Code No: R20A0321

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, May 2023

Heat Transfer

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Note: Heat and mass transfer data books are permitted.

SECTION-I

1 Explain modes of heat transfer with the suitable examples. **[14M]**

OR

2 An insulated pipe of 50 mm outside diameter ($\varepsilon = 0.8$) is laid in a room at 30 ^{o}C. If the surface temperature is 250 ^{o}C and the convective heat transfer coefficient is 10 W/m^{2}K, calculate the heat loss per unit length of pipe. **[14M]**

SECTION-II

3 List out types of fins and explain its importance in heat transfer **[14M]**

OR

4 An aluminium sphere weighing 5.5 kg and initially at a temperature of 290 ^{o}C is suddenly immersed in a fluid at 15 ^{o}C. The convective heat transfer coefficient is 58 W/m^{2}K. Estimate the time required to cool the aluminium to 95 ^{o}C, using the lumped capacity method of analysis. **[14M]**

SECTION-III

5 Explain the concept of Velocity Boundary layer **[14M]**

OR

6 Discuss on Dimensional Analysis applied to forced convection with Buckingham Pi theorem. **[14M]**

SECTION-IV

7 Derive LMTD equation for parallel flow heat exchanger. **[14M]**

OR

8 Discuss on Condensers and Evaporators. **[14M]**

SECTION-V

9 Explain the regimes of boiling. **[14M]**

OR

10 Explain the concept of a black body. **[14M]**

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Code No: R20A0326

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, May 2023

Automobile Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 Explain integral and semi integral type vehicle body construction. **[14M]**

OR

2 Explain with suitable reasons for usage of front engine rear wheel drive for most of the Vehicle layout **[14M]**

SECTION-II

3 Explain the key features and working principle of electronic ignition system **[14M]**

OR

4 Describe CRDi system in detail **[14M]**

SECTION-III

5 Explain the semi centrifugal clutch with neat sketch. **[14M]**

OR

6 Explain the working principle of torque tube drive with neat sketch. **[14M]**

SECTION-IV

7 Write short note on ABS and Traction control. **[14M]**

OR

8 Explain the steering geometry with neat sketch. **[14M]**

SECTION-V

9 Explain the operation of hydrogen fueled vehicle with neat sketch. **[14M]**

OR

10 Discuss the operation of an LPG propelled vehicle with neat sketch. **[14M]**

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Code No: R20A0566

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, May 2023

Artificial Intelligence & Machine Learning

(EEE, ME, ECE & AE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1	Explain Breadth- First Search strategy with an example.	**[14M]**
	OR	
2	Explain A* Heuristic Search strategy with an example.	**[14M]**

SECTION-II

3	What is alpha-beta Pruning? How does alpha-beta pruning work?	**[14M]**
	OR	
4	Explain Bayes' Theorem with an example.	**[14M]**

SECTION-III

5	Explain Unsupervised Machine learning with an example.	**[14M]**
	OR	
6	Explain the steps to prepare data in Machine Learning.	**[14M]**

SECTION-IV

7	Explain SVM algorithm with an example	**[14M]**
	OR	
8	Differentiate between Linear and Logistic Regression with an example.	**[14M]**

SECTION-V

9	What is K-Means Clustering? Explain the steps of k-Means Clustering Algorithm	**[14M]**
	OR	
10	Compare K-Nearest neighbour algorithm in Machine Learning with an example..	**[14M]**

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Code No: **R20A0352**

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, May 2023

Design Thinking

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 Explain the methods of Identifying the customer's Needs **[14M]**

OR

2 Describe the important steps in Engineering design process **[14M]**

SECTION-II

3 Explain in details pillars of TRIZ concepts **[14M]**

OR

4 Explain steps involved in generating concepts for product design **[14M]**

SECTION-III

5 Explain Fundamental Principles to DFMA (Design for Manufacturing Assembly) **[14M]**

OR

6 Explain basic steps of Design of Experiments **[14M]**

SECTION-IV

7 Explain the basics of design for assembly (DFA) **[14M]**

OR

8 Explain in details with sketch steps in the Electronic Assembly Process **[14M]**

SECTION-V

9 Describe the various types of Recycling **[14M]**

OR

10 List out and Explain types of hazardous materials **[14M]**

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Code No: R20A0322

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular Examinations, May 2023

Design of Transmission Systems

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a) Discuss the different types of belts and their material used for power transmission. **[4M]**

b) Explain, with the help of neat sketches, the types of various flat belt drives. **[10M]**

