

Hall Ticket Number :

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**R-19**

**Code: 19A344T**

II B.Tech. II Semester Regular Examinations August 2021

**Applied Thermodynamics-I**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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|   | Marks | CO | Blooms Level |
|---|-------|----|--------------|
| <b>UNIT-I</b>   |       |    |              |
| 1. a) Derive an equation for the air-standard efficiency and mean effective pressure of an Otto cycle.  | 7M    | 1  | L2           |
| b) For the same maximum temperature and pressure, which cycle – Otto or Diesel or Dual –will have the highest efficiency? Explain with the help of P-V and T-S diagrams.  | 7M    | 1  | L4           |
| <b>OR</b>   |       |    |              |
| 2. a) Explain how the actual cycles for I.C. engines differ from air-standard cycles.   | 7M    | 1  | L2           |
| b) In an Otto cycle, air at 20°C and 1atm is compressed adiabatically until the pressure is 12 bar. Heat is added at constant volume until the pressure rises to 35 bar. Calculate the air-standard efficiency and mean effective pressure for the cycle. | 7M    | 1  | L3           |
| <b>UNIT-II</b>  |       |    |              |
| 3. a) What are the important components of an IC engine? Explain their function briefly.  | 7M    | 2  | L2           |
| b) Give the comparison of Fuel injection and Air injection systems in I.C.Engines.  | 7M    | 2  | L2           |
| <b>OR</b>   |       |    |              |
| 4. a) Give one application each for air cooling and water cooling systems and explain their functioning.  | 7M    | 2  | L2           |
| b) Give the comparison of Wet sump and Dry sump lubrication systems in I.C.Engines.   | 7M    | 2  | L2           |
| <b>UNIT-III</b>   |       |    |              |
| 5. a) What are the different types of combustion chambers in S.I. engines? Explain with the help of neat sketches.  | 7M    | 3  | L2           |
| b) Explain different stages of combustion in C.I. Engines with the help of p- diagram.  | 7M    | 3  | L2           |
| <b>OR</b>   |       |    |              |
| 6. a) What are the factors that affect the delay period in C.I. Engines combustion process? Explain.  | 7M    | 3  | L2           |
| b) Give the comparison of knock in S.I & C.I engines.   | 7M    | 3  | L2           |
| <b>UNIT-IV</b>  |       |    |              |
| 7. a) What is the use of a dynamometer? Explain, with the help of a neat diagram, any one of the dynamometers.  | 7M    | 4  | L2           |
| b) Name different methods of measurement of fuel consumption in an engine and explain any one of them in detail.  | 7M    | 4  | L2           |

**OR**

8. a) The following observations were made during a trial of single-cylinder 4-stroke gas engine having a bore of 20 cm and stroke of 25 cm.

|                                      |   |                       |
|--------------------------------------|---|-----------------------|
| Duration of trial                    | = | 0.5 hours             |
| No. of revolutions                   | = | 10000                 |
| No. of explosions                    | = | 5000                  |
| Mean effective pressure              | = | 5 bar                 |
| Net load on the brake wheel          | = | 40 kg                 |
| Effective diameter of brake wheel    | = | 1 m                   |
| Total gas used at NTP                | = | 2.4 m <sup>3</sup>    |
| Calorific value of gas               | = | 20 kJ/m <sup>3</sup>  |
| Total air used                       | = | 36 m <sup>3</sup>     |
| Pressure of air                      | = | 1 bar                 |
| Temperature of air                   | = | 17°C                  |
| Density of air at NTP                | = | 1.3 kg/m <sup>3</sup> |
| Temperature of exhaust gas           | = | 350°C                 |
| Room temperature                     | = | 17°C                  |
| Specific heat of exhaust gas         | = | 1 kJ/kg K             |
| Cooling water circulated             | = | 80 kg                 |
| Rise in temperature of cooling water | = | 30°C                  |

Draw up a heat balance sheet and estimate the mechanical and indicated thermal efficiencies of the engine.

