

Code No: R18A1253

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular/Supplementary Examinations, June 2022

Software Testing Techniques

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions
All Questions carries equal marks.

- 1 Express Waterfall model in detail with neat architecture along with advantages and disadvantages of it [14M]
- 2 Illustrate Spiral model phases in detail with neat sketch and write pros and cons of it [14M]
- 3 a) Explain types of requirements in detail . [7M]
b) Compare functional and non-functional requirements [7M]
- 4 Describe types of reviews in software testing in detail [14M]
- 5 Discuss types of dynamic testing along with advantages and disadvantages of it [14M]
- 6 Interpret the types of mutation testing along with advantages and disadvantages of it [14M]
- 7 Analyse the functional testing of mobile application [14M]
- 8 a) Summarize the Use case based test case design [7M]
b) Identify the test case elements [7M]

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular/Supplementary Examinations, June 2022

Computer Aided Design

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 What do you understand by computer aided design? Discuss various reasons for implementing CAD in industry. [14M]
- 2 Discuss in detail about Cathode Ray Tube. [14M]
- 3 Explain in detail the properties and advantages of B-Splines. [14M]
- 4 Explain DDA algorithm in detail. [14M]
- 5 What are the differences between a wireframe model and a solid model? What are the advantages of wireframe modeling? [14M]
- 6 Explain the properties of solid model and representation schemes. [14M]
- 7
 - a. Explain in detail about CAD translation. [7M]
 - b. What is the meaning of scaling the drawing? Explain how to scale using CAD? [7M]
- 8 What is shading and explain various types of shading? [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular/Supplementary Examinations, June 2022

Heat Transfer

(ME)

Roll No									

Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

Note: heat and mass transfer data books are permitted

- 1 Derive general 3-dimensional heat conduction equation in cylindrical coordinates. Assume the material as homogeneous isotropic continues? [14M]
- 2 A cold storage has walls made of 23 cm of brick on the outside, 8 cm of plastic foam and finally 1.5 cm of wood on the inside. The outside and inside air temperatures are 22°C and -2°C respectively. The inside and outside heat transfer coefficients are respectively 29 and 12 W/m²K. the thermal conductivities of brick, foam and wood are 0.98, 0.02 and 0.12 W/mK respectively. If the total wall area is 90 m², determine the rate of heat removal by refrigeration and the temperature of the inside surface of the brick? [14M]
- 3 Derive the temperature profile equation for using lumped analysis? Also derive the equations for instantaneous and cumulative heat transfer? [14M]
- 4 A copper slab ($\rho=9000 \text{ kg/m}^3$, $c= 380\text{J/kg}^\circ\text{C}$, $k=370 \text{ W/m}^\circ\text{C}$) measuring 400 mm \times 400mm \times 5mm has uniform temperature of 250°C. Its temperature is suddenly lowered to 30°C. Calculate the time required for the plate to reach the temperature of 90°C. Assume convective heat transfer coefficient as 90 W/m² °C? [14M]
- 5 Using the method of dimensional analysis obtain the dimensionless numbers in the case of forced convection. After listing out the influencing parameter with dimensions repeating variables are chosen length, velocity, density, dynamic viscosity, conductivity, specific heat, enthalpy. [14M]
- 6 Air at 20°C and one atmosphere flows over a surface at 100°C with a free stream velocity of 6 m/s. Determine the values of Reynolds number, thermal and hydrodynamic boundary layer thicknesses and the local value and average values of convective heat transfer coefficients at distances of 0.1, 0.25, 0.5, 0.75, 1, 1.25 m from the leading edge. Also determine the length at which the flow turns to turbulent taking critical Reynolds number as 5×10^5 . [14M]

- 7 Explain the differences between drop wise and film wise condensation? Also describe the Nusselt theory for condensation and draw the velocity profile? [14M]
- 8 A thin aluminium sheet with an emissivity of 0.1 on both sides is placed between two very large parallel plates that are maintained at uniform temperatures $T_1 = 800$ K and $T_2 = 500$ K and have emissivities 0.2 and 0.7 respectively. Determine the net rate of radiation heat transfer between the two plates per unit surface area of the plates and compare the result to that without shield. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Regular/Supplementary Examinations, June 2022

Machine Design – II

(ME)

Roll No									
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Time: 3 hours

Max. Marks: 70

Answer Any Five Questions

All Questions carries equal marks.

Note: Design data book are permitted

- 1 A ball bearing for a drilling machine is rotating at 3000 r.p.m. It is subjected to a radial load of 2 kN and an axial load of 1 kN. It is to work 40 hours per week for one year. Design a suitable ball bearing if the diameter of the spindle is 50 mm. [14M]
- 2 Design a journal bearing for a centrifugal pump for the following specifications: [14M]
Diameter of the journal = 75 mm; speed of the journal = 1200 r.p.m.; Load on the journal = 12 kN, bearing temperature 90°C.
- 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/mm²; Indicated mean effective pressure = 0.65 N/mm²; Mechanical efficiency = 95%; Radius of crank = 110 mm; Fuel consumption = 0.3 kg/BP/hr; Calorific value of fuel (higher) = 44 × 10³kJ/kg; Difference of temperatures at the centre and edges of the piston head = 200°C; 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/mm² and allowable bearing pressure on the gudgeon pin = 17 N/mm².
- 4 A connecting rod is required to be designed for a high speed, four stroke I.C. engine. The following data are available. [14M]
Diameter of piston = 88 mm; Mass of reciprocating parts = 1.6 kg; Length of connecting rod (centre to centre) = 300 mm; Stroke = 125 mm; R.P.M. = 2200 (when developing 50 kW); Possible overspeed = 3000 r.p.m.; Compression ratio = 6.8:1 (approximately); Probable maximum explosion pressure (assumed shortly after dead centre, say at about 3°) = 3.5 N/mm².
Draw fully dimensioned drawings of the connecting rod showing the provision for the lubrication.
- 5 Two pulleys, one 450 mm diameter and the other 200 mm diameter, on parallel shafts 1.95 m apart are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power [14M]

can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25?

