

DEPARTMENT OF MECHANICAL ENGINEERING  
"End Term Examination, April-2023"

SEMESTER	2 <sup>nd</sup>	DATE OF EXAM	25.05.2023
SUBJECT NAME	Production Ergonomics and Work Place Design	SUBJECT CODE	MEH507-T
BRANCH	ME	SESSION	I
TIME	09:00AM - 12:00PM	MAX. MARKS	75
PROGRAM	M.Tech	CREDITS	04
NAME OF FACULTY	Dr. Ajit	NAME OF COURSE CORDINATOR	Dr. Ajit

Note: Attempt all questions from part A and two questions from part B and one question from part C

Q.NO.	QUESTIONS	MAR KS	CO	BLOOM' S LEVEL	PI
PART (A)	1. When should ergonomics principles be used in workplace design?	3	CO1	BT3, BT2	12.2.1
	2. Write a short note on effect of light and sound on human performance.	3	CO2	BT1, BT3	12.3.1
	3. What is a chronocyclegraph? What are the two factors that you can understand from it?	3	CO1	BT3	10.3.1
	4. Define ineffective time. Which are the factors reducing productivity?	3	CO2	BT2	12.3.1
	5. Write a short note on effect of cognitive load on human performance.	3	CO3	BT3	1.1.2
	6. What is manual material handling?	3	CO3	BT3	12.2.1
	7. Define the physical space and arrangement.	3	CO4	BT3	10.3.1
	8. What are the principles of arrangement of component?	3	CO4	BT2	12.2.1 12.2.2
	9. Differentiate between standard time and basic time.	3	CO3	BT3	12.2.1 12.2.2
	10. Discuss the rate of energy expenditure.	3	CO3	BT2	12.2.2





MANAV RACHNA UNIVERSITY  
DEPARTMENT OF SCIENCES  
"End Term Examination, Jan-June-2023"

SEMESTER	2 <sup>nd</sup>	DATE OF EXAM	25.05.2023
SUBJECT NAME	Optics and Wave Oscillations	SUBJECT CODE	PHH110B-T
BRANCH	SMA	SESSION	II
DURATION	3 hrs. (01:00-4:00 P.M.)	MAX. MARKS	100
PROGRAM	B. Tech.	CREDITS	4
NAME OF FACULTY	Dr. D. K. Sharma	NAME OF COURSE COORDINATOR	Dr. D. K. Sharma

Note: All questions are compulsory

[SET B]

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	Q1	10	CO1	BT4
PART-B	Q2	10	CO2	BT5
PART-C	Q3	10, 10	CO3	BT5
PART-C	Q4	5,5,10	CO3	BT3
PART-D	Q5	5,5,10	CO4	BT2, BT4
PART-D	Q6	10, 10	CO4	BT3, BT5

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DEPARTMENT OF MECHANICAL ENGINEERING

"T3 Examination, May-June, 2023"

SEMESTER	2nd	DATE OF EXAM	29.05.2023
SUBJECT NAME	ADVANCED WELDING TECHNIQUES	SUBJECT CODE	MEH508B-T
BRANCH	ME	SESSION	I
TIME	3 Hrs. (09:00AM-12:00PM)	MAX. MARKS	75
PROGRAM	M.Tech	CREDITS	03
NAME OF FACULTY	GIANENDER KAJAL	NAME OF COURSE COORDINATOR	GIANENDER KAJAL

Note: All questions are compulsory. Questions will be of descriptive type or numerical.