14M 4 L3

UNIT-V

9. a) What is the effect of clearance on the compression performance of a reciprocating compressor? Explain. 7M 5 L4
- b) Explain, with the help of a neat sketch, working principle of Roots Blower. 7M 5 L2

OR

10. A single stage, single acting reciprocating air compressor with 50 cm bore and 60cm stroke runs at 500 rpm. The suction pressure is 1 bar at 25 °C and the delivery pressure is 5 bar. Find the power required to run it if the compression follows i) isothermal process ii) adiabatic process and iii)  $pv^{1.3} = \text{constant}$ . Also find the isothermal and adiabatic efficiencies. 14M 5 L3

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| Hall Ticket Number : |  |  |  |  |  |  |  |  |  |
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**R-19**

**Code: 19A343T**

II B.Tech. II Semester Regular Examinations August 2021

**Dynamics of Machinery**  
( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks CO Blooms Level

**UNIT-I**

- |    |   |    |   |  |               |
|----|---|----|---|--|---------------|
| 1. | a) What is meant by the expression 'friction circle'? Deduce an expression for the radius of friction circle in terms of the radius of the journal and the angle of friction.   | 7M | 1 |  | L2,<br>L3, L4 |
|    | b) A conical pivot supports a load of 20 kN, the cone angle is 120° and the intensity of normal pressure is not to exceed 0.3 N/mm <sup>2</sup> . The external diameter is twice the internal diameter. Find the outer and inner radii of the bearing surface. If the shaft rotates at 200 r.p.m. and the coefficient of friction is 0.1, find the power absorbed in friction. Assume uniform pressure. | 7M | 1 |  | L2,<br>L3, L4 |

**OR**

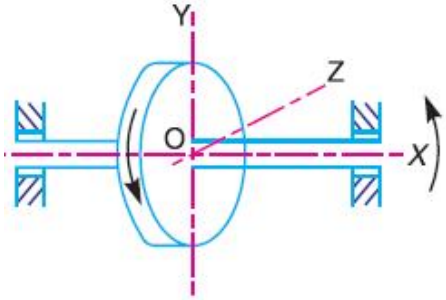
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|----|--|-----|---|--|---------------|
| 2. | Establish a formula for the maximum torque transmitted by a single plate clutch of external and internal radii $r_1$ and $r_2$ , if the limiting coefficient of friction is $\mu$ and the axial spring load is $W$ . Assume that the pressure intensity on the contact faces is uniform. | 14M | 1 |  | L2,<br>L3, L4 |
|----|--|-----|---|--|---------------|

**UNIT-II**

- |    |  |     |   |  |               |
|----|--|-----|---|--|---------------|
| 3. | Describe with sketches any two forms of transmission dynamometer and explain with detail the calculations involved in finding the power transmitted. | 14M | 2 |  | L2,<br>L3, L4 |
|----|--|-----|---|--|---------------|

**OR**

- |    |  |    |   |  |              |
|----|--|----|---|--|--------------|
| 4. | a) Discuss the effect of the gyroscopic couple on an aeroplane when taking a turn.   | 7M | 2 |  | L2,L3,<br>L4 |
|    | b) A uniform disc of 150 mm diameter has a mass of 5 kg. It is mounted centrally in bearings which maintain its axle in a horizontal plane. The disc spins about its axle with a constant speed of 1000 r.p.m. while the axle precesses uniformly about the vertical at 60 r.p.m. The directions of rotation are as shown in Fig. If the distance between the bearings is 100mm, find the resultant reaction at each bearing due to the mass and gyroscopic effects. |    |   |  |              |



7M 2 L2, L3, L4

## UNIT-III

5. a) Explain the terms 'fluctuation of energy' and 'fluctuation of speed' as applied to flywheels. 7M 3 L1, L2, L3
- b) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8metres. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds. 7M 3 L1, L2, L3

OR

6. a) Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor. What are the limitations of a Watt governor? 7M 3 L1, L2, L3
- b) A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor. 7M 3 L1, L2, L3

