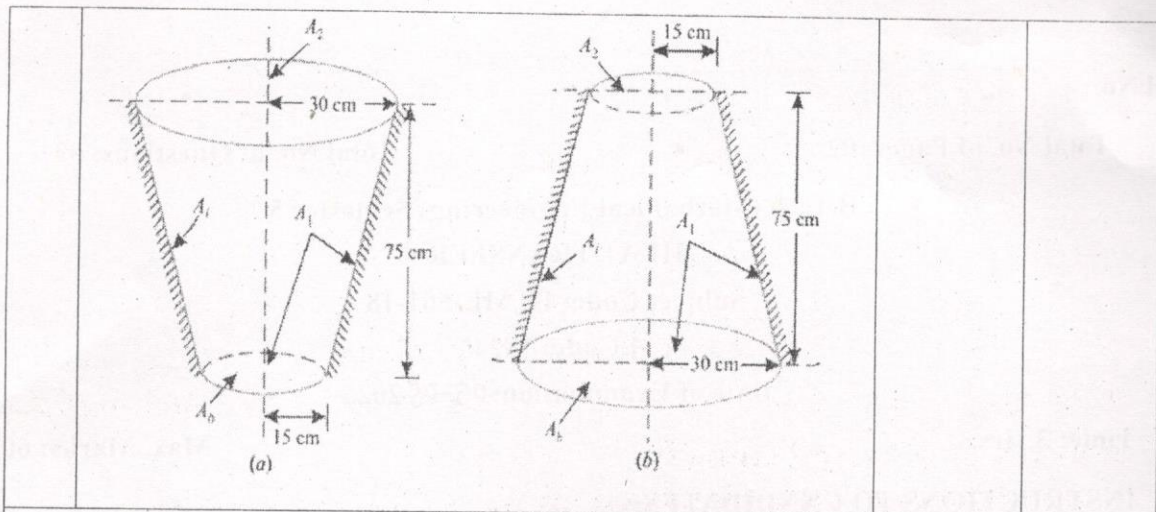
SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | CO   | BL | Marks |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |    | 20    |
| a.        | A single-stage reciprocating air compressor takes in air at 1 bar and compresses it to 5 bar. The suction volume is $0.2 \text{ m}^3/\text{min}$ . Find the work done per minute, assuming isothermal compression. (Take $p_1 = 1 \text{ bar} = 100 \text{ kPa}$ ).                                                                                                                                                                                                                                                                                                        | CO-1 | L1 | 2     |
| b.        | Explain superheated steam in thermodynamics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | CO-1 | L2 | 2     |
| c.        | Define the dryness fraction of steam and its significance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CO-2 | L1 | 2     |
| d.        | Illustrate the use of Mollier chart in analyzing steam processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CO-2 | L2 | 2     |
| e.        | List the thermodynamic variables that effect the efficiency and output of rankine cycle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CO-3 | L1 | 2     |
| f.        | Compare ideal and actual Rankine cycles and highlight the reasons for deviations in real systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CO-3 | L2 | 2     |
| g.        | Illustrate a convergent-divergent nozzle by labeling the throat.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CO-4 | L2 | 2     |
| h.        | Compare impulse and reaction turbines and highlight their differences in working principles and applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CO-5 | L2 | 2     |
| i.        | State Dalton's law of partial pressures as applied to condensers and its significance in condenser operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CO-6 | L1 | 2     |
| j.        | Summarize the function of a cooling tower in a condenser system and its importance in heat rejection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CO-6 | L2 | 2     |
| SECTION B |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |    | 20    |
| 2.        | A single acting two stage compressor with complete intercooling delivers $6 \text{ kg/min}$ . of air at 16 bar. Assuming intake at 1 bar and $15^\circ\text{C}$ and compression and expansion with the law $p.V^{1.3} = C$ , Solve for the below parameters: (i) Power required to run the compressor. (ii) Isothermal efficiency (iii) Free air delivery. (iv) If the clearance volume ratios for L.P. and H.P. cylinders are 0.04 and 0.06, calculate the volumetric efficiency and swept volumes for each cylinder. The speed of the compressor is $420 \text{ r.p.m.}$ | CO-1 | L3 | 5     |

| Q No.            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CO   | BL | Marks     |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-----------|
| 3.               | List the stages of combustion in IC engines and briefly explain each stage with respect to the combustion process and its effect on engine performance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CO-2 | L4 | 5         |
| 4.               | In a vapour power cycle, the steam enters the HP turbine at 4 MPa and 450° C. After expansion to 0.8 MPa, the steam is reheated to 450° C and then expanded in the LP turbine to the condenser pressure 15 kPa. Determine cycle efficiency and steam quality at LP turbine exit.                                                                                                                                                                                                                                                                                                                                                                 | CO-3 | L5 | 5         |
| 5.               | Analyze the effect of blade friction and speed ratio on the blade efficiency of an impulse turbine. Derive the condition for axial discharge and explain its significance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CO-5 | L4 | 5         |
| 6.               | The absolute pressure in the condenser is 11.56 kPa when the barometer reads 1 bar. The temperature is 40° C. Determine the partial pressure of air, vacuum efficiency and the mass of air present in the condenser per kg of steam.                                                                                                                                                                                                                                                                                                                                                                                                             | CO-6 | L5 | 5         |
| <b>SECTION C</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |    | <b>20</b> |
| 7.               | Steam at 20 bar and 360° C expands in a steam turbine to 0.08 bar. It is then condensed in a condenser to saturated water. The pump feeds back the water to boiler. Assume, ideal Rankine cycle and Examine: (i) Net workdone/kg of steam (ii) Rankine efficiency.                                                                                                                                                                                                                                                                                                                                                                               | CO-2 | L4 | 10        |
| 8.               | Construct a binary vapour power cycle and utilize appropriate thermodynamic principles to explain its working with the help of a neat schematic diagram. Also, analyze how it enhances overall thermal efficiency under varying operating conditions.                                                                                                                                                                                                                                                                                                                                                                                            | CO-4 | L3 | 10        |
| 9.               | Draw the velocity diagram for a velocity compounded impulse turbine having two rows of moving blades separated by a ring of fixed blades with the following particulars : Nozzle angle, $\alpha_1 = 10^\circ$ ; Moving blade tip discharge angles, $\phi_1 = \phi_2 = 30^\circ$ ; fixed blade discharge angle, $\alpha_2 = 13^\circ$ . Assume a loss of 10% in velocity due to friction when the steam passes over a blade ring. Determine the blade velocity for a steam velocity of 500 m/s from the nozzles so that final discharge of steam is axial. Also, determine the power developed for 1 kg/s of steam flow and the stage efficiency. | CO-5 | L5 | 10        |

