Hall Ticket Number :										

R-20

Code: 20A363T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

CAD/CAM

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer all the following short answer questions (5 X 2 = 10M)		CO	BL
a) Write any two reasons for implementing CAD.		CO1	BL1
b) Define Geometric Modeling.		CO2	BL2
c) What are M03, M30 codes stands for in NC Programming?		CO3	BL2
d) State the need of Group Technology?		CO4	BL2
e) Mention the difference between contact and noncontact inspection methods?		CO5	BL2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
UNIT–I				
2. a)	Briefly explain the conventional process of the product cycle in conventional manufacturing environment.	8M	CO1	BL2
b)	Write short notes on i) Stroke writing ii) Raster Scan	4M	CO1	BL2
OR				
3.	What is meant by Concatenation Matrix? Demonstrate how translation; scaling and rotation operations can be performed simultaneously on a graphic element using Concatenation Matrix.	12M	CO1	BL3
UNIT–II				
4. a)	Differentiate between solid modeling and surface modelling methods.	6M	CO2	BL2
b)	With the help of neat sketches, describe the most commonly used solid entities.	6M	CO2	BL3
OR				

5.	a)	What do you mean by blending function? Explain reparameterization of a surface.	6M	CO2	BL3
	b)	Why the sweep representations are useful in creating solid models of 2D objects?	6M	CO2	BL3

UNIT–III

6.	a)	List and give the meaning of any five G and M codes functions.	6M	CO3	BL2
	b)	Explain the principle of CNC system with a block diagram.	6M	CO3	BL2

OR

7.	a)	Write the procedure for writing computer assisted part programming?	6M	CO3	BL2
	b)	Discuss any two types of statements used in APT part programming	6M	CO3	BL3

UNIT–IV

8.	a)	What are the main objectives of MRP (Manufacturing Resource Planning)? Explain them briefly.	6M	CO4	BL3
	b)	Write a short note on Retrieval type and Generative type of CAPP.	6M	CO4	BL2

OR

9.	a)	Discuss how part classification is done in the context of GT. What are the essential attributes such a coding system should take care of?	6M	CO4	BL2
	b)	Elaborate briefly the MICLASS system of codification.	6M	CO4	BL2

UNIT–V

10.		Describe any two methods of non-contact type of computer aided testing.	12M	CO5	BL3

OR

11.	a)	Mention the objectives of CAQC. Explain the different computer aided inspection methods.	6M	CO5	BL2
	b)	Summarize the enterprise resource planning and capacity requirements planning?	6M	CO5	BL3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A361T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Heat Transfer

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define (i) thermal conductivity and (ii) convection heat transfer coefficient.	1	1
b)	Write the importance of critical radius of insulation.	2	1
c)	What is the significance of Reynold's number and Nusselt number?	3	1
d)	Define (i) Stefan-Boltzmann law and (ii) Kirchoff's law.	4	1
e)	What is the impact of fouling in heat exchangers?	5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.	a)	Write the basic assumptions required to use Fourier's law for one dimensional steady state heat conduction.	4M	1	1
	b)	Derive the general 3D heat conduction equation in Cylindrical coordinates and reduce it different forms.	8M	1	2
		OR			
3.	a)	What is initial boundary condition? Where it is applicable?	4M	1	1
	b)	One dimensional heat conduction through a slab is represented with $\frac{\partial^2 T}{\partial x^2} = 0$. If one end of the slab is insulated ($q'' = 0$) and other end subjected to constant temperature (T = constant), obtain expression for temperature distribution within the slab	8M	1	3
		UNIT–II			
4.	a)	Derive the governing equation in non-dimensional form for one-dimensional heat transfer from a rectangular fin.	4M	2	2
	b)	A plane wall (k = 68 W/mK) of thickness 10 cm is maintained with constant wall temperature equal to 50°C on its both sides. Convection coefficient at the end surfaces is equal to 25 W/m^{2}K. If it is having internal heat generation equal to 10^5 W/m^3, calculate (i) Centerline temperature of the wall and (ii) Heat transfer from the wall.	8M	2	3
		OR			
5.	a)	What is lumped heat capacity analysis (LHCA)? Derive an expression for temperature distribution using LHCA in case of transient heat conduction from a rectangular slab.	4M	2	1

	b)	A 60 x 60 cm^2 copper slab 7 mm thick has a uniform temperature of 320°C. If it is suddenly placed in a liquid at 45°C, calculate the time required for the plate to reach the temperature of 110°C Consider ρ = 8800 kg/m^3, C = 384 J/kgK, k=325W/mK and h = 25 W/m^2K.	8M	2	3

UNIT–III

6.	a)	Explain the concept of velocity and thermal boundary for external flow over a horizontal flat plate.	4M	3	1
	b)	Water enters into a circular pipe of 15 mm diameter at a temperature of 34°C. The circular pipe outer surface is maintained to a constant temperature equal to 200 °C. If the water velocity is 8 m/s, determine (i) the loss of heat from the pipe and (ii) exit temperature of water.	8M	3	3
		OR			
7.	a)	What are the differences between heat transfer by forced and natural convection.	4M	3	1
	b)	Consider free convection from a vertical wall of length 'L'. Using Buckingham's Π theorem, obtain an expression for Nusselt number in terms of *Gr* and *Pr*	8M	3	2