OR

2 Design a rubber belt to drive a dynamo generating 20 kW at 2250 r.p.m. and fitted with a pulley 200 mm diameter. Assume dynamo efficiency to be 85%. **[14M]**

Allowable stress for belt = 2.1 MPa

Density of rubber = 1000 kg / m^3

Angle of contact for dynamo pulley = 165°

Coefficient of friction between belt and pulley = 0.3.

SECTION-II

3 Discuss the design procedure of piston for an internal combustion engine. **[14M]**

OR

4 Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm^2. The diameter of the piston is 100 mm; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6:1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm^2 and 15 N/mm^2. The density of material of the rod may be taken as 8000 kg/m^3 and the allowable stress in the bolts as 60 N/mm^2 and in cap as 80 N/mm^2. The rod is to be of I-section for which you can choose your own proportions. **[14M]**

Draw a neat dimensioned sketch showing provision for lubrication. Use Rankine formula for which the numerator constant may be taken as 320 N/mm^2 and the denominator constant 1/7500.

SECTION-III

5 a) Discuss the materials and practical applications for the various types of springs. **[6M]**

b) Explain one method of avoiding the tendency of a compression spring to buckle. **[8M]**

OR

6 Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, G = 84 kN/mm^2. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils. **[14M]**

SECTION-IV

7 a) Write a short note on gear drives giving their merits and demerits. **[4M]**

b) Write the expressions for static, limiting wear load and dynamic load for spur gears and explain the various terms used there in. **[10M]**

OR

8 A pair of helical gears is to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10 000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given σ_{es} = 618 MPa. **[14M]**

SECTION-V

9 a) Discuss the various types of power threads. Give atleast two practical applications for each type. Discuss their relative advantages and disadvantages. **[10M]**

b) Why are square threads preferable to V-threads for power transmission? **[4M]**

OR

10 A vertical two start square threaded screw of a 100 mm mean diameter and 20 mm pitch supports a vertical load of 18 kN. The axial thrust on the screw is taken by a collar bearing of 250 mm outside diameter and 100 mm inside diameter. Find the force required at the end of a lever which is 400 mm long in order to lift and lower the load. The coefficient of friction for the vertical screw and nut is 0.15 and that for collar bearing is 0.20. **[14M]**

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Code No: R20A0321

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLO

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Heat Transfer

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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Note: Heat transfer data books are permitted

SECTION-I

1 Derive heat transfer rate and Overall heat transfer coefficient for composite slab. **[14M]**

OR

2 A wall of 0.5m thickness is to be constructed from a material which has an average thermal conductivity of 1.4 W/mK. The wall is be insulated with a material having an average thermal conductivity of 0.35 W/mK so that the heat loss per square meter will not exceed 1450 W. Assuming that the inner and outer surface temperatures are 1200 ^{o} C and 15 ^{o} C respectively, calculate the thickness of insulation required. **[14M]**

SECTION-II

3 Discuss on efficiency and effectiveness of fins. **[14M]**

OR

4 A 40 X 40 cm copper slab 5 mm thick at a uniform temperature of 250 ^{o}C suddenly has its surface temperature lowered at 30 ^{o}C. Find the time at which the slab temperature become 90 ^{o}C ; ρ = 9000 kg / m^3, c = 0.38 kJ/kgK, k = 370 W/mK and h = 90 W/m^2K **[14M]**

SECTION-III

5 Describe continuity equation in convection process. **[14M]**

OR

6 Calculate the pressure drop in 100 m of 2 cm X 2.5 cm smooth rectangular duct when water at 40 ^{o}C flows through it with a velocity of 0.5 m/s. **[14M]**