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### SECTION-C

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 7. | Develop an expression for heat conduction equation in Cylindrical coordinates.                                                                                                                                                                                                                                                                                                                                                                                            | CO-1 | L3 |
| 8. | Utilize the Buckingham $\pi$ theorem to formulate an expression for free convection heat transfer.                                                                                                                                                                                                                                                                                                                                                                        | CO-3 | L3 |
| 9. | Determine the heat transfer area required and the effectiveness, assuming two streams are in parallel flow for double pipe heat exchanger.<br>Hot water flows at a rate of 5000 kg/h and gets cooled from 95°C to 65°C. At the same time 50000 kg/h of cooling water at 30°C enters the heat exchanger. The flow conditions are such that overall heat transfer coefficient remains constant at 2270 W/m <sup>2</sup> K. Assume for both the streams $c_p = 4.2$ kJ/kg K. | CO-4 | L5 |

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Total No. of Pages: 02

Total No. of Questions: 09

**B.Tech (Mechanical Engineering), Semester 5th**

## DESIGN OF MACHINE ELEMENTS

Subject Code: BTME502-18

M.Code: 78248

Date of Examination: 19-05-2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q.No.            | Question                                                                                                                                                                                                                                                                                 | Course Outcome | Bloom's Level |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                                                                                                                                                          |                |               |
| 1.               | Answer briefly:                                                                                                                                                                                                                                                                          |                |               |
| a.               | Name different modes of failure in machine design.                                                                                                                                                                                                                                       | CO-1           | L1            |
| b.               | Explain the importance of general design considerations.                                                                                                                                                                                                                                 | CO-1           | L2            |
| c.               | Name two conditions for the design of shafts.                                                                                                                                                                                                                                            | CO-2           | L1            |
| d.               | Interpret the significance of fatigue load in shaft design.                                                                                                                                                                                                                              | CO-2           | L2            |
| e.               | List the types of V-belts.                                                                                                                                                                                                                                                               | CO-3           | L1            |
| f.               | Compare belt drive and chain drive systems.                                                                                                                                                                                                                                              | CO-3           | L2            |
| g.               | Classify the different gear tooth failures.                                                                                                                                                                                                                                              | CO-4           | L2            |
| h.               | Demonstrate the function of a centrifugal clutch.                                                                                                                                                                                                                                        | CO-5           | L2            |
| i.               | Summarize the advantages of flexible couplings over rigid couplings.                                                                                                                                                                                                                     | CO-6           | L2            |
| j.               | What is the objective of nipping of leaf spring?                                                                                                                                                                                                                                         | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                                                                                                                                                                                          |                |               |
| 2.               | Apply the design steps to develop a systematic procedure for a machine element?                                                                                                                                                                                                          | CO-1           | L3            |
| 3.               | A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10 000 N-m. The shaft is made of 45 C 8 steel having ultimate tensile stress of 700 MPa and a ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, analyze the diameter of the shaft. | CO-2           | L4            |

|                  |                                                                                                                                                                                                                                                                                                                                              |      |    |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 4.               | Design a belt drive to transmit 110 kW for a system consisting of two pulleys of diameters 0.9 m and 1.2 m, centre distance of 3.6 m, a belt speed 20 m / s, coefficient of friction 0.3, a slip of 1.2% at each pulley and 5% friction loss at each shaft, 20% over load.                                                                   | CO-3 | L6 |
| 5.               | A pair of spur wheels with involute teeth is to give a gear ratio of 3 to 1. The arc of approach is not to be less than the circular pitch and the smaller wheel is the driver. The pressure angle is 20°. Determine the least number of teeth that can be used on each wheel, and the addendum of the wheel in terms of the circular pitch. | CO-4 | L5 |
| 6.               | Make use of strength equations to design a flexible coupling.                                                                                                                                                                                                                                                                                | CO-6 | L3 |
| <b>SECTION-C</b> |                                                                                                                                                                                                                                                                                                                                              |      |    |
| 7.               | A shaft made of mild steel is required to transmit 100 kW at 300 r.p.m. The supported length of the shaft is 3 metres. It carries two pulleys each weighing 1500 N supported at a distance of 1 metre from the ends respectively. Assuming the safe value of stress, analyze the diameter of the shaft.                                      | CO-2 | L4 |
| 8.               | Apply the standard design equations to outline the procedure for designing spur gear.                                                                                                                                                                                                                                                        | CO-4 | L3 |
| 9.               | Explain the design procedure of a journal bearing and examine how operating parameters (load, speed, viscosity) influence the steps involved.                                                                                                                                                                                                | CO-5 | L5 |

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21M-78248



Total No. of Questions: 09

**B.Tech (Mechanical Engineering), Semester 5th**

MANAGEMENT ENGINEERING AND ECONOMICS  
 5 (1) 1981, pp. 1-18  
 0145-0173/81 \$04.00  
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Subject Code: BTME504-18

M.Code: 78250

Date of Examination: 14-05-2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                   | Course Outcome | Bloom's Level |
|------------------|----------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                            |                |               |
| 1.               | Answer briefly:                                                                                                            |                |               |
| a.               | List various decision making principles in management.                                                                     | CO-1           | L1            |
| b.               | Explain the importance of planning.                                                                                        | CO-1           | L2            |
| c.               | Recall the meaning of departmentation.                                                                                     | CO-2           | L1            |
| d.               | Outline the principles of organization.                                                                                    | CO-2           | L2            |
| e.               | Name any two modern techniques of control.                                                                                 | CO-3           | L1            |
| f.               | Classify types of organizational communication based on direction.                                                         | CO-3           | L2            |
| g.               | Explain cash flow diagrams.                                                                                                | CO-4           | L2            |
| h.               | Illustrate demand and supply of a product.                                                                                 | CO-5           | L2            |
| i.               | Explain any two causes of depreciation.                                                                                    | CO-6           | L2            |
| j.               | What is meant by salvage value?                                                                                            | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                            |                |               |
| 2.               | Apply the development of management thought with reference to early and-modern approaches.                                 | CO-1           | L3            |
| 3.               | List and explain the steps involved in the organizing process.                                                             | CO-2           | L4            |
| 4.               | Justify the role of effective leadership in maintaining organizational control and justify how it shapes team performance. | CO-3           | L5            |
| 5.               | Explain the laws of demand and supply. Also explain the factors influencing demand and supply.                             | CO-4           | L5            |
| 6.               | Apply the effect of taxation on cost estimation and decision making.                                                       | CO-6           | L3            |