UNIT–IV

8.	a)	Describe various stages of poll boiling heat transfer.	6M	4	2
	b)	A copper pan of 42 cm diameter contains water and its bottom surface is maintained at 125°C by an electric heater. Calculate the rate at which water evaporates from the pan due to the boiling process.	6M	4	3
		OR			
9.	a)	Explain the concept of blackbody radiation.	4M	4	1
	b)	Two large concentric cylinders with radii equal to 25 mm and 50 mm are exchanging radiation heat between their common interface. Emissivities of the two cylinders are 0.35 and 0.72. If the cylinders are maintained at constant temperature equal to 870°C and 525°C, Calculate (i) Mean emissivity and (ii) Net radiation heat exchange between the two cylinders.	8M	4	3

UNIT–V

10.	a)	Why is a counter flow heat exchanger more effective than a parallel flow heat exchanger?	4M	5	1
	b)	A pipe (k = 60 W/mK) with an I.D. of 3.2 cm and wall thickness 0.32 cm is externally heated by steam at a temperature of 200°C. The water flows through the pipe with a velocity of 1.23 m/s. Calculate the length of the pipe required to heat water from 35°C to 85°C assuming the heat transfer coefficient on the steam side to be 11 kW/m^2K.	8M	5	4
		OR			
11.	a)	What are the fouling factors? Explain their effect in heat exchanger design.	4M	5	1
	b)	A shell-and-tube type of heat exchanger is designed to cool 1.64 kg/s of oil (C_p = 2910 J/kgK) from 66°C to 44°C by using 1.1 kg/s of water at an inlet temperature of 26°C. Assuming an overall heat transfer coefficient of 680 W/m^2K and a single-shell, 4-tube pass type of heat exchanger determine the required heat transfer area. Use the effectiveness method.	8M	5	3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A362T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Metrology & Measurements

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1.	Answer ***all*** the following short answer questions **(5 X 2 = 10M)**		**CO**	**BL**
	a) Describe Taylor's Principle for gauge design.		CO2	L1
	b) Differentiate line and end standards.		CO2	L2
	c) Compare surface roughness and waviness.		CO3	L2
	d) What is a resistance transducer?		CO4	L1
	e) List out the methods for pressure measurements.		CO5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	**CO**	**BL**
		UNIT–I			
2.	a)	With neat sketches differentiate between hole base system and shaft basis system.	6M	CO1	L2
	b)	Illustrate the terms "Interchangeability" and "Selective Assembly".	6M	CO1	L2
		OR			
3.	a)	What are GO and No-Go gauges? Differentiate them with neat sketches.	6M	CO1	L2
	b)	Write short notes on ring gauges and plug gauges. Also, mention their applications.	6M	CO1	L2
		UNIT–II			
4.	a)	Why is sine bar not suitable for measuring angles above 45^0?	6M	CO2	L3
	b)	With the help of a neat diagram explain the construction and working of bevel protractor.	6M	CO2	L2
		OR			
5.	a)	Describe the precautionary measures to be taken at various stages of using slip gauges.	6M	CO2	L3

	b)	Illustrate the measurement of internal taper of a shaft by using rollers/spheres.	6M	CO2	L2

UNIT–III

6.	a)	The heights of peaks and valleys of 20 successive points on a surface are 45, 25, 23, 22, 24, 53, 15, 22,64, 32, 63, 12, 23, 34, 55, 23, 11, 12, 17, 15 microns respectively, measured over a length 20 mm. Determine CLA and RMS values of roughness surface.	6M	CO3	L3
	b)	With a line diagram explain the working principle of Taylor Hobson Talysurf method. Also, write the advantages of it.	6M	CO3	L2

OR

7.	a)	Draw and explain the measurement of effective diameter of a screw thread using two and three wires.	6M	CO3	L2
	b)	What are the methods employed for gear tooth measurement? Explain anyone in detail.	6M	CO3	L2

UNIT–IV

8.	a)	What is a transducer? Explain the working of piezoelectric transducer.	6M	CO4	L2
	b)	Describe the working of any one speed measuring device with a neat sketch.	6M	CO4	L2

OR

9.	a)	Differentiate mechanical tachometers and electrical tachometers.	6M	CO4	L3
	b)	Write short notes on inductive transducers and capacitance transducers.	6M	CO4	L2

UNIT–V

10.	a)	What are the Methods of measuring temperature? Explain in detail about Thermopiles.	6M	CO5	L2
	b)	With a neat sketch explain how pressure can be measured with bourdon tube pressure gauge.	6M	CO5	L2

OR

11.	a)	List out various force measuring methods and explain any one in detail.	6M	CO5	L2
	b)	Explain the principle of measuring shaft torque using strain gauge torsion meter.	6M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A36AT