Q.NO.	QUESTIONS	MARKS	CO	BLOOM'S LEVEL	PI
PART (A)	1(A) Describe, with a neat sketch, the salient features and basic principles of resistance spot and seam welding.	05	CO1	BT3	12.2.1
	1(B) Explain the effect of welding parameters on weld bead geometry.	05	CO1	BT2	12.3.1
PART (B)	2(A) Explain the structure and characteristics of welding arc with their different zone.	05	CO2	BT2	10.3.1
	2(B) Difference between automatic and semi-automatic welding process with examples.	05	CO2	BT2,3	10.3.1



PART (C)	3(A)	Brief explains the process of Electron beam welding. How is different from friction welding process? Can dissimilar metals be welded by electrosag welding? If so, give the necessary precautions.	05	CO3	BT3	3.1.4
	3(B)	What are the various destructive and non-destructive testing techniques used to test the quality of welded joints?	10	CO3	BT3	10.3.1
	3(C)	(a) Explain the principle and application of Explosive welding. (b) Difference between TIG, MIG & SAW process with practical application.	10	CO3	BT2	1.1.2
PART (D)	4(A)	With neat labeled sketch explain Plasma Arc Welding. Write its advantages and disadvantages	10	CO4	BT2	12.2.1
	4(B)	List any five welding defects and describe the consequences of those defects and remedies.	10	CO4	BT3	10.3.1
	4(C)	Explain the effect of the following welding parameters on weld bead geometry: (a) Welding current (b) Arc Voltage (c) Welding Speed (d) Electrode diameter (e) Electrode feed rate (f) Preheat temperature (g) Electrode polarity	10	CO4	BT3	10.3.1

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

**DEPARTMENT OF MECHANICAL ENGINEERING**  
"End-Term Examination, Jan-May-2023"

SEMESTER	2 <sup>nd</sup>	DATE OF EXAM	31.05.2023
SUBJECT NAME	Technical Research Paper Writing	SUBJECT CODE	MES513B
BRANCH	MECHANICAL	SESSION	I
TIME	9:00AM-10:30AM	MAX. MARKS	40
PROGRAM	M.TECH.	CREDITS	2
NAME OF FACULTY	SMRITI MISHRA	NAME OF SUBJECT-COORDINATOR	SMRITI MISHRA

Note: All questions are compulsory.

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	Q1(a) Illustrate the purpose of writing a research paper? Describe the guidelines for writing the technical research paper?	5	C01	BT3
	Q1(b) What is the procedure of citing the references in the research paper?	5	C01	BT2
PART-B	Q2(a) What are the main characteristics of good academic writing in English?	5	C02	BT2
	Q2(b) Explain the difference between technical research paper writing and review paper writing.	5	C02	BT2
PART-C	Q3(a) Discuss difference between qualitative and quantitative research approach. What is plagiarism and why it should be avoided while writing any research article?	10	C03	BT3
	Q3(b) What are the sequences to be followed in writing? Abstract? Which format of the references should be preferred for writing the Book Chapter and Journal article?	10	C04	BT2



## DEPARTMENT OF MECHANICAL ENGINEERING

"End Term Examination, Jan-May 2023"

SEMESTER	4 <sup>th</sup>	DATE OF EXAM	19.05.2023
SUBJECT NAME	Lean Manufacturing	SUBJECT CODE	MEH609B -T
BRANCH	Mechanical Engineering	SESSION	I
TIME	09:00AM - 12:00PM	MAX. MARKS	75
PROGRAM	M.Tech	CREDITS	3
NAME OF FACULTY	Ms. Smriti Mishra	NAME OF COURSE COORDINATOR	Ms. Smriti Mishra

Note: All questions are compulsory.

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	Q1(A) Briefly explain the importance of lean manufacturing and also Differentiate the key features of traditional manufacturing and lean manufacturing.	5	CO1	BT1
	Q1(B) What is the concept of value creation and waste elimination?	5	CO1	BT3
	Q1(C) Explain the Kaizen technique. How will this method help in value creation and productivity enhancement?	5	CO2	BT2
	Q1(D) Name 5S principles of quality related to lean manufacturing. Illustrate the preventive maintenance. Why it is important to increase the productivity	5	CO2	BT3
	Q1(E) How to decide the batch size for quality production. What is the overall equipment effectiveness and how it can improve?	5	CO2	BT2
PART-B	Q2(A) Illustrate the concept of Just-in -Time manufacturing technique. What are the elements of JIT?	10	CO3	BL3
	Q2(B) Briefly explain key features of Pull Production. Write down the different models of Pull Production. What do you mean by inexpensive set-up and this type of set-up is preferable for which products?	10	CO3	BT3