## UNIT-IV

7. A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance 14M 4 L4, L5

OR

8. The following data apply to an outside cylinder uncoupled locomotive: Mass of rotating parts per cylinder = 360 kg ; Mass of reciprocating parts per cylinder=300kg ; Angle between cranks = 90° ; Crank radius = 0.3 m ; Cylinder centres = 1.75 m ; Radius of balance masses = 0.75 m ; Wheel centres = 1.45 m. If whole of the rotating and two-thirds of reciprocating parts are to be balanced in planes of the driving wheels, find : 1. Magnitude and angular positions of balance masses, 2. Speed in kilometers per hour at which the wheel will lift off the rails when the load on each driving wheel is 30 kN and the diameter of tread of driving wheels is 1.8 m, and 3. Swaying couple 14M 4 L4, L5

## UNIT-V

9. a) Discuss briefly with neat sketches the longitudinal, transverse and torsional free vibrations. 7M 5 L1, L2, L3
- b) Calculate the whirling speed of a shaft 20 mm diameter and 0.6 m long carrying a mass of 1 kg at its mid-point. The density of the shaft material is 40 Mg/m<sup>3</sup>, and Young's modulus is 200 GN/m<sup>2</sup>. Assume the shaft to be freely supported. 7M 5 L1, L2, L3
- OR
10. a) How the natural frequency of torsional vibrations of two rotor system is obtained. 7M 5 L1, L2, L3
- b) A shaft of 100 mm diameter and 1 metre long has one of its end fixed and the other end carries a disc of mass 500 kg at a radius of gyration of 450 mm. The modulus of rigidity for the shaft material is 80 GN/m<sup>2</sup>. Determine the frequency of torsional vibrations. 7M 5 L1, L2, L3

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Hall Ticket Number :

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R-19

Code: 19A342T

II B.Tech. II Semester Regular Examinations August 2021

**Fluid Mechanics and Hydraulic Machinery**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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|   | Marks | CO | Blooms Level |
|---|-------|----|--------------|
| <b>UNIT-I</b>   |       |    |              |
| 1. a) Define viscosity, surface tension and vapor pressure and explain their influence on fluid motion.   | 9M    | 1  | L1,L2        |
| b) A U-tube is made up of two capillaries of bores 1.2 mm and 2.4 mm respectively. The tube is held vertical and partially filled with liquid of surface tension 0.06 N/m and zero contact angle. If the estimated difference in the level of two menisci is 15mm. Determine the mass density of the liquid.  | 5M    | 1  | L3           |
| <b>OR</b>   |       |    |              |
| 2. a) Explain stream length and stream tube with neat sketch.   | 6M    | 1  | L2           |
| b) Calculate the gauge pressure and absolute pressure at a point 3 m below the free surface of a liquid having a density of $1.53 \times 10^3 \text{ kg/m}^3$ if the atmospheric pressure is equal to 750 mm of mercury. The specific gravity of mercury is 13.6 and density of water $1000 \text{ kg/m}^3$ .   | 8M    | 1  | L3           |
| <b>UNIT-II</b>  |       |    |              |
| 3. a) Derive an expression for loss of head due to friction in pipes.   | 8M    | 2  | L6           |
| b) A horizontal venturi meter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturi meter is 60 liters/sec. Find the reading of oil-mercury differential manometer by taking $C_d = 0.98$  | 6M    | 2  | L3           |
| <b>OR</b>   |       |    |              |
| 4. The difference in water surface levels in two tanks which are connected by a series of three pipes of lengths 300 m, 170 m and 210 m and diameters 300 mm, 200 mm and 400 mm respectively is 12 m. Determine the rate of flow of water if coefficient of friction of water are 0.005, 0.0052 and 0.0048 respectively by<br>(i) considering minor losses and<br>(ii) neglecting minor losses. | 14M   | 2  | L6           |
| <b>UNIT-III</b>   |       |    |              |
| 5. What is hydroelectric power station? What are its elements? Discuss them one by one elaborately with neat sketches.  | 14M   | 3  | L1,L2        |
| <b>OR</b>   |       |    |              |
| 6. a) What do you understand by pumped storage type of power station?   | 6M    | 3  | L1,L2        |
| b) A jet of water moving at 20 m/s impinges on a symmetrical curved vane shaped to deflect the jet through $120^\circ$ . If the vane is moving at 5 m/s, find the angle of the jet so that there is no shock at the inlet. Also determine the absolute velocity of exit in magnitude and direction, and the work done.  | 8M    | 3  | L3           |