- 6 The free end of a torsional spring deflects through 90° when subjected to a torque of 4 N-m. The spring index is 6. Determine the coil wire diameter and number of turns with the following data : Modulus of rigidity = 80 GPa ; Modulus of elasticity = 200 GPa; Allowable stress = 500 MPa. **[14M]**
- 7 A pair of helical gears with 30° helix angle is used to transmit 15 kW at 10 000 r.p.m. of the pinion. The velocity ratio is 4 : 1. Both the gears are to be made of hardened steel of static strength 100 N/mm². The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module. Find the module and face width from the standpoint of strength and check the gears for wear. **[14M]**
- 8 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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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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III B.Tech II Semester Regular/Supplementary Examinations, June 2022

Smart Manufacturing Technologies

(ME)

Roll No										
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Time: 3 hours

Max. Marks: 70

Answer Any **Five** Questions
All Questions carries equal marks.

- 1 Explain the primary objective of the smart manufacturing? Also describe CIM wheel elaborately? [14M]
- 2 Describe CIMS structure and functions? [14M]
- 3 Describe various digital tools used in Industry 4.0? [14M]
- 4 Explain the principles of Agile Manufacturing? [14M]
- 5 Discuss the application of neural networks in machining process? [14M]
- 6 Discuss the application of fuzzy sets in networks in metal forming process? [14M]
- 7 Explain Group technology in automated manufacturing system? [14M]
- 8 Explain the Monitoring and Intelligent Control of Machining process? [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, April 2023

Software Testing Techniques

(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 (a) Describe the deployment phase of the waterfall model. [7M]
(b) What types of professionals might take part in a company's projects run by the waterfall methodology? [7M]

OR

- 2 (a) Explain verification and validation model. [7M]
(b) What is the difference between V-Model and Agile models? [7M]

SECTION-II

- 3 (a) Categorize the difference between Functional and Non-Functional Requirements. [7M]
(b) What are software testing objectives and purposes? [7M]

OR

- 4 (a) What are the factors to consider during the test case review? [7M]
(b) Classify defects in the peer review of the Test Cases. [7M]

SECTION-III

- 5 (a) Explain practical difficulties in White-Box testing with suitable examples. [7M]
(b) Discuss the functionalities of the Cause-Effect table. [7M]

OR

- 6 (a) How does a tester decide which tests to run in the context of Black-Box testing? [7M]
(b) Discuss relevant examples of Black-Box testing techniques. [7M]

SECTION-IV

- 7 (a) When should Smoke testing be done in the Software Development Life Cycle (SDLC)? [7M]
(b) Why compatibility testing is important? Discuss with suitable examples. [7M]

OR

- 8 Emphasize the process of business intelligence testing and its applications. [14M]

SECTION-V

- 9 What are the types of test case design techniques? Explain with suitable examples. [14M]

OR

- 10 Write the reasonable test cases for this scenario – If you are a new customer and you want to open a credit card account then there are three conditions first you will get a 15% discount on all your purchases today, second if you are an existing [14M]

customer and you hold a loyalty card, you get a 10% discount and third if you have a coupon, you can get 20% off today (but it can't be used with the 'new customer' discount). Discount amounts are added, if applicable.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, April 2023

Computer Aided Design

(ME)

Roll No										
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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 Describe the differences between LCD and LED display devices and their respective fundamentals. [14M]

OR

2 What is CAD/CAM hardware, and how has it improved the manufacturing process? [14M]

SECTION-II

3 Discuss the properties of cubic spline curves, including their equations, blending functions, and use in computer graphics. [14M]

OR

4 Describe the current trends in surface modeling and rendering, including the use of machine learning and other advanced techniques to create more realistic and interactive surfaces. [14M]

SECTION-III

5 Describe the adaptive subdivision meshing (ASM) scheme used in solid modeling, including its advantages and limitations. [14M]

OR

6 Explain the constructive solid geometry (CSG) representation scheme used in solid modeling, including its basic operations and limitation [14M]

SECTION-IV

7 Explain the concept of homogeneous representation in geometric transformations and its advantages over traditional vector representation. [14M]

OR

8 Describe the translation transformation in 2D and its mathematical representation using homogeneous coordinates. [14M]

SECTION-V

9 Compare and contrast the different techniques used in computer graphics to create visual realism, including their strengths and weaknesses, and provide examples of their typical applications. [14M]

OR

10 Discuss the different techniques used to create special effects in computer graphics, including compositing and motion blur. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, April 2023

Heat Transfer

(ME)

Roll No										
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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: Heat and mass transfer data books are permitted

SECTION-I

- 1 Describe the steady-state one-dimensional heat conduction solutions for plain and composite slabs, cylinders, and spheres, and provide examples of their typical applications. [14M]

OR

- 2 Explain the concept of electrical resistance and its relationship to heat transfer, including the use of the electrical analogy in solving heat transfer problems. [14M]

SECTION-II

- 3 Derive the temperature distribution equation in unsteady state conduction heat transfer. [14M]

OR

- 4 Discuss the lumped system analysis method and its use in solving unsteady-state heat transfer problems. [14M]

SECTION-III

- 5 A flat plate is exposed to air at 30°C with a velocity of 10 m/s. The plate is 1 m wide and 2 m long. Calculate the average convective heat transfer coefficient if the surface temperature of the plate is maintained at 70°C. Use the appropriate correlation for forced convection heat transfer. [14M]

OR

- 6 A vertical plate of 1 m × 2 m size is maintained at a uniform temperature of 80°C. The plate is exposed to air at 30°C with a velocity of 5 m/s. Determine the convective heat transfer coefficient and the rate of heat transfer from the plate to the air using the appropriate correlation for free convection heat transfer. [14M]

SECTION-IV

- 7 A parallel flow heat exchanger is designed to heat a flow of water from 20°C to 60°C using hot air at 150°C. The water flow rate is 2 kg/s and the air flow rate is 4 kg/s. The overall heat transfer coefficient is 400 W/m²K. Determine the length of the heat exchanger required if the heat transfer surface area is 10 m². [14M]