| SECTION-C |                                                                                                                                                                                                                                                                                                                                                                                      |      |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7.        | Analyze Maslow's hierarchy of needs theory and Herzberg's motivation theory in detail. How are these applied in management?                                                                                                                                                                                                                                                          | CO-2 |
| 8.        | Distinguish between increasing, constant, and diminishing returns with suitable illustrations, according to the Law of Returns to scale.                                                                                                                                                                                                                                             | CO-4 |
| 9.        | Two equipments are purchased each for Rs.12,000/-. The estimated useful life is 5 years for both the estimated scrap value for each equipment is RS.2,000/-. For one equipment the straight line method is used to calculate annual depreciation and for the other equipment, the reducing balance method is adopted. Compare the depreciation charges for both for all the 5 years. | CO-5 |
|           |                                                                                                                                                                                                                                                                                                                                                                                      | L5   |

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21M-78250

IM-78250



Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 5th

MANUFACTURING PROCESSES

Subject Code: BTME 503-18

M.Code: 78249

Date of Examination: 09.05.2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                     | Course Outcome | Bloom's Level |
|------------------|------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                              |                |               |
| 1.               | Answer briefly:                                                                                                              |                |               |
| a.               | Define manufacturing processes. Classify the manufacturing process.                                                          | CO-1           | L1            |
| b.               | Compare hot working and cold working process.                                                                                | CO-1           | L2            |
| c.               | List the four examples of single and multi-point cutting tool each.                                                          | CO-2           | L1            |
| d.               | Illustrate the factors affecting machining.                                                                                  | CO-2           | L2            |
| e.               | What is the need for an additive manufacturing process?                                                                      | CO-3           | L1            |
| f.               | Outline the various applications of Additive Manufacturing.                                                                  | CO-3           | L2            |
| g.               | Explain the working principle of spot welding process with a neat sketch.                                                    | CO-4           | L2            |
| h.               | Outline some of the tool material used in EDM.                                                                               | CO-5           | L2            |
| i.               | Explain two functions of a jig.                                                                                              | CO-6           | L2            |
| j.               | What are the standard work holding devices in lathe?                                                                         | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                                                                              |                |               |
| 2.               | Write and explain different steps involved in casting process.                                                               | CO-1           | L3            |
| 3.               | Explore the concept of machining and compare non-traditional machining process with traditional machining process in detail. | CO-2           | L4            |

|                  |                                                                                                                                                                                                                                          |      |    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 4.               | Explain the process of Selective Laser Sintering (SLS) with a suitable diagram and write its industrial applications.                                                                                                                    | CO-3 | L5 |
| 5.               | Explain the working of Gas Metal Arc Welding (GMAW/MIG welding) with a neat labelled diagram. How does it differ from TIG welding?                                                                                                       | CO-4 | L5 |
| 6.               | Construct the suitable diagrams of any two types of jigs and explain in brief.                                                                                                                                                           | CO-6 | L3 |
| <b>SECTION-C</b> |                                                                                                                                                                                                                                          |      |    |
| 7.               | Lathe machines are widely used in workshops for making shafts, bolts, and machine parts. List the major operations performed on a lathe and explain them with neat diagrams.                                                             | CO-2 | L4 |
| 8.               | Examine the construction and working of Oxy-acetylene gas welding process and describe it with suitable diagram. Write its advantages, disadvantages and applications.                                                                   | CO-4 | L4 |
| 9.               | Explain the construction and working principle of Electrical Discharge Machining (EDM) with a neat labelled diagram. Explain how the metal is removed in detail. Also, write the advantages, limitation and applications of the process. | CO-5 | L5 |

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21M-78249



11M-78249

Roll No. 

Total No. of Questions: 9

Date : 22-05-2026  
Total No. of Pages: 1B.Tech(ME), Semester-6th  
Subject Name: COMPUTER AIDED DESIGN  
Subject Code: BTME613-18  
MCode: 79658

Max. Marks: 60

Time: 03:00 Hrs.

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                                                                                                       | CO   | BL | Marks |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                                                                                                   |      |    | 20    |
| a.        | Name the different types of coordinate systems commonly used in CAD modeling.                                                                                                                                                                     | CO-1 | L1 | 2     |
| b.        | Compare explicit equations and implicit equations used for curve representation.                                                                                                                                                                  | CO-1 | L2 | 2     |
| c.        | Write the meaning of surface patch.                                                                                                                                                                                                               | CO-2 | L1 | 2     |
| d.        | Explain Bezier surface formulation.                                                                                                                                                                                                               | CO-2 | L2 | 2     |
| e.        | Illustrate parametric representation of solids.                                                                                                                                                                                                   | CO-3 | L2 | 2     |
| f.        | Interpret the role of curves in defining solid geometry.                                                                                                                                                                                          | CO-3 | L2 | 2     |
| g.        | What is boundary representation in B- spline curve?                                                                                                                                                                                               | CO-4 | L1 | 2     |
| h.        | Illustrate sweep representation in solid modeling                                                                                                                                                                                                 | CO-4 | L2 | 2     |
| i.        | Define homogeneous transformation matrix.                                                                                                                                                                                                         | CO-5 | L1 | 2     |
| j.        | Explain why scaling is considered a non-rigid transformation.                                                                                                                                                                                     | CO-5 | L2 | 2     |
| SECTION B |                                                                                                                                                                                                                                                   |      |    | 20    |
| 2.        | Identify suitable curve representation techniques for different geometric modeling applications.                                                                                                                                                  | CO-1 | L3 | 5     |
| 3.        | Determine the application of union, intersection, and difference operations in Constructive Solid Geometry (CSG) for generating complex solid models.                                                                                             | CO-2 | L5 | 5     |
| 4.        | Justify the use of parametric solid representation over non-parametric representation for complex engineering components.                                                                                                                         | CO-3 | L5 | 5     |
| 5.        | Distinguish between Euler operators and Boolean operations in model construction.                                                                                                                                                                 | CO-4 | L4 | 5     |
| 6.        | Justify the role of homogeneous transformations in three-dimensional modeling and explain their importance in combining multiple transformations.                                                                                                 | CO-5 | L5 | 5     |
| SECTION C |                                                                                                                                                                                                                                                   |      |    | 20    |
| 7.        | Differentiate different surface blending methods used for smooth surface transitions in geometric design.                                                                                                                                         | CO-2 | L4 | 10    |
| 8.        | Analyze the role of continuity in composite solid design. Explain the positional, tangential, and curvature continuity and discuss how they influence the smoothness, strength, and overall quality of the designed model with suitable examples. | CO-3 | L4 | 10    |
| 9.        | Evaluate the role of geometric transformations in positioning and orienting components during assembly design.                                                                                                                                    | CO-5 | L5 | 10    |