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| <b>UNIT-IV</b> |
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7. a) What are the uses of a draft tube? Describe with neat sketches different types of draft tubes. 7M 4 L1,L2
- b) A turbine develops 7355 kW under a head of 24.7 m at 210 rpm. What is its specific speed? Indicate the type of turbine suitable for this purpose. If this turbine is tested in the laboratory where the head of water available is only 7.5 m, what power will it develop and at what speed? 7M 4 L3

**OR**

8. a) Explain different types of Heads in hydraulic turbines 7M 4 L2
- b) Differentiate a turbine and a pump. Classify turbines. 7M 4 L2,L4

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|---------------|
| <b>UNIT-V</b> |
|---------------|

9. a) Define a centrifugal pump. Explain the working of a single-stage and multistage centrifugal pumps with sketches. 7M 5 L1,L2
- b) Find the number of pumps required to take water from a deep well under a total head of 89 m. All the pumps are identical and are running at 800 rpm. The specific speed of each pump is given as 25 while the rated capacity of each pump is 0.16 m<sup>3</sup>/s 7M 5 L3

**OR**

10. a) Compare discharge curves for single acting and double acting reciprocating pumps and indicate under what conditions are either type used. 8M 5 L5
- b) A centrifugal pump is to discharge 0.118 m<sup>3</sup>/sec at a speed of 1450 rpm against head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller. 6M 5 L3

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Hall Ticket Number :

**R-19**

**Code: 19AE41T**

II B.Tech. II Semester Regular Examinations August 2021

**Managerial Economics and Financial Accounting**

( Common to CE & ME )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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|  | Marks | CO | Blooms Level |
|--|-------|----|--------------|
| <b>UNIT-I</b>  |       |    |              |
| 1. a) Discuss the nature and scope of Managerial economics. Identify its nature through its definitions.   | 7M    | 1  | L1           |
| b) Describe the various factors involved in Demand forecasting of a product  | 7M    | 1  | L2           |
| <b>OR</b>  |       |    |              |
| 2. a) What is managerial economics? Explain its relation with the other subjects.  | 7M    | 1  | L1           |
| b) Outline the significance of demand forecasting methods. State Regression method of demand forecasting.  | 7M    | 1  | L4           |
| <b>UNIT-II</b>   |       |    |              |
| 3. a) State Iso-quants and Iso-costs and their characteristics   | 7M    | 2  | L3           |
| b) What are the managerial uses of breakeven analysis?   | 7M    | 2  | L1           |
| <b>OR</b>  |       |    |              |
| 4. a) Explain the Law of returns to scale. State how it indicates production behaviour.  | 7M    | 2  | L2           |
| b) Determine BEP, P/V Ratio and Sales level for a profit of Rs.15.00 Lakhs, if Fixed Cost is Rs.25.00 Lakhs, Sales is Rs.175.00 Lakhs and Variable Cost is Rs.170.00 Lakhs.  | 7M    | 2  | L3           |
| <b>UNIT-III</b>  |       |    |              |
| 5. a) Define markets and describe the features of perfect competition.   | 7M    | 2  | L1           |
| b) Differentiate the features of Monopolistic & Oligopolistic Markets.   | 7M    | 2  | L2           |
| <b>OR</b>  |       |    |              |
| 6. a) Distinguish between monopolistic and oligopolistic markets.  | 7M    | 2  | L2           |
| b) Differentiate features of Private Limited Company to that of Public Limited Company?  | 7M    | 2  | L2           |
| <b>UNIT-IV</b>   |       |    |              |
| 7. a) Define Capital and outline its significance in financial management  | 7M    | 3  | L4           |
| b) Compare merits & demerits of Pay Back Period & Accounting Rate of Return Methods  | 7M    | 3  | L5           |
| <b>OR</b>  |       |    |              |
| 8. a) Summarise the various sources of raising capital   | 7M    | 3  | L2           |
| b) Determine the average rate of return for a period for a project which requires - Cash- outlay of Rs.10,000 and generates cash inflows of Rs.2,000, Rs.4,000, Rs.3,000 and Rs.2, 000 in the first, second, third, and fourth year respectively | 7M    | 3  | L2           |