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Automobile Engineering

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What are the uses of Wiper?	1	1
b)	Explain the use of propeller shaft.	2	1
c)	What is the function of brake?	3	1
d)	List any two advantages of ABS.	4	1
e)	What are the limitations of Electrical Vehicles?	5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.		Describe the various chassis components of automobiles and discuss the advantages and disadvantages.	12M	1	4
		OR			
3.	a)	Explain with neat sketch about the constructional details of spark ignition (SI) engine.	6M	1	3
	b)	Explain the concept of Crank case ventilation.	6M	1	3
		UNIT–II			
4.		Draw schematic diagram showing the layout of complete transmission system of a four wheeler automobile.	12M	2	3
		OR			
5.		Illustrate the working principle of single plate clutch and multi plate with neat sketch.	12M	2	5
		UNIT–III			
6.		Discuss in detail the Ackermann steering mechanism.	12M	3	3
		OR			
7.	a)	Compare the mechanical and hydraulic braking systems.	6M	3	4
	b)	List and explain the objectives of suspension system.	6M	3	2
		UNIT–IV			
8.		Write short notes on a) Seat belt system and b) Anti-theft systems	12M	4	3
		OR			
9.		With a neat sketch explain the working of air bag restraint system	12M	4	3
		UNIT–V			
10.		What are the various components of Electrical vehicle? Explain each component with neat sketch.	12M	5	2
		OR			
11.	a)	Explain the role of National and International emission standards role in controlling the Automobile emissions	6M	5	3
	b)	Discuss the social and environmental importance of hybrid and electric vehicles	6M	5	3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A36DT

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Automation & Robotics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions (5 X 2 = 10M) CO BL

a) State the principle of automation? CO1 L1

b) Describe the process of assembly? CO2 L2

c) What is meant by end effector? CO3 L1

d) Distinguish the forward and inverse kinematics? CO4 L2

e) What is the application of the proximity sensor? CO5 L3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT–I

2. Classify the various levels of automation and explain them with suitable sketch? 12M CO1 L4

OR

3. Describe the part transfer mechanism with neat sketch? 12M CO1 L2

UNIT–II

4. Solve the following problem using largest candidate rule. Also calculate its balancing efficiency and balance delay

Work Element (j)	T_{ej} (min)	Must be preceded by
1	1.2	--
2	1.4	--
3	1.7	1
4	1.1	1,2
5	1.3	2
6	1.11	3

Work Element (j)	T_{ej} (min)	Must be preceded by
7	1.32	3
8	1.6	3,4
9	1.27	6,7,8
10	1.38	5,8
11	1.5	9,10
12	1.12	11

12M CO2 L5

OR

5.	Explain the procedure for line balancing using Rank Position Weight Method? Explain the merits and demerits of the same?	12M	CO2	L1

UNIT–III

6.	Explain the various levels of robot and enumerate the need for robot?	12M	CO3	L1

OR

7.	Discuss the various types of robot configuration with suitable sketch?	12M	CO3	L2

UNIT–IV

8.	Describe the manipulator kinematics of homogeneous transformation with respect to rotation and translations?	12M	CO4	L2

OR

9.	Compare and contrast the skew motion, joint integrated motion and straight-line motion?	12M	CO4	L2

UNIT–V

10.	Describe the principle and operation of hydraulic actuator for robot with suitable sketch?	12M	CO5	L2

OR

11.	Sketch and explain the application of the robot a) Material Handling b) Assembly	12M	CO5	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20A36DT

III B.Tech. II Semester Regular Examinations May/June 2023

Automation & Robotics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions (5 X 2 = 10M) CO BL

a) What is the need for automation? CO1 L1

b) Write down the benefits of flexible manual assembly line? CO2 L1

c) State the law of robot? CO3 L1

d) What is the application of trajectory planning? CO4 L3

e) Differentiate the hydraulic and pneumatic actuator? CO5 L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT–I

2. Describe the elements of automated system with suitable sketch? 12M CO1 L2

OR

3. Sketch and explain the automated flow line with buffer storage? 12M CO1 L1

UNIT–II

4. Explain the procedure associated with line balancing using Largest candidate rule? 12M CO2 L1

OR

5. Solve the problem by using Rank position weight method. Consider the following assembly network relation shown in table. The number of shifts per day is one and the number of working hours is 8. The company aims to produce 40 units of the product per shift. To compute the balancing efficiency of the line.

Operation number	Immediate preceding tasks	Duration (Min)
1.	--	8
2.	1	3
3.	1	2
4.	1	4
5.	3,4	7

12M CO2 L5

6.	2,7	4
7.	2,4,5	5
8.	4	6
9.	6,8	8

UNIT–III

6. Discuss the degrees of freedom in Robots and what is significance of the same? 12M CO3 L2

OR

7. Classify the different types of grippers and explain any one of the same with neat sketch? 12M CO3 L4

UNIT–IV

8. Discuss the D-H rotation with suitable sketch? 12M CO4 L2

OR

9. Describe the concept of trajectory planning and also discuss the avoidance of obstacle? 12M CO4 L2

UNIT–V

10. Discuss the function of the following
    (i) Resolver (ii) Encodes (iii) Potentiometer 12M CO5 L2

OR

11. Explain the application of robot
    (i) Spray painting (ii) Inspection (iii) Loading and unloading 12M CO5 L3

*** End ***