OR

- 8 A vertical flat plate is used for laminar film condensation of steam at 100°C on a surface area of 0.2 m². The plate is maintained at a temperature of 20°C. Determine the rate of heat transfer and the thickness of the condensate layer if the steam pressure is 1 bar and the steam velocity is 0.05 m/s. [14M]

SECTION-V

- 9** Explain the concept of black body radiation and its importance in heat transfer. [14M]
- OR
- 10** Derive the equation for net radiation heat transfer between two surfaces. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, April 2023

Machine Design - II

(ME)

Roll No										
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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 ball bearings and roller bearings with respect to their load carrying capacity, frictional resistance, and suitability for different applications. [14M]

OR

- 2 A roller bearing has a radial load of 1000 N and an axial load of 500 N. The roller diameter is 20 mm and the bearing is rotating at 3000 rpm. Calculate the minimum required dynamic load rating of the bearing, assuming a safety factor of 2. Given that the static load rating of the bearing is 4000 N, determine if the selected bearing is suitable for the given load. [14M]

SECTION-II

- 3 The following data refers to a six-cylinder petrol engine with bore 100 mm, stroke 120 mm and operating at 2500 rpm. Determine the magnitude of the resultant force acting on the piston, the maximum thrust on the connecting rod and the maximum gas pressure. [14M]

Piston crown area = 0.008 m²
Connecting rod length = 150 mm
Mass of piston assembly = 0.5 kg
Mass of connecting rod = 1.2 kg
Maximum combustion pressure = 6 MPa

OR

- 4 A connecting rod is 200 mm long, the crank radius is 50 mm, and the piston stroke is 100 mm. The engine operates at 1200 rpm and the maximum gas pressure is 6 MPa. The mass of the reciprocating parts is 2 kg. Determine the maximum compressive and tensile stresses developed in the connecting rod, and the maximum thrust on the connecting rod. Assume the connecting rod to be of uniform thickness and density. [14M]

SECTION-III

- 5 A flat belt is transmitting power between two pulleys with diameters of 400 mm and 800 mm. The tension on the tight side of the belt is 500 N and the coefficient of friction between the belt and pulleys is 0.3. Determine the power transmitted by the belt if the belt speed is 12 m/s. [14M]

OR

- 6 A helical spring is made of a wire of diameter 10 mm and has 20 coils. The mean diameter of the spring is 100 mm and the length of the spring in the unloaded [14M]

condition is 200 mm. The spring is subjected to an axial load of 1000 N. Determine the stress and deflection in the spring.

SECTION-IV

- 7 A pair of helical gears with 20° pressure angle, pinion and gear has 20 and 40 teeth respectively. The module of the gears is 4mm and the face width is 30mm. Determine the centre distance between the gears, and the contact ratio. Also, calculate the power transmitted by the gears if the speed of the smaller gear is 1200 rpm and the pinion rotates in a clockwise direction. [14M]

OR

- 8 A pair of spur gears has a pitch circle diameter of 80mm and 40mm with a module of 4mm. The centre distance between the gears is 80mm. The speed of the driver gear is 500 rpm. Determine the speed of the follower gear, and the number of teeth on the follower gear if the velocity ratio is 2:1. [14M]

SECTION-V

- 9 A square-threaded power screw is required to raise a load of 12 kN. The screw has a mean diameter of 50 mm and a pitch of 8 mm. Determine the maximum torque that can be transmitted by the screw if the coefficient of friction between the screw and the nut is 0.12. Also, calculate the axial force exerted on the screw. [14M]

OR

- 10 A power screw is designed for a load of 20 kN to be lifted by the screw. The screw has a single start square thread of pitch 10 mm and a mean diameter of 60 mm. Determine the torque required to lift the load and the axial force on the screw. The coefficient of friction between the screw and the nut is 0.15. [14M]

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III B.Tech II Semester Supplementary Examinations, April 2023

Smart Manufacturing Technologies

(ME)

Roll No										
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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 How do Computer Integrated Manufacturing (CIM) systems contribute to the implementation of smart manufacturing? [14M]

OR

2 What is CAQC (Computer-Aided Quality Control) and how does it ensure product quality in smart manufacturing? [14M]

SECTION-II

3 Explain the concept of Smart Machine Tools and how they can enhance manufacturing processes. [14M]

OR

4 What are the major standards used in smart design/fabrication processes and why are they important? [14M]

SECTION-III

5 How do fuzzy sets contribute to the optimization of metal forming processes? [14M]

OR

6 What are the limitations of using artificial neural networks in process optimization in manufacturing? [14M]

SECTION-IV

7 Explain the role of artificial intelligence and machine learning in KBSGT and its potential applications in modern manufacturing systems. [14M]

OR

8 Explain the concept of Knowledge Based Group Technology and its importance in modern automated manufacturing systems. [14M]

SECTION-V

9 Discuss the importance of monitoring and intelligent control in manufacturing processes. Give examples of how this can be implemented in real-world scenarios. [14M]

OR

10 Explain the concept of smart energy management in manufacturing processes and [14M]

facilities. What are some key factors to consider when implementing such a system, and what benefits can it provide?

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, December 2022

Software Testing Techniques

(ME)

Roll No										
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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 Write short notes on the following
- a) Characteristics of good Software [7M]
- b) Roles and responsibilities of software tester [7M]
- OR
- 2 Explain the spiral model design, application, pro's and con's [14M]

SECTION-II

- 3 Explain the types of requirements in software testing in detail. [14M]
- OR
- 4 Exemplify the types of reviews in software testing. [14M]

SECTION-III

- 5 Design the block diagram to represent the types of software testing and explain each type of testing briefly [14M]
- OR
- 6 Describe the techniques used in black box testing. [14M]

SECTION-IV

- 7 What is performance testing? Explain types of performance testing in detail. [14M]
- OR
- 8 Discuss the following
- a) Functional testing of mobile application [7M]
- b) SOA testing [7M]

SECTION-V

- 9 Illustrate Defect life cycle work flow using neat diagram and mention the states of it [14M]
- OR
- 10 Explain the following
- a) Test case based template [7M]
- b) AdHoc Testing [7M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, December 2022**Computer Aided Design****(ME)**