|               |
|---------------|
| <b>UNIT-V</b> |
|---------------|

9. a) Define accounting. What do you understand by Double Entry System of book-keeping?

7M 3 L2

b) Identify the Ratios that are used to find the soundness and strength of long-term financial position of a firm.

7M 3 L1

**OR**

10. From the following Trial Balance, prepare final accounts of M/s Janardhan enterprises as on 31-03-2021. Taking into account the following adjustments.

a) Closing stock Rs. 4000

b) Prepaid salaries Rs. 300

c) Bad Debts Rs. 500

d) Reserve for Bad debts 5%

e) Depreciation of Premises 5% .

Trial Balance of M/s Janardhan Enterprises

| Particulars       | Amount<br>(Rs.) |  | Amount (Rs.) |
|-------------------|-----------------|--|--------------|
| Opening stock     | 1000            |  | 20000        |
| Purchases         | 4000            |  | 200          |
| Sales Returns     | 500             |  | 6000         |
| Carriage inwards  | 600             |  | 600          |
| Wages             | 700             |  |              |
| Salaries          | 1000            |  |              |
| Interest          | 300             |  |              |
| Trade expenses    | 400             |  |              |
| Debtors           | 8000            |  |              |
| Bad debts         | 300             |  |              |
| Business premises | 6000            |  |              |
| Bills receivable  | 4000            |  |              |
| <b>total</b>      | <b>26800</b>    |  | <b>26800</b> |

14M 3 L2

\*\*\*END\*\*\*



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Code: 19A341T

II B.Tech. II Semester Regular Examinations August 2021

**Manufacturing Processes**

( Mechanical Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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| Marks | CO | Blooms Level |
|-------|----|--------------|
|-------|----|--------------|

**UNIT-I**

1. Justify the following statements

- |  |    |     |     |
|--|----|-----|-----|
| a) If solid shrinkage is not compensated, a undersized casting is produced | 4M |     |     |
| b) In case of non-directional solidification shrinkage cavity occurs       | 3M |     |     |
| c) Top gate cannot be used for Aluminum and Mg alloys                      | 4M |     |     |
| d) Cold shut may be caused by low permeability of moulding sand also       | 3M | CO1 | BT4 |

**OR**

- |  |     |     |     |
|--|-----|-----|-----|
| 2. a) What is the gating ratio? What are pressurised and nonpressurised gating systems       | 4M  | CO1 | BT1 |
| b) Describe the working of centrifugal casting and explain its advantages and disadvantages? | 10M | CO1 | BT3 |

**UNIT-II**

- |  |     |     |     |
|--|-----|-----|-----|
| 3. a) Write the differences between soldering and brazing and its advantages.                | 4M  | CO2 | BT2 |
| b) What are various resistance welding processes? Explain any two of them with neat sketches | 10M | CO2 | BT1 |

**OR**

- |  |     |     |     |
|--|-----|-----|-----|
| 4. a) What is the purpose of supplying oxygen from the central hole of the nozzle after preheating the metal in case of Oxy-Acetylene cutting? | 4M  | CO2 | BT2 |
| b) Compare MIG and TIG welding process? Explain the processes with neat sketches   | 10M | CO2 | BT2 |

**UNIT-III**

- |  |     |     |     |
|--|-----|-----|-----|
| 5. a) Compare hot and cold working processes                   | 4M  | CO3 | BT2 |
| b) Describe Rolling process. And describe some Rolling stands. | 10M | CO3 | BT3 |