PART-C	Q3(A)	What do you mean by Best Practices which a company should prefer to improve the productivity as well as employee satisfaction?	10	CO4	BT4
	Q3(B)	What is six sigma technique and how it will help to improve the productivity. Why ISO certification is required for the industry and what are the basic requirements for the ISO certification.	10	CO4	BT5
	Q3(C)	What is Optimized Production Technology? How it relates to small scale production industry, Discuss?	10	CO3	BT3





DEPARTMENT OF MECHANICAL ENGINEERING  
"End Term Examination, 2023"

SEMESTER	IV	DATE OF EXAM	22.05.2023
SUBJECT NAME	Mechatronics	SUBJECT CODE	MEH319B-T
BRANCH	ME (SMA)	SESSION	I
TIME	2 hours (9:00-12:00PM)	MAX. MARKS	75
PROGRAM	B.TECH	CREDITS	4
NAME OF FACULTY	Dr. VINEET DUBEY	NAME OF COURSE COORDINATOR	Dr. VINEET DUBEY

Note: Part A: (9 marks) All questions are compulsory (Q1 (A)(B)(C)).

Part B: (6 marks) All questions are compulsory (Q2 (A)(B)).

Part C: (30 marks) All questions are compulsory (Q 3(A)(B) and Q4(A)(B))

Part D: (30 marks) All questions are compulsory (Q 5(A)(B) and Q6(A)(B))

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(A) Define different types of automation with suitable example.	3	C01	BT1	1.4.1
	Q1(B) Discuss the advantages of belt drive and rope drive?	3	C01	BT2	1.4.1
	1(C) What are the static characteristics of sensors.	3	C02	BT1	1.4.1
PART-B	Q2(A) Explain the key element of mechatronics.	3	C01	BT2	1.4.1
	Q2(B) Explain pneumatic actuation system.	3	C02	BT2	1.4.1
PART-C	Q3(A) Differentiate between the characteristic features of pneumatic and hydraulic automation.	10	C02	BT2	1.4.1
	Q3(B) What are programmable logic controllers?	5	C03	BT3	1.4.1

	Q4(A)	Explain the laws of the robot given by Asimov?	10	CO2	BT3	1.4.1
	Q4(B)	Illustrate the different basic requirement desired for a sensor or transducer?	5	CO1	BT3	1.4.1
PART-D	Q5(A)	Elaborate the essential elements of microcontroller and its industrial application.	10	CO4	BT3	1.4.1
	Q5(B)	Evaluate the criterion regarding the safety of robots.	5	CO4	BT4	1.4.1
	Q6(A)	Explain the architecture of microprocessor with a suitable diagram.	10	CO3	BT4	1.4.2
	Q6(B)	Differentiate between robotic end effector and robotic manipulator.	5	CO4	BT3	1.4.1
	TOTAL MARKS		75			
***** END *****						



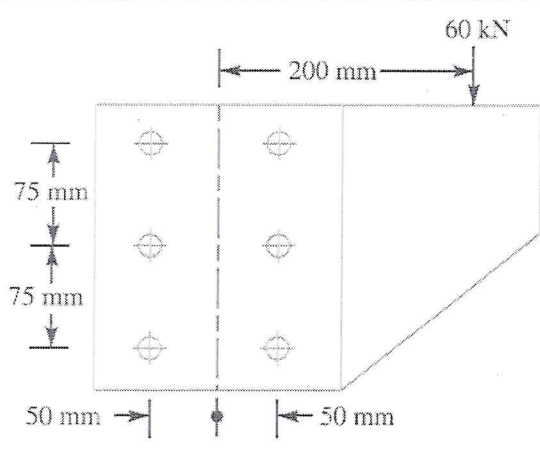


Department Of Mechanical Engineering  
"END TERM EXAMINATIONS, May-June, 2023"