Roll No										
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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 in detail the direct view storage tube with a neat sketch.](#) [14M]

OR

- 2 What are various coordinate systems and explain any two of them in detail. [14M]

SECTION-II

- 3 Differentiate between Bezier Curve and B spline curves. [14M]

OR

- 4 Explain the equation, properties and blending of Cubic Spline. [14M]

SECTION-III

- 5 What is the difference between geometry and topology? Explain with suitable examples. [14M]

OR

- 6 What is meant by sweep and discuss in detail the various types of sweep techniques? [14M]

SECTION-IV

- 7 What is the significance of homogeneous transformation in CAD? [14M]

OR

- 8 What is shearing in 2D transformation? Explain the procedure of shearing in CAD. [14M]

SECTION-V

- 9 What is visual realism? Explain in detail. [14M]

OR

- 10 What is meant by hidden-line removal? Explain the algorithm which is used for hidden-line removal. [14M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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R18

III B.Tech II Semester Supplementary Examinations, December 2022

Heat Transfer

(ME)

Roll No										
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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 Derive general 3-dimensional heat conduction equation in spherical coordinates. [14M]
Assume the material as homogeneous isotropic continues.

OR

- 2 Derive the equation for critical thickness of insulation for a cylinder? A copper wire of radius 0.5 mm is insulated uniformly with plastic ($K=0.5$ W/mK) sheathing 1 mm thick. The wire is exposed to atmosphere at 30°C and the surface coefficient is $8\text{W/m}^2\text{K}$. Find the maximum safe current carried by the wire so that no part of the insulated plastic is above 75°C . Also calculate critical thickness of insulation. For copper: Thermal conductivity = 400 W/mK, specific electrical resistance = 2×10^{-8} ohm-m. [14M]

SECTION-II

- 3 A long cylinder of radius 15 cm initially at 30°C is exposed over the surface to gases at 600°C with a convective heat transfer coefficient of 65 W/m²K. Using the following property values determine the temperatures at the center, mid radius and outside surface after 20 minutes. Density = 3550 kg/m³, $C_p = 586$ J/kg K, conductivity = 19.5 W/mK. Also calculate the heat flow. [14M]

OR

- 4 A solar concentrator provides a heat flux of 8000 W/m² to heat a 10 mm plate on one side. The other side of the plate is exposed to convection at 40 W/m²K at 20°C . The plate material has a density of 800 kg/m³ and specific heat of 500 J/kg K. The initial temperature of the plate is 20°C . Thermal conductivity of the material is 80 W/m²K. (i) Determine the time for the plate to reach 100°C . (ii) Determine the plate temperature after 6 minutes. [14M]

SECTION-III

- 5 A 0.15 m OD steel pipe lies 2 m vertically and 8 m horizontally in a large room with an ambient temperature of 30°C . The pipe surface is at 250°C and has an emissivity of 0.60. Estimate the total rate of heat loss from the pipe to the atmosphere. [14M]

OR

- 6 Nitrogen at a pressure of 0.1 atm flows over a flat plate with a free stream velocity [14M]

of 8 m/s. The temperature of the gas is -20°C . The plate temperature is 20°C . Determine the length for the flow to turn turbulent. Assume 5×10^5 as critical Reynolds number. Also determine the thickness of thermal and velocity boundary layers and the average convection coefficient for a plate length of 0.3 m. Properties are to be found at film temperature.

SECTION-IV

- 7 Explain the types of boiling? And also explain the regimes of pool boiling with neat sketch? [14M]

OR

- 8 It is required to design a shell and tube heat exchanger for heating 9000 kg/hr of water from 15°C to 88°C by hot engine oil ($C_p = 2.35 \text{ kJ/kg-K}$) flowing through the shell of the heat exchanger. The oil makes a single pass, entering at 150°C and leaving at 95°C with an average heat transfer coefficient of $400 \text{ W/m}^2\text{-K}$, the water flow through 10 thin walled tubes of 25 mm diameter with each tube making 8 passes through the shell. The heat transfer efficient on the water side is $3000 \text{ W/m}^2\text{-K}$. Find the length of the tube required the heat exchanger [14M]

SECTION-V

- 9 A furnace is of cylindrical shape with a diameter of 1.2 m and a length of 1.2 m. [14M]
The top surface has an emissivity of 0.70 and is maintained at 500 K. The bottom surface has an emissivity of 0.50 and is maintained at 650 K. The side surface has an emissivity of 0.40. Heat is supplied from the base surface at a net rate of 1400 W. Determine the temperature of the side surface and the net rates of heat transfer between the top and the bottom surfaces, and between the bottom and side surfaces.

OR

- 10 A steam main ($\epsilon=0.79$) having an outside diameter of 80mm runs in a large room [14M]
in which the air temperature is 27°C . The surface temperature of the steam main is 300°C . Calculate the loss of heat to surroundings per meter length of pipe due to radiation. Calculate also the reduction in heat loss if the above pipe is enclosed in a brick conduit (at 27°C) of emissivity 0.93.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

R18

III B.Tech II Semester Supplementary Examinations, December 2022

Machine Design - II

(ME)

Roll No									
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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 Design a full hydrodynamic journal bearing with the following specifications for machine tool application: Journal diameter=80 mm; radial load=12 kN; journal speed 1440 r.p.m.; minimum oil film thickness=22 microns; inlet temperature=30°C; bearing material: Babbitt. Determine the length of the bearing and select suitable oil for this application. [14M]

OR

- 2 The ball bearing is subjected to radial force of 2500 N and an axial force of 1000 N. The dynamic load carrying capacity of the bearing is 7350 N. The values of X and Y factors are 0.56 and 1.6 respectively. The shaft is rotating at 720 rpm. Calculate the life of the bearing. [14M]

SECTION-II

- 3 Design a cast iron piston for a single acting four stroke engine for the following data: [14M]
Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm² ;
Indicated mean effective pressure = 0.75 N/mm² ; Mechanical efficiency = 80% ;
Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel = 42 × 10³ kJ/kg ; Speed = 2000 r.p.m. Any other data required for the design may be assumed.