Roll No. 

Total No. of Questions: 9

Date : 19-05-2026  
Total No. of Pages: 1B.TECH(ME), Semester-6TH  
Subject Name: INTRODUCTION TO INDUSTRIAL MANAGEMENT  
Subject Code: BTME604-18  
Mode: 79653

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                               | CO   | BL | Marks |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                           |      |    | 20    |
| a.        | Name the various tools utilized in management science with suitable examples.                                                                                             | CO-1 | L1 | 2     |
| b.        | Compare manufacturing excellence and service excellence with examples.                                                                                                    | CO-1 | L2 | 2     |
| c.        | How are production and manufacturing interrelated? Explain with examples.                                                                                                 | CO-2 | L1 | 2     |
| d.        | Define the term production system with suitable examples.                                                                                                                 | CO-2 | L1 | 2     |
| e.        | What is meant by buying technique in purchasing? Give a brief explanation.                                                                                                | CO-3 | L1 | 2     |
| f.        | List the objectives of plant maintenance and their relevance in production systems.                                                                                       | CO-3 | L2 | 2     |
| g.        | Name the various activities involved in the purchasing process in industries.                                                                                             | CO-3 | L1 | 2     |
| h.        | Explain the objectives of inventory control in industries.                                                                                                                | CO-4 | L2 | 2     |
| i.        | Name the different types of customers. Write suitable example of each types of customer.                                                                                  | CO-5 | L1 | 2     |
| j.        | A company is experiencing repeated customer complaints. How should it structure its complaint-handling process to resolve issues effectively? Outline the steps involved. | CO-5 | L2 | 2     |
| SECTION B |                                                                                                                                                                           |      |    | 20    |
| 2.        | Identify the steps involved in implementing Total Quality Management in manufacturing industry                                                                            | CO-1 | L3 | 5     |
| 3.        | Differentiate between fixed cost and variable cost with respect to production planning.                                                                                   | CO-2 | L4 | 5     |
| 4.        | Apply preventive maintenance techniques to reduce machine breakdown in a plant.                                                                                           | CO-3 | L3 | 5     |
| 5.        | Evaluate the role of ABC analysis with a suitable diagram in prioritizing inventory management decisions.                                                                 | CO-4 | L5 | 5     |
| 6.        | Explain the impact of benchmarking on quality improvement initiatives.                                                                                                    | CO-5 | L5 | 5     |
| SECTION C |                                                                                                                                                                           |      |    | 20    |
| 7.        | Utilize the concept of product life cycle to plan marketing and production strategies for a product at different stages.                                                  | CO-2 | L3 | 10    |
| 8.        | Examine the principles of Just-In-Time (JIT) system and analyze how it reduces inventory levels in industries.                                                            | CO-4 | L4 | 10    |
| 9.        | Explain various techniques used for measuring customer satisfaction and their reliability in decision-making.                                                             | CO-5 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 15-05-2026  
Total No. of Pages: 2B.TECH(ME), Semester-6TH  
Subject Name: REFRIGERATION AND AIR CONDITIONING  
Subject Code: BTME601-18  
M. Code: 79650

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                                                                                                                                                              | CO   | BL | Marks |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                                                                                                                                                          |      |    | 20    |
| a.        | Define Evaporative Cooling.                                                                                                                                                                                                                                                              | CO-1 | L1 | 2     |
| b.        | Show the formula of COP for Heat Pump with suitable diagram.                                                                                                                                                                                                                             | CO-1 | L2 | 2     |
| c.        | Show dry saturated vapour after compression on P-h and T-S diagram.                                                                                                                                                                                                                      | CO-2 | L2 | 2     |
| d.        | What is the purpose of capillary tube?                                                                                                                                                                                                                                                   | CO-2 | L1 | 2     |
| e.        | What do you mean by azeotropes?                                                                                                                                                                                                                                                          | CO-3 | L1 | 2     |
| f.        | Describe the effect of moisture contamination on refrigerant performance.                                                                                                                                                                                                                | CO-3 | L2 | 2     |
| g.        | Name the parts by which compressor is replaced in vapour absorption refrigeration system.                                                                                                                                                                                                | CO-4 | L1 | 2     |
| h.        | Define the term Specific Humidity and also write its formula.                                                                                                                                                                                                                            | CO-5 | L1 | 2     |
| i.        | State the Dalton's law of partial pressures.                                                                                                                                                                                                                                             | CO-5 | L2 | 2     |
| j.        | Explain the purpose of fresh air in air conditioning.                                                                                                                                                                                                                                    | CO-6 | L2 | 2     |
| SECTION B |                                                                                                                                                                                                                                                                                          |      |    | 20    |
| 2.        | Compute the mass of ice produced per day from water at 25°C for a refrigerator having the capacity of 200 TR working between -6°C and 25°C. Also find the power required to drive the unit. Assume the cycle operates on reversed Carnot cycle and latent heat of ice is 335 kJ/kg.      | CO-1 | L3 | 5     |
| 3.        | Assume that a refrigeration system operates with multiple evaporators at the same temperature using a single compressor and a single expansion valve; draw a neat diagram and explain its working principle.                                                                             | CO-2 | L4 | 5     |
| 4.        | Explain the role of leak detection methods in preventing refrigerant loss.                                                                                                                                                                                                               | CO-3 | L5 | 5     |
| 5.        | Explain the role of absorber and rectifier in maintaining effective operation of the Aqua-Ammonia vapour absorption system.                                                                                                                                                              | CO-4 | L5 | 5     |
| 6.        | Determine the sensible heat transfer when moist air enters a heating coil at 12°C, 40% relative humidity, and leaves at 32°C, if the mass flow rate of dry air is 80 kg/s. Also determine the steam flow rate required if steam enters at 110°C saturated and condensate leaves at 85°C. | CO-5 | L4 | 5     |
| SECTION C |                                                                                                                                                                                                                                                                                          |      |    | 20    |
| 7.        | Classify different types of compressors, and explain the construction and working of hermetic and semi-hermetic sealed compressors with suitable diagrams.                                                                                                                               | CO-2 | L4 | 10    |