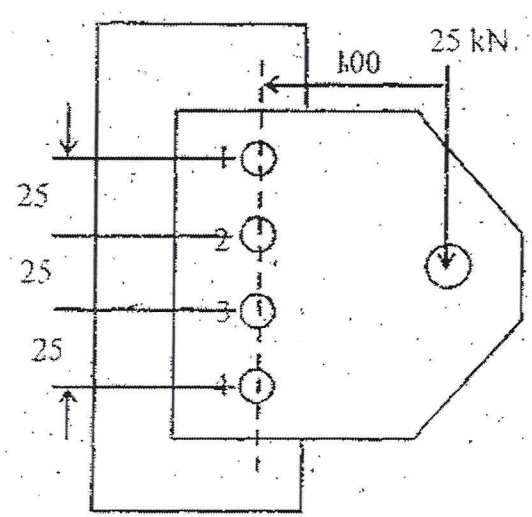
SEMESTER	4th	DATE OF EXAM	22.05.2023
SUBJECT NAME	MACHINE DESIGN-I	SUBJECT CODE	MEH302B-T
BRANCH	ME	SESSION	I
TIME	3hrs (9:00-12:00 PM)	MAX. MARKS	100
PROGRAM	B.TECH	CREDITS	04
NAME OF FACULTY	Nazish Ahmad Shamsi	NAME OF COURSE COORDINATOR	Nazish Ahmad Shamsi

Note: All questions are compulsory.

Q.NO.	QUESTIONS	MA RKS	CO ADD RESS ED	BLOO M'S LEVEL	PI
PART-A	1(A) Elaborate the purpose of tolerances given on a mechanical component with suitable example.	5	CO1	BT2	1.3.1
	1(B) A rotating shaft, 40 mm in diameter, is made of steel ( $S_{yt} = 580 \text{ N/mm}^2$ ). It is subjected to a steady torsional moment of 250 N-m and bending moment of 1250 N-m. Calculate the factor of safety based on, (i) maximum principal stress theory; and (ii) Maximum shear stress theory.	5	CO1	BT4	1.4.1
	2(A) What is the purpose of a coupling? Elaborate your answer by using suitable practical applications.	5	CO2	BT3	12.1.1
	2(B) Write a brief note on types of failure on which shafts are designed.	5	CO2	BT2	1.3.1
PART-B	Q3(A) A bracket is attached to a column by means of 6 identical bolts as shown in figure below. It carries a load of 60kN at a distance of 200mm from the center. Determine the diameter of bolts, if permissible shear stress is 150MPa.	20	CO3	BT5	2.3.1,12.1.1



A bracket is supported by 4 identical rivets as shown in figure. Determine the diameter of the rivets if permissible shear stress is  $100 \text{ N/mm}^2$ .



Q3(B)

20

CO5

BT4

2.2.4

Why the belts are commonly used in order to transmit power. Elaborate your answer by discussing various types of belts used along with its advantages and disadvantages.

Q4(A)

20

C04

BT2

1.3.1,2.2.4

Write a short Note on:

- (i) Discuss the advantages of hydraulic and pneumatic brakes.
- (ii) Factors on which brake capacity depends.
- (iii) Desirable properties for the material of belts.
- (iv) The purpose of using clutch and their various groups.

Q4(B)

5\*4

C04

BT3

2.3.2,12.1.1

PART-C

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



**DEPARTMENT OF MECHANICAL ENGINEERING**  
"End Term Examination, MAY-2023"

SEMESTER	IV	DATE OF EXAM	22.05.2023
SUBJECT NAME	OPERATION RESEARCH	SUBJECT CODE	MCH246B
BRANCH	BBA (BA)	SESSION	I
TIME	9:00-12:00	MAX. MARKS	80
PROGRAM	BBA (BA)	CREDITS	3
NAME OF FACULTY	MNDEEP BHADANA	COURSE COORDINATOR	MANDEEP BHADANA

Note: Part A&B: Questions will be of 10 Marks each.

Part C&D: Each question will be of 15 marks. Attempt all questions.