OR

- 4 Determine the dimensions of an *I*-section connecting rod for a petrol engine from the following data: [14M]
Diameter of the piston = 110 mm; Mass of the reciprocating parts = 2 kg; Length of the connecting rod from centre to centre = 325 mm; Stroke length = 150 mm; R.P.M. = 1500 with possible overspeed of 2500; Compression ratio = 4:1; Maximum explosion pressure = 2.5 N/mm².

SECTION-III

- 5 An engine running at 150 r.p.m. drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft is 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of dynamo shaft, when 1. there is no slip, and 2. there is a slip of 2% at each drive. [14M]

OR

- 6 A helical compression spring made of oil tempered carbon steel, is subjected to a load which varies from 600 N to 1600 N. The spring index is 6 and the design factor of safety is 1.43. If the yield shear stress is 700 MPa and the endurance stress is 350 MPa, find the size of the spring wire and mean diameter of the spring coil. [14M]

SECTION-IV

- 7 A reciprocating compressor is to be connected to an electric motor with the help of spur gears. The distance between the shafts is to be 500 mm. The speed of the electric motor is 900 r.p.m. and the speed of the compressor shaft is desired to be 200 r.p.m. The torque, to be transmitted is 5000 N-m. Taking starting torque as 25% more than the normal torque, determine : [14M]
1. Module and face width of the gears using 20 degrees stub teeth, and
 2. Number of teeth and pitch circle diameter of each gear. Assume suitable values of velocity factor and Lewis factor.

OR

- 8 A helical cast steel gear with 30° helix angle has to transmit 35 kW at 1500 r.p.m. [14M]
If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20° full depth teeth. The static stress for cast steel may be taken as 56 MPa. The width of face may be taken as 3 times the normal pitch. What would be the end thrust on the gear? The tooth factor for 20° full depth involute gear may be taken as $0.154 - (0.912 / T_E)$ – where T_E represents the equivalent number of the teeth.

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 The lead screw of a lathe has square threads of 24 mm outside diameter and 5 mm pitch. In order to drive the tool carriage, the screw exerts an axial pressure of 2.5 kN. Find the efficiency of the screw and the power required to drive the screw, if it is to rotate at 30 r.p.m. Neglect bearing friction. Assume coefficient of friction of screw threads as 0.12. [14M]

Code No: R18A0321

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, December 2022

Smart Manufacturing Technologies

(ME)

Roll No										
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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 Automated Storage and Retrieval System with neat sketch? [14M]

OR

2 Explain different stages of smart manufacturing with suitable examples? [14M]

SECTION-II

3 What is Agile Manufacturing? Describe with suitable examples? [14M]

OR

4 Discuss about mass customization with examples? [14M]

SECTION-III

5 Explain the application of FEM in machining process? [14M]

OR

6 Discuss the application of neural networks in metal forming processes? [14M]

SECTION-IV

7 Describe the classification of Knowledge Based Group Technology with examples? [14M]

OR

8 Explain the architecture of a knowledge-based Process Planning Systems for small scale industries? [14M]

SECTION-V

9 Discuss the role of IoT in smart manufacturing applications? [14M]

OR

10 Explain the smart energy management of facilities? [14M]

Code No: R18A1253

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, February 2022

Software Testing Techniques

(ME)

Roll No									
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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 Discuss Roles and Responsibilities of STM and explain Independent Verification and Validation. [14M]

OR

2 Describe about Waterfall Model, Spiral Model and Prototyping in software testing techniques. [14M]

SECTION-II

3 What is review process? Explain its types in software testing. [14M]

OR

4 Classifying the Functional and Non Functional Requirements with appropriate illustration. [14M]

SECTION-III

5 What is McCabe's Cyclomatic Complexity and also discuss about Pair Wise Testing – Use Case Testing. [14M]

OR

6 Interpret about control flow graphs and how flow chart is differed from a control flow graph? [14M]

SECTION-IV

7 Explain Data ware House Testing, Business Intelligence Testing, SOA Testing and Mobile Testing with respect to Non Functional Testing. [14M]

OR

8 Write a short note on Usability Testing, Ad Hoc Testing, Internationalization Testing and Configuration Testing in the context of non-functional testing. [14M]

SECTION-V

9 Describe about Winrunner, Loadrunner, Selenium and JMeter. [14M]

OR

10 Explain about Test Case templates, Creation of Test Case, Requirement Coverage, Traceability Matrix and Test Case Review Process in test case design. [14M]

Code No: **R18A0319****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****III B.Tech II Semester Supplementary Examinations, February 2022****Computer Aided Design****(ME)**

Roll No										
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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 a) Briefly explain the product cycle. [10M]
b) What is the structure of a computing system? [4M]

OR

- 2 a) Explain the functioning of Liquid Crystal Display terminals as used in CAD. [10M]
b) Explain the different types of co ordinate systems? [4M]

SECTION-II

- 3 a) Write the characteristics of Bezier curve. [7M]
b) Explain the B-Spline curve. [7M]

OR

- 4 a) Explain the surface entities. [10M]
b) Discuss about NURBS. [4M]

SECTION-III

- 5 Explain the following.
i) B-rep [7M]
ii) CSG. [7M]

OR

- 6 a) What is Sweep representation? Explain. [10M]
b) Explain the Boolean operations. [4M]

SECTION-IV

- 7 a) What is homogeneous transformation? [4M]
b) Discuss about the two dimensional transformations. [10M]

OR

- 8 A rectangle has corner co-ordinates (10,20) (40,20), (40,40), (10,40). This rectangle is rotated by 30° anticlockwise about (i) origin and (ii) about the point (40,20). Compute the new co-ordinates in both cases. [14M]

SECTION-V

- 9 a) Compare the techniques of Phong shading and Gouraud shading [7M]
b) Make a comparative study of hidden surface removal algorithms [7M]

OR

- 10 a) Describe an algorithm for the removal of hidden lines [7M]
b) Explain the Z-Buffer algorithm [7M]