| Q No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | CO   | BL | Marks |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| 8.    | Calculate the relative humidity of air at exit from the duct and the rate of heat transfer., if the air enters a duct at 10°C and 80% RH at the rate of 150 m <sup>3</sup> /min and is heated to 30°C without adding or removing any moisture. The pressure remains constant at 1 atmosphere.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CO-5 | L3 | 10    |
| 9.    | Determine the following: (a) Amount of recirculated air, if the recirculated air is mixed with fresh air before entering the cooling coil, (b) Capacity of the cooling coil in tonnes of refrigeration and its by-pass factor if dew point temperature of the coil is 5°C, and (c) Capacity of the heating coil in kW. if the temperature of the air entering the room is not to exceed 15°C. A cold storage is to be designed to store 500 tonnes of vegetables when the following data are available: Outdoor conditions = 35°C DBT and 28°C WBT<br>Required indoor conditions = 20°C DBT and 60% RH Water contents of the vegetables = 76% Loss of water content = 0.01% per hour People working in the cold storage = 25<br>Fresh air supplied from outside = 4400 m <sup>3</sup> /h Sensible heat gain through glass = 5.8 kW<br>Sensible heat gain through walls and ceilings = 11.6 kW Heat from equipment and reaction heat of vegetables = 3.5 kW Infiltrated air = 200 m <sup>3</sup> /h. Assume that, the air conditioning is achieved by first cooling and dehumidifying and then heating, | CO-6 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 12-05-2026  
Total No. of Pages: 1B.TECH(ME), Semester-6TH  
Subject Name: AUTOMOBILE ENGINEERING  
Subject Code: BTME603-18

Mcode: 79652

Time: 03:00 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                             | CO   | BL | Marks |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                         |      |    | 20    |
| a.        | What is meant by general layout of an automobile?                                                                                                       | CO-1 | L1 | 2     |
| b.        | Differentiate between 2-stroke and 4-stroke engines.                                                                                                    | CO-1 | L2 | 2     |
| c.        | State the necessity of lubrication in an engine.                                                                                                        | CO-2 | L1 | 2     |
| d.        | Explain the working of coil ignition system.                                                                                                            | CO-2 | L2 | 2     |
| e.        | State loads acting on an automobile frame.                                                                                                              | CO-3 | L1 | 2     |
| f.        | Compare between caster angle and camber angle.                                                                                                          | CO-3 | L2 | 2     |
| g.        | Define gearbox in an automobile.                                                                                                                        | CO-4 | L1 | 2     |
| h.        | Describe the function of Electronic Stability Program (ESP) and explain its role in improving vehicle control under different driving conditions.       | CO-4 | L2 | 2     |
| i.        | What is biodiesel and its applications in diesel engine?                                                                                                | CO-5 | L1 | 2     |
| j.        | Differentiate between hybrid vehicles and electric vehicles.                                                                                            | CO-5 | L2 | 2     |
| SECTION B |                                                                                                                                                         |      |    | 20    |
| 2.        | Apply the concept of DPF in BS6 compliant Diesel vehicles.                                                                                              | CO-1 | L3 | 5     |
| 3.        | Categorize the desirable properties of lubricants and explain their importance in engine performance.                                                   | CO-2 | L4 | 5     |
| 4.        | Justify the role of steering linkages in maintaining directional control of a vehicle.                                                                  | CO-3 | L5 | 5     |
| 5.        | Interpret the effectiveness of torque converter in automatic transmission systems.                                                                      | CO-4 | L5 | 5     |
| 6.        | Interpret the effectiveness of a preventive maintenance plan for cooling and suspension systems of a commercial vehicle in extreme climatic conditions. | CO-5 | L5 | 5     |
| SECTION C |                                                                                                                                                         |      |    | 20    |
| 7.        | Implement the concept of common rail injection to demonstrate the working of CRDI system with neat sketch.                                              | CO-2 | L3 | 10    |
| 8.        | Use suspension system concepts to demonstrate the performance of double wishbone suspension compared to conventional suspension.                        | CO-3 | L3 | 10    |
| 9.        | Evaluate the effectiveness of ABS, EBD and BA, in improving vehicle safety.                                                                             | CO-5 | L5 | 10    |

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Roll No. 

Total No. of Questions: 9

Date : 08-05-2026

Total No. of Pages: 1

B.TECH(ME), Semester-6TH  
Subject Name: MECHANICAL MEASUREMENT & METROLOGY

Subject Code: BTME602-18

M.Code: 79651

Time: 03:00 Hrs.