SECTION-IV

7 Derive LMTD equation for counter flow Heat Exchanger. **[14M]**

OR

8 In a double pipe counter flow heat exchanger, 10,000 kg/h of an oil having a specific heat of 2095 J/kgK is cooled from 80 ^{o}C to 50 ^{o}C by 8000 kg/h of water entering at 25 ^{o}C. Determine the heat exchanger area for an overall heat transfer coefficient of 300 W/ m^2K. Take C_p for water as 4180 J/kgK. **[14M]**

SECTION-V

9 A vertical plate 2.8 m high is maintained at 54 ^{o}C in the presence of saturated steam at atmospheric pressure. Estimate the heat transfer rate per unit width. **[14M]**

OR

10 Explain terms

i) Absorption **[5M]**

ii) Reflection **[5M]**

iii) Transmission. **[4M]**

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Code No: R20A0326

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Automobile Engineering

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1 Compare and contrast rear engine rear wheel drive lay out with front engine rear wheel drive. [14M]

OR

2 Discuss the factors that affect the resistances to vehicle motion [14M]

SECTION-II

3 Explain engine emission control by three way catalytic converter system [14M]

OR

4 Explain the construction and working of Turbocharger with a neat sketch [14M]

SECTION-III

5 Explain the working principle of fluid flywheel with neat sketch and mention the limitations. [14M]

OR

6 Explain the working principle of hotch kiss drive with neat sketch. [14M]

SECTION-IV

7 Explain the working principles of hydraulic brake with neat sketch [14M]

OR

8 Explain the working of power steering with neat sketch? [14M]

SECTION-V

9 Explain the construction and working of an electric car [14M]

OR

10 Compare bio-diesel with diesel engine in Performance ,Combustion and Emission Characteristics [14M]

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Code No: R20A0566

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Artificial Intelligence & Machine Learning

(ME, ECE & AE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1	Explain Depth-first with Iterative Deepening Search strategy with an example.	**[14M]**
	OR	
2	Explain Best - First Heuristic Search strategy with an example.	**[14M]**

SECTION-II

3	Explain AO* search implementation strategy with an example.	**[14M]**
	OR	
4	Explain Minimax Search strategy with an example.	**[14M]**

SECTION-III

5	Explain Supervised Machine learning with an example.	**[14M]**
	OR	
6	Explain reinforcement Machine Learning with an example	**[14M]**

SECTION-IV

7	What is Regression? Explain Linear Regression with an example.	**[14M]**
	OR	
8	Explain Support Vector Machine classification method with an example.	**[14M]**

SECTION-V

9	Explain KD Tree With an example in Machine Lerning	**[14M]**
	OR	
10	Describe K-Means Clustering and explain with an example	**[14M]**

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R20

Code No: R20A0352

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Design Thinking

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

***

SECTION-I

1 Explain the basic elements of Design that form the backbone of great work in manufacturing process. **[14M]**

OR

2 Explain various steps involved in Design process **[14M]**

SECTION-II

3 Explain the theory of inventive problem solving **[14M]**

OR

4 What is the functional decompositions of the problem for innovative concept development. **[14M]**

SECTION-III

5 Explain the concept of Axiomatic design. **[14M]**

OR

6 Explain various steps of FMEA (Failure mode and effective analysis) **[14M]**

SECTION-IV

7 Explain in details components of a manufacturing system **[14M]**

OR

8 Explain in details with sketch steps in the four wheeler Assembly Process **[14M]**

SECTION-V

9 Explain in details Golden Rules of Recycling **[14M]**

OR

10 Explain the features of environmental design? **[14M]**

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Code No: R20A0322

R20

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024

Design of Transmission Systems

(ME)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

.***Note: Design data books are permitted**

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SECTION-I

1 Power of 60 kW at 750 r.p.m. is to be transmitted from an electric motor to compressor shaft at 300 r.p.m. by V-belts. The approximate larger pulley diameter is 1500 mm. The approximate centre distance is 1650 mm, and overload factor is to be taken as 1.5. Give a complete design of the belt drive. A belt with cross-sectional area of 350 mm2 and density 1000 kg/m^3 and having an allowable tensile strength 2 MPa is available for use. The coefficient of friction between the belt and the pulley may be taken as 0.28. The driven pulley is overhung to the extent of 300 mm from the nearest bearing and is mounted on a shaft having a permissible shear stress of 40 MPa with the help of a key. The shaft, the pulley and the key are also to be designed. **[14M]**