**OR**

- |   |     |     |     |
|---|-----|-----|-----|
| 6. a) Define Bite angle and length of contact.  | 4M  | CO3 | BT1 |
| b) Explain the phenomena of recrystallisation, recovery and grain growth. And explain the variation of the mechanical properties after the same | 10M | CO3 | BT2 |

**UNIT-IV**

- |  |     |     |     |
|--|-----|-----|-----|
| 7. a) Describe drop forging process or roll forging process.   | 4M  | CO4 | BT2 |
| b) Which Extrusion process do you suggest for brittle material? Explain the process with a neat sketch | 10M | CO4 | BT2 |

**OR**

- |  |     |     |     |
|--|-----|-----|-----|
| 8. a) State various forging defects.   | 4M  | CO4 | BT2 |
| b) What is Extrusion? Discuss various types of extrusion process, stating applications, merits& demerits | 10M | CO4 | BT1 |

**UNIT-V**

- |  |     |     |     |
|--|-----|-----|-----|
| 9. a) What are the merits and demerits of 3D printing compared subtractive manufacturing | 4M  | CO5 | BT2 |
| b) Explain the Injection moulding process with a neat sketch                             | 10M | CO5 | BT1 |

**OR**

- |  |     |     |     |
|--|-----|-----|-----|
| 10. a) Compare thermo plastics with thermosetting plastics                                   | 4M  | CO5 | BT1 |
| b) Suggest a suitable method of manufacturing pet bottles and explain it with a neat diagram | 10M | CO5 | BT2 |

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Hall Ticket Number :

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R-19

Code: 19AC41T

II B.Tech. II Semester Regular Examinations August 2021  
**Numerical Methods & Probability and Statistics**  
 ( Common to CE & ME )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks CO Blooms Level

**UNIT-I**

1. a) Determine a root correct to three decimal places for the equation  $x^3 - x - 2 = 0$  using Newton Raphson method.  
 b) Find the polynomial using Lagrange's formula and hence find  $f(5)$  from the following data:

|        |     |     |     |     |
|--------|-----|-----|-----|-----|
| $x$    | 1   | 3   | 4   | 6   |
| $f(x)$ | 648 | 704 | 729 | 792 |

7M CO1 L3  
 7M CO1 L1

OR

2. a) Find the root of the equation  $x^2 - 7 = 0$  using the bisection method correct to three decimal places.  
 b) Estimate the value of  $e^x$  and  $\sin x$  using the following data:

|        |     |     |     |     |   |
|--------|-----|-----|-----|-----|---|
| $x$    | 1   | 2   | 3   | 4   | 5 |
| $f(x)$ | 2.5 | 3.2 | 4.1 | 5.6 |   |

7M CO1 L1  
 7M CO1 L2

**UNIT-II**

3. a) Apply Runge-Kutta method of fourth order to find an approximate value of  $y$  at  $x = 0.2$ , given that  $\frac{dy}{dx} = \frac{y-x}{y+x}$ ,  $y(0) = 1$  and  $h = 0.2$ .

7M CO2 L3

- b) Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 1.2$  for the following data:

|     |       |       |       |       |       |       |
|-----|-------|-------|-------|-------|-------|-------|
| $x$ | 1.0   | 1.1   | 1.2   | 1.3   | 1.4   | 1.5   |
| $y$ | 6.691 | 7.213 | 7.632 | 8.435 | 9.214 | 9.834 |

7M CO2 L1

OR

4. a) Evaluate  $\int_0^1 \frac{1}{x^2+1} dx$  by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule.  
 b) Apply Euler's method to obtain  $y$  at  $x = 0.1, 0.2, 0.3$  from  $y' = 1 - y$ ,  $y(0) = 0$ .