Max. Marks: 60

## INSTRUCTIONS TO CANDIDATES:

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q No.     | Description                                                                                                                                    | CO   | BL | Marks |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|
| SECTION A |                                                                                                                                                |      |    | 20    |
| a.        | What is measurement error?                                                                                                                     | CO-1 | L1 | 2     |
| b.        | Explain hysteresis in measuring instruments.                                                                                                   | CO-1 | L2 | 2     |
| c.        | Describe the use of sine bar in angular measurement.                                                                                           | CO-2 | L2 | 2     |
| d.        | List different instruments used for angular measurement.                                                                                       | CO-2 | L1 | 2     |
| e.        | Where is a dynamometer used? State its purpose.                                                                                                | CO-3 | L1 | 2     |
| f.        | Summarize the working of accelerometers.                                                                                                       | CO-3 | L2 | 2     |
| g.        | Write the principle of resistance temperature detector.                                                                                        | CO-4 | L1 | 2     |
| h.        | Define precision and state its significance in measurement systems.                                                                            | CO-4 | L1 | 2     |
| i.        | Describe surface texture characteristics.                                                                                                      | CO-5 | L2 | 2     |
| j.        | Explain the effect of magnification on accuracy in comparators.                                                                                | CO-6 | L2 | 2     |
| SECTION B |                                                                                                                                                |      |    | 20    |
| 2.        | Make use of sensitivity and resolution to explain instrument performance.                                                                      | CO-1 | L3 | 5     |
| 3.        | Interpret the use of LVDT in displacement measurement with reference to its limitations and practical constraints.                             | CO-3 | L5 | 5     |
| 4.        | Evaluate the temperature using a thermistor when the resistance becomes half of its value at 25°C. Take $\beta = 3500$ K.                      | CO-4 | L5 | 5     |
| 5.        | Justify the selection of base tangent method over constant chord method for gear tooth thickness measurement in precision applications.        | CO-5 | L5 | 5     |
| 6.        | Compare tool maker's microscope and profile projector in dimensional measurement.                                                              | CO-6 | L4 | 5     |
| SECTION C |                                                                                                                                                |      |    | 20    |
| 7.        | Apply the working principles of vernier caliper and micrometer to measure a given component and explain the differences in their applications. | CO-2 | L3 | 10    |
| 8.        | Apply the concept of limits, fits and tolerances to explain their role in inspection and measurement with suitable examples.                   | CO-4 | L3 | 10    |
| 9.        | Evaluate the working principle and advantages of electrical comparators with reference to their performance in precision measurement.          | CO-6 | L5 | 10    |

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|                  |                                                                                                                                       |      |    |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 5.               | Categorize the concept of environmental and economic integration to demonstrate how sustainability can be achieved in product design. | CO-4 | L4 |
| 6.               | Explain the challenges of scaling Rapid Prototyping for large production volumes.                                                     | CO-5 | L5 |
| <b>SECTION-C</b> |                                                                                                                                       |      |    |
| 7.               | Analyze the effectiveness of design by innovation over evolution, considering time and cost factors.                                  | CO-1 | L4 |
| 8.               | Examine the economic and quality benefits of designing for producibility in machine components, providing justification.              | CO-3 | L4 |
| 9.               | Evaluate the impact of safety and reliability considerations on long-term profitability.                                              | CO-4 | L5 |

**Note: Disclosure of identity by writing mobile number or making of passing request on any paper of Answer Sheet will lead to UMC against the student.**

Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 7<sup>th</sup>

**MECHANICAL VIBRATIONS**

Subject Code: -BTME 701-18

M.Code: -90474

Date of Examination: 09-05-2025

Time: 3 Hrs.

Max. Marks: 60

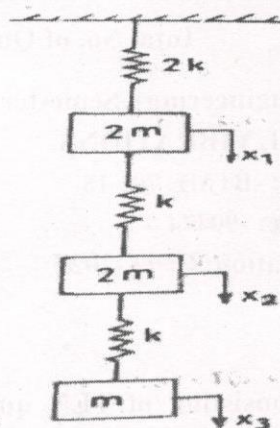
**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

| Q. No.           | Question                                                                                                   | Course Outcome | Bloom's Level |
|------------------|------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                            |                |               |
| 1.               | Answer briefly:                                                                                            |                |               |
| a.               | List the types of vibration systems.                                                                       | CO-1           | L1            |
| b.               | Compare free vibration and damped vibration.                                                               | CO-1           | L2            |
| c.               | Recall the meaning of vibration isolation.                                                                 | CO-2           | L1            |
| d.               | Interpret transmissibility for damping ratio less than one.                                                | CO-2           | L2            |
| e.               | Define two-degree freedom system.                                                                          | CO-3           | L1            |
| f.               | Demonstrate the function of a centrifugal pendulum absorber.                                               | CO-3           | L2            |
| g.               | Recall reciprocal theorem in vibrations.                                                                   | CO-4           | L1            |
| h.               | Explain undamped free vibration of a 2-DOF system.                                                         | CO-4           | L2            |
| i.               | Define Rayleigh's method.                                                                                  | CO-5           | L1            |
| j.               | Explain critical speed of a shaft.                                                                         | CO-5           | L2            |
| <b>SECTION-B</b> |                                                                                                            |                |               |
| 2.               | Examine the importance of vibration analysis in mechanical systems and justify its practical applications. | CO-1           | L4            |
| 3.               | Construct the amplitude-frequency curve for forced vibration with damping.                                 | CO-2           | L3            |
| 4.               | Determine principal modes in a simple double pendulum.                                                     | CO-3           | L5            |
| 5.               | Analyze the vibration of a two-disc torsional shaft.                                                       | CO-4           | L4            |
| 6.               | Compare Rayleigh and Rayleigh-Ritz methods.                                                                | CO-5           | L5            |
| <b>SECTION-C</b> |                                                                                                            |                |               |
| 7.               | Analyze the natural frequency of Vibrating System using the principle of energy method.                    | CO-1           | L4            |
| 8.               | Examine the importance of vibration absorbers in mechanical systems.                                       | CO-3           | L4            |



|    |                                                                                 |      |    |
|----|---------------------------------------------------------------------------------|------|----|
| 9. | Solve the natural frequencies of the system shown in figure using matrix method | CO-4 | L6 |
|----|---------------------------------------------------------------------------------|------|----|