Part C&D: Each question will be of 15 marks. Attempt all questions.																																									
Q.NO.		QUESTIONS	MARKS	CO ADDRESS ED	BLOOM'S LEVEL																																				
PART-A&B	Q1	What is Break Even Analysis? Draw the break even curve and explain it.	10	CO1	L1																																				
	Q2	A firm is producing 1000 units. At this level of output AC and AVC are respectively equal to Rs 240 & Rs 200. Find TFC, TVC, TC, AFC.	10	CO2	L2																																				
PART-C	Q3	Find an initial basic feasible solution to the following transportation problem using NWCR Method And optimize it by MODI method. <table><tr><td></td><td>W1</td><td>W2</td><td>W3</td><td>W4</td><td>SUPPLY</td></tr><tr><td>F1</td><td>5</td><td>3</td><td>6</td><td>2</td><td>19</td></tr><tr><td>F2</td><td>4</td><td>7</td><td>9</td><td>1</td><td>37</td></tr><tr><td>F3</td><td>3</td><td>4</td><td>7</td><td>5</td><td>34</td></tr><tr><td>DEMAND</td><td>16</td><td>18</td><td>31</td><td>25</td><td></td></tr></table>		W1	W2	W3	W4	SUPPLY	F1	5	3	6	2	19	F2	4	7	9	1	37	F3	3	4	7	5	34	DEMAND	16	18	31	25		15	CO3	L3						
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DEMAND	16	18	31	25																																					
	Q4	Briefly explain the Hungarian Method procedure with example. Solve the assignment problem by Hungarian method to assign the different jobs to different operators so that the time should be minimized. <table><tr><td>JOB/OPERATOR</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>1</td><td>4</td><td>6</td><td>7</td><td>5</td><td>11</td></tr><tr><td>2</td><td>7</td><td>3</td><td>6</td><td>9</td><td>5</td></tr><tr><td>3</td><td>8</td><td>5</td><td>4</td><td>6</td><td>9</td></tr><tr><td>4</td><td>9</td><td>12</td><td>7</td><td>11</td><td>10</td></tr><tr><td>5</td><td>7</td><td>5</td><td>9</td><td>8</td><td>11</td></tr></table>	JOB/OPERATOR	1	2	3	4	5	1	4	6	7	5	11	2	7	3	6	9	5	3	8	5	4	6	9	4	9	12	7	11	10	5	7	5	9	8	11	15	CO3	L3
JOB/OPERATOR	1	2	3	4	5																																				
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PART-D	Q5	<p>What do you mean by Dual Simplex method?</p> <p>Solve the given LPP by using Dual Simplex method Minimize <math>Z=2X_1+4X_2+6X_3</math>, subject to constraints</p> <p><math>4X_1-2X_2+2X_3 \geq 8</math>,</p> <p><math>2X_1+2X_2+4X_3 \leq 16</math></p> <p><math>2X_2-2X_3 \geq 4</math>,</p> <p>and <math>X_1, X_2, X_3 \geq 0</math>.</p>	15	CO4	L4
	Q6	<p>What is Big M method?</p> <p>Solve the given LPP by using Big M method Minimize <math>Z=14X_1+30X_2+40X_3</math>, subject to constraints</p> <p><math>4X_1+8X_2+12X_3 \geq 48</math></p> <p><math>6X_1+18X_2+12X_3 \geq 60</math></p> <p>And <math>X_1, X_2, X_3 \geq 0</math>.</p>	15	CO4	L4



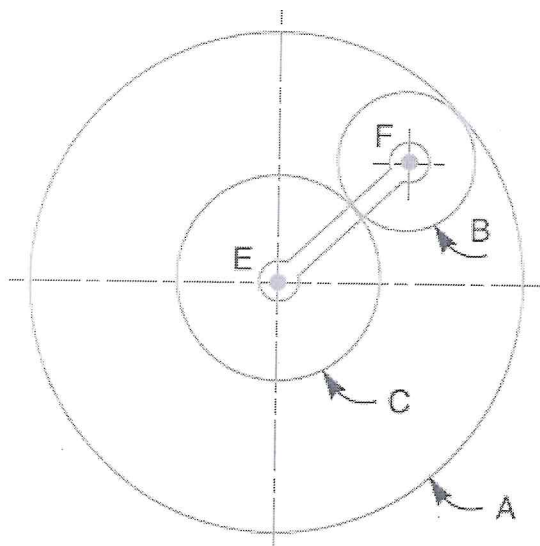
**DEPARTMENT OF MECHANICAL ENGINEERING**