Code No: R18A0318

R18

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, February 2022

Heat Transfer

(ME)

Roll No									
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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 a A mild steel tank of wall thickness 12mm contains water at 95°C. The thermal conductivity of mild steel is 50 W/m°C and the heat transfer co-efficient for the inside and outside the tank are 2850 and 10 W/m² °C, respectively. If the atmospheric temperature is 15°C, calculate: [8M]
- i. The Rate of heat loss per m² of tank surface area.
 - ii. The temperature of outside surface of the tank.
- b What is Fourier law of conduction? State also assumptions on which this law is based. [6M]

OR

- 2 a A small electric heating application uses wire of 2mm diameter with 0.8mm thick insulation (k=0.12W/m°C). The heat transfer coefficient (h₀) on the insulated surface is 35W/m²°C. Determine the critical thickness of insulation in this case and the percentage change in the heat transfer rate if the critical thickness is used, assuming the temperature difference between the surface of the wire and surrounding air remains unchanged. [10M]
- b Define the modes of heat transfer? [4M]

SECTION-II

- 3 A long cylindrical bar (k=17.4 W/m°C, α = 0.019 m²/h) of radius 80 mm comes out of oven at 830 °C throughout and is cooled by quenching it in a large bath of 40 °C coolant. The surface co-efficient of heat transfer between the bar surface and the coolant is 180 W/m² °C. Determine; [14M]
- (i) The time taken by the shaft centre to reach 120 °C
 - (ii) The surface temperature of the shaft when its centre temperature is 120 °C. Also calculate the temperature gradient at the outside surface at the same instant of time.

OR

- 4 a The initial uniform temperature of a large mass of material (α = 0.42 m²/h) is 120 °C. The surface is suddenly exposed to held permanently at 6 °C. Calculate the time required for the temperature gradient at the surface to reach 400 °C/m. [10M]
- b What is the physical significance of fourier and Biot numbers? [4M]

SECTION-III

- 5 a A tube 5 m long is maintained at 100 °C by steam jacketing. A fluid flows through the tube at the rate of 2940 kg/h at 30 °C. The diameter of the tube is [10M]

- 2 cm. Find out average heat transfer co-efficient. [4M]
- b State any two Non-dimensionless numbers [4M]
- OR
- 6 a Find the convective heat loss from a radiator 0.6 m wide and 1.2 m high maintained at a temperature of 90 °C in a room at 14 °C. Consider the radiator as a vertical plate. [10M]
- b Define free convection and forced convection. [4M]
- SECTION-IV**
- 7 a Derive an expression for logarithmic mean temperature difference (LMTD) in the case of parallel flow heat exchanger. [12M]
- b What is heat exchanger? [2M]
- OR
- 8 a Explain briefly the physical mechanism of boiling. [7M]
- b Differentiate between mechanisms of film wise drop wise condensation. [7M]
- SECTION-V**
- 9 a Two large parallel plates with $\epsilon=0.5$ each, are maintained at different temperatures and are exchanging heat only by radiation. Two equally large radiation shields with surface emissivity 0.05 are introduced in parallel to the plates. Find the percentage reduction in net radiative heat transfer. [10M]
- b What is a radiation shield? [4M]
- OR
- 10 a Derive an expression for the shape factor in case of the radiation exchange between two surfaces. [8M]
- b Enumerate the factors on which the rate of emission of radiation by a body depends. [6M]

Code No: R18A0320

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, February 2022

Machine Design - II

(ME)

Roll No										
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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 a What are the different bearing materials? [2M]
b A full journal bearing having the following data. [12M]
Radial load = 3.2 KN, Bearing length = 50 mm, Journal diameter = 50 mm
Viscosity of lubricant = 25 cp.
Assuming that the total oil flow carries away the heat generated. Determine
i. Coefficient of friction ii. Power lost in friction.
OR
2 a List the advantages of rolling contact bearings. [2M]
b Select a suitable deep groove ball bearing for an axial compressor to carry a [12M]
radial load of 4000N and axial thrust of 2000N. The services impose light
shock and it is to be in use for 50 Hrs per week for 5 years. Diameter of shaft
not to exceed 75 mm. Speed of the shaft is 1000RPM.

SECTION-II

- 3 Discuss in detail, the design procedure of a connecting rod. [14M]
OR
4 Design an aluminium alloy piston for a single acting four stroke petrol engine [14M]
for the following data.
Cylinder bore= 400mm, Stroke= 375mm, Max. Gas pressure= 9MPa,
Brake mean effective pressure=2MPa, Fuel consumption = 0.22 kg/kW/hr,
Speed= 50 RPM.

SECTION-III

- 5 In an open belt drive, the pulley diameters are 300mm and 450mm and the [14M]
corresponding angle of lap are 160° and 200° . The smaller pulley runs at 240
rpm. The coefficient of friction between the pulleys and belt is 0.3. It is found
that the belt is on the point of slipping when 5kW power is transmitted. To
increase the power transmitted two alternatives are suggested viz., (i)
increasing the belt tension by 15% and (ii) increasing the coefficient of friction
by 15%. Which of the above two methods would be more effective.
OR
6 A railway wagon is resting on 8 helical springs. The wagon along with goods [14M]
weighs 180kN. The dynamic load on the spring due to irregularities on the rail

track may be taken as 60kN and the corresponding amplitude of oscillation being 20mm. Design the spring with Nickel chromium steel having yield point of 1500N/mm² and endurance limit of 800N/mm². Spring index may be taken as 6. Take $G=0.86 \times 10^5 \text{N/mm}^2$.

SECTION-IV

- 7 A pair of spur gears having 20° full depth teeth is to transmit 12kW at 300 rpm of the pinion. The velocity ratio is 3:1. The static strength of cast iron gear and steel pinion are 60MPa and 105MPa respectively. Determine the module, face width and pitch diameters of gears. Also check the gears for wear. Use the following particulars. [14M]

No. of teeth on the pinion =16, face width $b = 10 m$ (m-module), Velocity factor $\frac{4.5}{4.5+v}$, Endurance limit= 600MPa.