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**Total No. of Pages:02**

**Total No. of Questions: 09**

**B.Tech (Mechanical Engineering), Semester 7<sup>th</sup>**

## ELECTRONIC DEVICES

**Subject Code: BTEC-301-18**

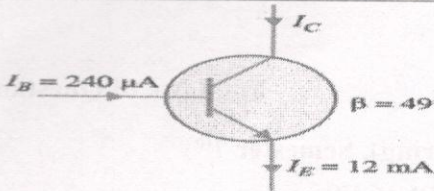
**M.Code: 90606**

**Date of Examination:** 13-05-2026

**Time: 3 Hrs.****Max. Marks: 60****INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                                                            | Course Outcome | Bloom's Level |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                                     |                |               |
| 1.               | Answer briefly:                                                                                                                                                     |                |               |
| a.               | Define mobility of charge carriers.                                                                                                                                 | CO-1           | L1            |
| b.               | Explain the importance of E-K diagrams.                                                                                                                             | CO-1           | L2            |
| c.               | Show and label the energy band diagram of intrinsic semiconductor.                                                                                                  | CO-1           | L2            |
| d.               | Recall a P-N junction diode.                                                                                                                                        | CO-2           | L1            |
| e.               | Explain the principle of operation of a Zener diode.                                                                                                                | CO-2           | L2            |
| f.               | Outline the operation of LED.                                                                                                                                       | CO-2           | L2            |
| g.               | Define a bipolar junction transistor.                                                                                                                               | CO-3           | L1            |
| h.               | Explain the three regions of operation of BJT.                                                                                                                      | CO-3           | L2            |
| i.               | Define an Integrated Circuit.                                                                                                                                       | CO-4           | L1            |
| j.               | Explain the role of annealing in IC fabrication.                                                                                                                    | CO-4           | L2            |
| <b>SECTION-B</b> |                                                                                                                                                                     |                |               |
| 2.               | Analyze the role of impurities in making a diode with the help of energy band diagram.                                                                              | CO-1           | L4            |
| 3.               | Make use of circuit diagram to show the principle of operation of a P-N junction diode along with its V-I characteristics.                                          | CO-2           | L3            |
| 4.               | Find the $\alpha$ rating of the transistor shown in figure. Also determine the value of collector current using both $\alpha$ and $\beta$ rating of the transistor. | CO-3           | L5            |

|                  |                                                                                                                                         |      |    |
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|                  |                                                        |      |    |
| 5.               | Analyse using suitable diagram the process of Oxidation in IC fabrication.                                                              | CO-4 | L4 |
| 6.               | Evaluate the trade-offs between thermal oxidation and plasma oxidation.                                                                 | CO-4 | L5 |
| <b>SECTION-C</b> |                                                                                                                                         |      |    |
| 7.               | Model the Blackbody Radiation Phenomena. Also explain the photoelectric effect with the help of neat diagram.                           | CO-1 | L3 |
| 8.               | Analyze the output characteristics of BJT in CE and CB configurations. Also examine the expression of Gain of CE and CB configurations. | CO-3 | L4 |
| 9.               | Explain along with suitable diagram various steps involved in CMOS fabrication process. Give suitable examples.                         | CO-4 | L5 |

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

**B.Tech (Branch), Semester 7<sup>th</sup>  
FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS**

Subject Code: BTME 703-18

M.Code:90476

Date of Examination: 20-05-2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                               | Course Outcome | Bloom's Level |
|------------------|------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                        |                |               |
| 1.               | Answer briefly:                                                        |                |               |
| a.               | Label the basic elements of management process.                        | CO-1           | L1            |
| b.               | Illustrate the relationship between planning and controlling.          | CO-1           | L2            |
| c.               | Name any two TQM models.                                               | CO-2           | L1            |
| d.               | Illustrate with example how lean manufacturing reduces waste.          | CO-2           | L2            |
| e.               | What is meant by market segmentation?                                  | CO-3           | L1            |
| f.               | Outline the importance of Supply Chain Management in competitiveness.  | CO-3           | L2            |
| g.               | Interpret the meaning of standard time in work measurement.            | CO-4           | L2            |
| h.               | Classify different types of productivity measures.                     | CO-5           | L2            |
| i.               | Explain the importance of personnel management in an organization.     | CO-6           | L2            |
| j.               | What is meant by safety engineering?                                   | CO-6           | L1            |
| <b>SECTION-B</b> |                                                                        |                |               |
| 2.               | Develop a plan to improve managerial skills in a growing organization. | CO-1           | L3            |
| 3.               | Compare the advantages and disadvantages of different plant layouts.   | CO-2           | L4            |
| 4.               | Evaluate how product life cycle impacts marketing strategies.          | CO-3           | L5            |
| 5.               | Evaluate principles of motion economy to redesign an assembly task.    | CO-4           | L5            |
| 6.               | Distinguish between recruitment and selection processes.               | CO-6           | L4            |

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|                  |                                                                                                               |      |    |
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| <b>SECTION-C</b> |                                                                                                               |      |    |
| 7.               | Apply Total Quality Management principles to a textile unit and explain its benefits in productivity.         | CO-2 | L3 |
| 8.               | Examine Therbligs in motion study and conclude their importance in reducing fatigue.                          | CO-4 | L4 |
| 9.               | Explain the impact of value-engineering techniques on cost, quality, and innovation in manufacturing systems. | CO-5 | L5 |

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 7<sup>th</sup>

MAINTENANCE AND RELIABILITY

Subject Code: BTME617-18

M.Code: 90485

Date of Examination: 16-05-2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                             | Course Outcome | Bloom's Level |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                      |                |               |
| 1.               | Answer briefly:                                                                                                                      |                |               |
| a.               | List two objectives of the maintenance.                                                                                              | CO-1           | L1            |
| b.               | Illustrate the concept of maintainability by considering an example where two systems have different repair characteristics.         | CO-1           | L2            |
| c.               | Define predictive maintenance.                                                                                                       | CO-2           | L1            |
| d.               | Show the relationship between manpower skill levels and their corresponding maintenance activities.                                  | CO-2           | L2            |
| e.               | List common reliability terms used in failure data analysis.                                                                         | CO-3           | L1            |
| f.               | Compare reliability and availability in systems.                                                                                     | CO-3           | L2            |
| g.               | How reliability estimation can help in reducing production cost?                                                                     | CO-4           | L1            |
| h.               | Describe the consequences of incorrectly assuming a failure pattern while planning maintenance.                                      | CO-4           | L2            |
| i.               | How numerical evaluation in fault tree analysis influences decision-making?                                                          | CO-5           | L1            |
| j.               | Explain the role of fault tree analysis in accident prevention.                                                                      | CO-5           | L2            |
| <b>SECTION-B</b> |                                                                                                                                      |                |               |
| 2.               | Prepare a suitable preventive maintenance schedule for a medium-scale plant, highlighting the key activities and their significance. | CO-1           | L3            |
| 3.               | Distinguish between preventive, predictive, and diagnostic maintenance.                                                              | CO-2           | L4            |
| 4.               | Justify the need for statistical reliability estimation in critical engineering systems.                                             | CO-4           | L5            |