OR

2 A rope drive is to transmit 250 kW from a pulley of 1.2 m diameter, running at a speed of 300 r.p.m. The angle of lap may be taken as π radians. The groove half angle is 22.5°. The ropes to be used are 50 mm in diameter. The mass of the rope is 1.3 kg per metre length and each rope has a maximum pull of 2.2 kN, the coefficient of friction between rope and pulley is 0.3. Determine the number of ropes required. If the overhang of the pulley is 0.5 m, suggest suitable size for the pulley shaft if it is made of steel with a shear stress of 40 MPa. **[14M]**

SECTION-II

3 Design a cast iron trunk type piston for a single acting four stroke engine developing 75 kW per cylinder when running at 600 r.p.m. The other available data is as follows: **[14M]**

Maximum gas pressure = 4.8 N/mm^2; Indicated mean effective pressure = 0.65 N/mm^2; Mechanical efficiency = 95%; Radius of crank = 110 mm; Fuel consumption = 0.3 kg/BP/hr; Calorific value of fuel (higher) = 44 × 10^{3}kJ/kg; Difference of temperatures at the centre and edges of the piston head = 200ºC; Allowable stress for the material of the piston = 33.5 MPa; Allowable stress for the material of the piston rings and gudgeon pin = 80 MPa; Allowable bearing pressure on the piston barrel = 0.4 N/mm^2 and allowable bearing pressure on the gudgeon pin = 17 N/mm^2.

OR

4 Discuss the design procedure of connecting rod for an internal combustion engine. **[14M]**

SECTION-III

5 Design a helical spring for a spring loaded safety valve (Ramsbottom safety valve) for the following conditions : **[14M]**

Diameter of valve seat = 65 mm; Operating pressure = 0.7 N/mm^2; Maximum pressure when the valve blows off freely = 0.75 N/mm^2; Maximum lift of the valve when the pressure rises from 0.7 to 0.75 N/mm^2 = 3.5 mm; Maximum allowable stress = 550 MPa; Modulus of rigidity = 84 kN/mm^2; Spring index = 6. Draw a neat sketch of the free spring showing the main dimensions.

OR

6 Design a leaf spring for the following specifications : **[14M]**

Total load=140 kN; Number of springs supporting the load = 4; Maximum number of leaves=10; Span of the spring=1000 mm; Permissible deflection=80 mm. Take Young's modulus, E = 200 kN/mm^2 and allowable stress in spring material as 600 MPa.

SECTION-IV

7 Discuss the design procedure of spur gears. **[14M]**

OR

8 A pair of helical gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 r.p.m. The normal pressure angle is 20° while the helix angle is 25°. The face width is 40 mm and the normal module is 4 mm. The pinion as well as gear is made of steel having ultimate strength of 600 MPa and heat treated to a surface hardness of 300 B.H.N. The service factor and factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and calculate the power transmitting capacity of the gears. **[14M]**

SECTION-V

9 The lead screw of a lathe has Acme threads of 50 mm outside diameter and 8 mm pitch. The screw must exert an axial pressure of 2500 N in order to drive the tool carriage. The thrust is carried on a collar 110 mm outside diameter and 55 mm inside diameter and the lead screw rotates at 30 r.p.m. Determine (a) the power required to drive the screw; and (b) the efficiency of the lead screw. Assume a coefficient of friction of 0.15 for the screw and 0.12 for the collar. **[14M]**

OR

10 Design a screw jack for lifting a load of 50 kN through a height of 0.4 m. The screw is made of steel and nut of bronze. Sketch the front sectional view. The following allowable stresses may be assumed **[14M]**

For steel: Compressive stress = 80 MPa ; Shear stress = 45 MPa

For bronze: Tensile stress=40MPa; Bearing stress=15MPa; Shear stress=25 MPa.

The coefficient of friction between the steel and bronze pair is 0.12. The dimensions of the swivel base may be assumed proportionately. The screw should have square threads. Design the screw, nut and handle. The handle is made of steel having bending stress 150 MPa (allowable).

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