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 10000 rpm. 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 $\sigma_{es} = 618 \text{ MPa}$. [14M]

SECTION-V

- 9 a Name the devices in which a power screw forms a part. [2M]
b A load of 12kN is raised by a screw, with single start square threads of 50mm mean diameter and 12mm pitch. The screw is operated by a hand-wheel, the boss of which is threaded to act as a nut. The load is resisted by a thrust collar, which supports wheel boss and has a mean radius of 30mm. The coefficient of friction is 0.15 for the screw and 0.18 for the collar. If the tangential force applied by each hand on the wheel is 120N. Determine the diameter of hand wheel required. [12M]

OR

- 10 A double start square threaded power screw is used to raise a load of 200kN. The nominal diameter of the screw is 100mm and pitch is 12mm. The coefficient of friction at the screw threads is 0.15. Neglecting the collar friction, determine [14M]
- The torque required to raise the load
 - The torque required to lower the load
 - Efficiency of the screw.

Code No: R18A0321

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

R18

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, February 2022

Smart Manufacturing Technologies

(ME)

Roll No									
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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 about the Automated Storage and Retrieval System and types of ASRS in detail? [14M]

OR

- 2 Explain about the Computer Aided Quality Control and types of contact inspection methods? [14M]

SECTION-II

- 3 Explain about the Industrial Internet of Things , Big Data, Cloud computing and Additive manufacturing [14M]

OR

- 4 What is Agile Manufacturing? Explain about the Agile methods in detail. [14M]

SECTION-III

- 5 Explain about the function of a Biological Neuron with the help of a neat sketch and explain how the Artificial Neuron works? [14M]

OR

- 6 Explain about the artificial neural networks and fuzzy sets are used in the machining? [14M]

SECTION-IV

- 7 Differentiate between cluster identification method and knowledge based group technology? [14M]

OR

- 8 Explain about the Database, knowledge base and Clustering algorithms in detail? [14M]

SECTION-V

- 9 What is smart energy management system and explain the benefits of energy management system in detail ? [14M]

OR

- 10 Define the term logistics and explain the various activities carried out in Logistics in detail? [14M]

Code No: R18A1253

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024
Software Testing Techniques

(ME)

Roll No									
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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 (a) Which project management model do software development teams use most often, and why? [7M]
(b) Why do feasibility studies matter during SDLC? [7M]
OR
- 2 What are the different phases of the Spiral model? Discuss the Spiral model in detail. [14M]

SECTION-II

- 3 Discuss the process of how the adequacy criterion specifies a particular software testing requirement. [14M]
OR
- 4 Explain about functional and non functional requirements in software testing. [14M]

SECTION-III

- 5 (a) Why is White-Box testing called Glass-Box testing? [7M]
(b) What is black box testing and explain in detail. [7M]
OR
- 6 Discuss the merits and demerits of White-Box and Black-Box testing. [14M]

SECTION-IV

- 7 What are the two major requirements in performance testing? And explain the working process of those two requirements in the performance testing. [14M]
OR
- 8 Can you explain what the goal of smoke testing is and how it differs from other types of software testing like unit, integration, or regression testing? [14M]

SECTION-V

- 9 How Risks can be identified and analyzed by using Risk Based Testing (RBT) Techniques? [14M]
OR
- 10 Illustrate the process of the Test Case Review. State its two advantages & disadvantages. [14M]

Code No: R18A0319

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024**Computer Aided Design****(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 role of computers in industrial manufacturing and how it has impacted the industry. [14M]

OR

- 2 Compare and contrast the cathode ray tube (CRT) and the digital vector storage tube (DVST) display devices. [14M]

SECTION-II

- 3 Explain the concept of Bezier curves, their equations, properties, and advantages over other curve representations. [14M]

OR

- 4 Explain the different types of surfaces used in computer graphics, including parametric, implicit, and subdivision surfaces. [14M]

SECTION-III

- 5 Explain different representation schemes used in solid modeling, including their efficiency, accuracy, and suitability for different applications [14M]

OR

- 6 Explain B-representation scheme used in solid modelling including its basic operations and limitations. [14M]

SECTION-IV

- 7 Discuss the advantages and disadvantages of different transformation orders, including pre-multiplication and post-multiplication. [14M]

OR

- 8 Describe the different types of 2D transformations, including translation, scaling, rotation, and shearing, and their mathematical representations using homogeneous coordinates. [14M]

SECTION-V

- 9 Discuss the different color mapping techniques used in computer graphics, including RGB and CMYK. [14M]

OR

- 10 Discuss the hidden-surface and hidden-solid removal algorithms used in computer graphics, including their mathematical representations and typical applications. [14M]

Code No: R18A0318

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)**III B.Tech II Semester Supplementary Examinations, January 2024****Heat Transfer****(ME)**

Roll No										
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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: Heat transfer data books are permitted**SECTION-I**

- 1 Discuss the differential heat conduction equation in Cartesian, cylindrical, and spherical coordinate systems and how it is used to solve heat transfer problems. [14M]

OR

- 2 Explain the concept of heat transfer rate equations and their importance in heat transfer analysis. [14M]

SECTION-II

- 3 Discuss the different factors that can affect the accuracy of numerical methods in solving unsteady-state heat transfer problems, including grid size, time step, and boundary conditions. [14M]

OR

- 4 Describe the one-dimensional transient heat conduction equation and its use in solving unsteady-state heat transfer problems. [14M]

SECTION-III

- 5 A sphere of 10 cm diameter is heated to a temperature of 100°C. The sphere is then exposed to air at 25°C with a velocity of 3 m/s. Calculate the convective heat transfer coefficient and the rate of heat transfer from the sphere to the air using the appropriate correlation for forced convection heat transfer. [14M]

OR

- 6 A 2 cm diameter copper pipe is heated to a temperature of 80°C. Water at 20°C is passed through the pipe with a velocity of 0.5 m/s. Calculate the convective heat transfer coefficient and the rate of heat transfer per unit length of the pipe using the appropriate correlation for forced convection heat transfer. [14M]