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|                  |                                                                                                                                       |      |    |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 5.               | Construct reliability block diagram for a system with three components.                                                               | CO-3 | L3 |
| 6.               | Explain, how Fault Tree Analysis (FTA) helps in improving the reliability and safety of an industrial system.                         | CO-5 | L5 |
| <b>SECTION-C</b> |                                                                                                                                       |      |    |
| 7.               | Construct a simple preventive maintenance schedule for a medium-scale plant.                                                          | CO-2 | L3 |
| 8.               | Analyze how variations in failure data influence the estimation of reliability and mean time between failures                         | CO-3 | L4 |
| 9.               | Explain the stepwise procedure to perform Fault Tree Analysis for identifying and preventing system failures in a manufacturing unit. | CO5  | L5 |

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (Mechanical Engineering), Semester 7<sup>th</sup>

MAINTENANCE AND RELIABILITY

Subject Code: BTME617-18

M.Code: 90485

Date of Examination: 16-05-2026

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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| Q. No.    | Question                                                                                                                             | Course Outcome | Bloom's Level |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| SECTION-A |                                                                                                                                      |                |               |
| 1.        | Answer briefly:                                                                                                                      |                |               |
| a.        | List two objectives of the maintenance.                                                                                              | CO-1           | L1            |
| b.        | Illustrate the concept of maintainability by considering an example where two systems have different repair characteristics.         | CO-1           | L2            |
| c.        | Define predictive maintenance.                                                                                                       | CO-2           | L1            |
| d.        | Show the relationship between manpower skill levels and their corresponding maintenance activities.                                  | CO-2           | L2            |
| e.        | List common reliability terms used in failure data analysis.                                                                         | CO-3           | L1            |
| f.        | Compare reliability and availability in systems.                                                                                     | CO-3           | L2            |
| g.        | How reliability estimation can help in reducing production cost?                                                                     | CO-4           | L1            |
| h.        | Describe the consequences of incorrectly assuming a failure pattern while planning maintenance.                                      | CO-4           | L2            |
| i.        | How numerical evaluation in fault tree analysis influences decision-making?                                                          | CO-5           | L1            |
| j.        | Explain the role of fault tree analysis in accident prevention.                                                                      | CO-5           | L2            |
| SECTION-B |                                                                                                                                      |                |               |
| 2.        | Prepare a suitable preventive maintenance schedule for a medium-scale plant, highlighting the key activities and their significance. | CO-1           | L3            |
| 3.        | Distinguish between preventive, predictive, and diagnostic maintenance.                                                              | CO-2           | L4            |
| 4.        | Justify the need for statistical reliability estimation in critical engineering systems.                                             | CO-4           | L5            |

|           |                                                                                                                                       |      |    |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 5.        | Construct reliability block diagram for a system with three components.                                                               | CO-3 | L3 |
| 6.        | Explain, how Fault Tree Analysis (FTA) helps in improving the reliability and safety of an industrial system.                         | CO-5 | L5 |
| SECTION-C |                                                                                                                                       |      |    |
| 7.        | Construct a simple preventive maintenance schedule for a medium-scale plant.                                                          | CO-2 | L3 |
| 8.        | Analyze how variations in failure data influence the estimation of reliability and mean time between failures                         | CO-3 | L4 |
| 9.        | Explain the stepwise procedure to perform Fault Tree Analysis for identifying and preventing system failures in a manufacturing unit. | CO5  | L5 |

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B. Tech (Branch), Semester 7<sup>th</sup>  
AUTOMATION IN MANUFACTURING

Subject Code: BTME702-18

M. Code: 90475

Date of Examination: 30-04-2026

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

| Q. No.           | Question                                                                                                                                                 | Course Outcome | Bloom's Level |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|
| <b>SECTION-A</b> |                                                                                                                                                          |                |               |
| 1.               | Answer briefly:                                                                                                                                          |                |               |
| a.               | Where is computer control used in machining centers?                                                                                                     | CO-1           | L1            |
| b.               | Outline the main systems required for automation.                                                                                                        | CO-1           | L2            |
| c.               | Show the relation between system specification and performance.                                                                                          | CO-2           | L1            |
| d.               | Explain the working principle of an automated system with an example.                                                                                    | CO-2           | L2            |
| e.               | State two advantages of electrical drives over mechanical drives.                                                                                        | CO-3           | L1            |
| f.               | Summarize the importance of signal conditioning in automation.                                                                                           | CO-3           | L2            |
| g.               | Label the parts of a basic hydraulic circuit.                                                                                                            | CO-4           | L1            |
| h.               | Compare hydraulic and pneumatic systems in terms of pressure and speed.                                                                                  | CO-4           | L2            |
| i.               | Draw the basic elements of a CNC system.                                                                                                                 | CO-5           | L1            |
| j.               | Compare pneumatic and hydraulic systems.                                                                                                                 | CO-5           | L2            |
| <b>SECTION-B</b> |                                                                                                                                                          |                |               |
| 2.               | Analyze how computer control of machining centers helps in reducing human error?                                                                         | CO-1           | L4            |
| 3.               | Compare various fabrication methods used in automated system design and analyze their suitability, and limitations in different industrial applications. | CO-2           | L4            |
| 4.               | Explain COMPUTER INTEGRATED MANUFACTURING (CIM) in detail with block diagram                                                                             | CO-4           | L5            |
| 5.               | Construct a block diagram of a microcontroller-based Data Acquisition (DAQ) system.                                                                      | CO-3           | L3            |



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|                  |                                                                                                                                                                                                           |      |   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|
| 6.               | Explain the classification of NC machines based on the control system. Differentiate between Point-to-Point (PTP), Straight Cut, and Contouring control systems with suitable examples.                   | CO-5 | L |
| <b>SECTION-C</b> |                                                                                                                                                                                                           |      |   |
| 7.               | Construct a schematic showing integration of actuators and controllers in an automated system.                                                                                                            | CO-2 | L |
| 8.               | Categorize automation mechanisms based on motion type (linear, rotary, transfer) and analyze their characteristics, working principles, and suitability for different industrial applications.            | CO4  | L |
| 9.               | Defend whether flexible automation is the future of manufacturing industries, and analyze its advantages, limitations, and impact on productivity and competitiveness under modern industrial conditions. | CO-1 | L |

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