7M CO2 L3  
 7M CO2 L3

**UNIT-III**

5. a)  $X$  is a continuous random variable with probability density function given by  $f(x) = \begin{cases} kx, & 0 \leq x < 2 \\ k, & 2 \leq x < 4 \\ -kx + 6k, & 4 \leq x < 6 \end{cases}$

7M CO3 L1

- Find i)  $k$ , ii) mean iii) variance  
 b) Fit a Poisson distribution to the following data given the number of yeast cells per square for 400 squares:

|                       |     |     |    |    |   |   |   |   |   |   |    |
|-----------------------|-----|-----|----|----|---|---|---|---|---|---|----|
| No. of. Cells per sq: | 0   | 1   | 2  | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| No. of squares        | 103 | 143 | 98 | 42 | 8 | 4 | 2 | 0 | 0 | 0 | 0  |

7M CO3 L2

OR

6. a) A random variable  $x$  has the probability function

|          |      |      |      |      |      |       |       |
|----------|------|------|------|------|------|-------|-------|
| $x$      | 0    | 1    | 2    | 3    | 4    | 5     | 6     |
| $P(X=x)$ | $2k$ | $3k$ | $6k$ | $7k$ | $8k$ | $11k$ | $12k$ |

- (i) Find the value of the  $k$ , (ii) Evaluate  $P(X < 4)$ ,  $P(X \geq 3)$ .

7M CO3 L3

- b) The mean height of 500 students is 151 cm. and the standard deviation is 15 cm. Assuming that the heights are normally distributed, find how many students' heights lie between 120 and 155 cm.

7M CO3 L2

**UNIT-IV**

7. a) One type of aircraft is found to develop engine trouble in 5 flights out of a total of 100 and another type in 7 flights out of a total of 200 flights. Is there a significant difference in the two types of aircrafts so far as engine defects are concerned?

7M CO4 L4

- b) If in a random sample of 600 cars making a right turn at a certain traffic junction 157 drove into the wrong lane, test whether actually 30% of all drivers make this mistake or not at this given junction. Use 0.05 level of significance..

7M CO4 L4

**OR**

8. a) If random sample data show that 42 men earn on the average  $x_1 = 744.85$  with s.d.  $s_1 = 397.7$  while 32 women earn on the average  $x_2 = 516.78$  with s.d.  $s_2 = 162.523$ , test at 0.05 level of significance whether the average income for men and women is same or not.

7M CO4 L4

- b) Out of two vending machines at a 'super bazar', the first machine fails to work 13 times in 250 trials and second machine fails to work 7 times in 250 trials. Test at 0.05 level of significance, whether the difference between the corresponding sample proportions is significant.

7M CO4 L4

**UNIT-V**

9. a) A machinist is making engine parts with axle diameter of 0.7 inch. A random sample of 10 parts shows mean diameter 0.742 inch with a standard deviation of 0.04 inch. On the basis of this sample, would you say that the work is inferior?

7M CO5 L2

- b) Marks obtained in mathematics by 11 students before and after intensive coaching are given below:

|        |    |    |    |    |    |    |    |    |    |    |    |
|--------|----|----|----|----|----|----|----|----|----|----|----|
| Before | 24 | 17 | 18 | 20 | 19 | 23 | 16 | 18 | 21 | 20 | 19 |
| After  | 24 | 20 | 22 | 20 | 17 | 24 | 20 | 20 | 18 | 19 | 22 |

Test at 0.05 L.O.S. whether the intensive coaching is useful?

7M CO5 L2

**OR**

10. The household net expenditure on health care in south and north India, in two samples of households, expressed as percentage of total income is shown the following table

|       |      |      |      |     |      |      |      |      |      |
|-------|------|------|------|-----|------|------|------|------|------|
| South | 15.0 | 8.0  | 3.8  | 6.4 | 27.4 | 19.0 | 35.3 | 13.6 |      |
| North | 18.8 | 23.1 | 10.3 | 8.0 | 18.0 | 10.2 | 15.2 | 19.0 | 20.2 |

Test the equality of variances of household's net expenditure on health care in south and north India.

14M CO5 L2

\*\*\*END\*\*\*