SECTION-IV

- 7 A counter flow heat exchanger is used to cool a process fluid from 100°C to 40°C using water at 20°C. The process fluid flow rate is 2 kg/s and the water flow rate is 4 kg/s. The overall heat transfer coefficient is 300 W/m²K. Determine the length of the heat exchanger required if the heat transfer surface area is 5 m². [14M]

OR

- 8 A horizontal tube is used for condensation of steam at 100°C on a surface area of 1 m². The tube is maintained at a temperature of 20°C. Determine the rate of heat transfer, the overall heat transfer coefficient, and the log mean temperature difference if the steam pressure is 1 bar and the steam velocity is 1 m/s. [14M]

SECTION-V

9 Derive the Stefan-Boltzmann equation and explain its significance in radiation heat transfer. **[14M]**

OR

10 State and explain Kirchhoff's laws related to radiation. **[14M]**

Code No: R18A0320

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)**III B.Tech II Semester Supplementary Examinations, January 2024****Machine Design - II****(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*SECTION-I**

- 1 Explain the lubrication mechanisms in journal bearings and the different types of lubricants used. [14M]

OR

- 2 Design a journal bearing for a 60 mm diameter shaft rotating at 1000 rpm. The length of the bearing is 120 mm and the oil film thickness should be 0.05 mm. The maximum pressure in the oil film should not exceed 1 MPa and the maximum temperature rise should not exceed 10°C. Use a lubricant with a viscosity of 0.02 Pa.s and a density of 900 kg/m³. Select a suitable bearing material. [14M]

SECTION-II

- 3 A connecting rod is 240 mm long and the crank pin is 60 mm from the centre of the big end. The engine runs at 3000 rpm and the reciprocating mass is 2 kg. Find the thrust load and maximum compressive and tensile stress in the connecting rod if the cylinder pressure is 6.5 bar. The crank pin radius is 50 mm and the mass of the big end is 4 kg. Take the connecting rod to be of uniform thickness and 80 mm diameter at the big end. [14M]

OR

- 4 A four-cylinder, four-stroke engine has a bore of 80 mm and a stroke of 100 mm. The connecting rods are 180 mm long and the crankshaft has a throw of 42.5 mm. The engine runs at a maximum speed of 5000 rpm. The piston is made of aluminum alloy with a diameter of 79.9 mm and a height of 57.2 mm. The maximum gas pressure in the cylinder is 7.5 MPa and the maximum temperature is 550°C. The connecting rod is made of steel with an ultimate strength of 400 MPa and a yield strength of 240 MPa. Determine: [14M]
- The maximum force acting on the piston and the corresponding maximum pressure on the piston.
 - The maximum compressive stress in the connecting rod and the safety factor for the design.
 - The minimum thickness of the piston if it is to be designed with a factor of safety of 3 against yielding under the maximum gas pressure.
- Assumptions: Neglect the mass of the piston and connecting rod. Neglect any axial forces acting on the connecting rod.

SECTION-III

- 5 A V-belt is used to transmit power between two pulleys with diameters of 250 mm [14M]

and 500 mm. The angle of groove of the pulley is 38 degrees and the coefficient of friction between the belt and pulleys is 0.25. The tension on the tight side of the belt is 1000 N. Determine the power transmitted by the belt if the belt speed is 20 m/s.

OR

- 6 An extension spring is made of a wire of diameter 8 mm and has 10 coils. The spring has a free length of 500 mm and is designed to carry a load of 800 N. Determine the stress in the spring when the length is 400 mm. [14M]

SECTION-IV

- 7 A helical gear has 30 teeth, a module of 3mm, a helix angle of 20°, and a pressure angle of 25°. The gear transmits 10 kW at 2000 rpm. Determine the pitch diameter, face width, and the maximum shear stress in the gear teeth. Also, calculate the contact stress, and the minimum number of teeth required to avoid interference. [14M]

OR

- 8 A spur gear with 20 teeth and a module of 2.5mm is to be designed to transmit 7.5kW power at 600 rpm. The gear face width is 40mm. Determine the pitch diameter of the gear and the tangential force acting on the gear teeth. Also, calculate the bending stress and contact stress in the gear. [14M]

SECTION-V

- 9 A buttress-threaded power screw is used to lift a load of 25 kN. The screw has a single start thread of pitch 15 mm and a mean diameter of 60 mm. The coefficient of friction between the screw and the nut is 0.18. Calculate the torque required to lift the load and the axial force on the screw. [14M]

OR

- 10 A differential screw is used to adjust the height of a machine tool table. The screw has two threads of 8 mm and 12 mm pitch on the same shaft. The mean diameter of the screw is 60 mm. Determine the axial force on the screw and the ratio of the linear displacement of the table to the angular displacement of the screw. [14M]

Code No: R18A0321

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, January 2024**Smart Manufacturing Technologies**

(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 What are the key characteristics of smart manufacturing and how does it differ from traditional manufacturing methods? [14M]

OR

- 2 What are Automated Storage and Retrieval Systems (ASRS) and how do they contribute to smart manufacturing? [14M]

SECTION-II

- 3 What are Agile (Additive) Manufacturing Systems and how do they differ from traditional manufacturing processes? [14M]

OR

- 4 Discuss the importance of robotics and automation in smart design/fabrication, including the role of perception, manipulation, mobility, and autonomy. [14M]

SECTION-III

- 5 What are the advantages of using artificial neural networks for process optimization in manufacturing? [14M]

OR

- 6 Describe the process of modeling and optimizing a manufacturing process using neural networks. [14M]

SECTION-IV

- 7 Discuss the potential benefits and limitations of KBSGT in improving productivity, quality, and efficiency in modern manufacturing systems. [14M]

OR

- 8 Describe the structure of a Knowledge Based System for Group Technology (KBSGT) and its various components. [14M]

SECTION-V

- 9 What is smart energy management in manufacturing processes and facilities? Explain its significance. [14M]

OR

- 10 Explain the concept of online predictive modeling in machining/manufacturing processes. How can it help improve process efficiency and quality? [14M]