*"End Term Examination, May-2023"*

SEMESTER	4 <sup>th</sup>	DATE OF EXAM	26.05.2023
SUBJECT NAME	THEORY OF MACHINE	SUBJECT CODE	MEH206B-T
BRANCH	MECHANICAL (SMA)	SESSION	1 <sup>st</sup>
TIME	3 hrs (9:00 - 12:00 PM)	MAX. MARKS	100
PROGRAM	B.TECH.	CREDITS	4
NAME OF FACULTY	Dr. Prashant Bhardwaj	NAME OF COURSE COORDINATOR	Dr. Prashant Bhardwaj

*Note: Part A: All questions are compulsory. Part B & C: Attempt any 4 out of 5 questions.*

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
PART-A	1(A) Define instantaneous centre? What are the types of instantaneous centre?	5	CO1	BT2
	1(B) Discuss the three types of instantaneous centres for a mechanism. Also write the relation between the number of instantaneous centres and the number of links in a mechanism.	5	CO1	BT2
	1(C) Explain with sketches the different types of cams and followers.	5	CO2	BT3
	1(D) What do you understand by 'gear train'? Discuss the various types of gear trains.	5	CO2	BT2
PART-B	Q2 An epicyclic gear consists of three gears A, B and C as shown in Fig. below. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm EF which rotates about the centre of A at 18 r.p.m. If the gear A is fixed, evaluate the speed of gears B and C.	20	CO2	BT5



Q3

An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.

20

CO3

BT4

Q4

A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the range of speed, sleeve lift, governor effort and power of the governor in the following cases:

1. When the friction at the sleeve is neglected, and
2. When the friction at the sleeve is equivalent to 10 N.

20

CO3

BT4

Q5

The turning moment diagram for a multicylinder engine has been drawn to a scale of 1 mm=4500 N-m vertically and 1 mm=2.4° horizontally. The intercepted areas between output torque curve and mean resistance line taken in order from one end are 342, -23, 245, -303, 115, -232, 227, -164 mm<sup>2</sup>, when the engine is running at 150 r.p.m. If the mass of the flywheel is 1000 kg and the total fluctuation of speed does not exceed 3% of the mean speed, find the minimum value of the radius of gyration.

20

CO4

BT4

Q6

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

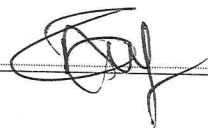
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CO4

BT4



**DEPARTMENT OF MECHANICAL ENGINEERING**  
"END TERM Examination, MAY 2023"

SEMESTER	IV	DATE OF EXAM.	30.05.2023
SUBJECT NAME	Advanced Manufacturing	SUBJECT CODE	MEH212B-T
BRANCH	ME	SESSION	I
TIME	3 Hrs (9:00-12:00 PM)	MAX. MARKS	80
PROGRAM	B.Tech SMA	CREDITS	03
NAME OF FACULTY	MANDEEP BHADANA	Signature: HOD	

Note: Part A&B: Each question will be of 10 Marks.

Part C&D: Each question will be of 15 marks. Attempt all questions.

Q.NO.	QUESTIONS	MARKS	CO ADDRESS ED	BLOOM'S LEVEL
PART-A&B	Q1 What are unconventional machining processes? Write any two processes with diagram, process parameters and also write their application.	10	C01	L1
	Q2 Explain advanced casting also write any two advanced casting processes with their diagrams, processes parameter and application.	10	C02	L2
PART-C	Q3 What do you mean by Rapid prototyping? Explain Stereo lithography. Write its working principle, methods and applications.	15	C03	L3
	Q4 Explain the fused Deposition method and write its application, limitation and advantages with suitable examples.	15	C03	L3
PART-D	Q5 Explain the term advanced metal forming process. Write the working principle of high energy rate forming(HERF) with its applications and limitations.	15	C04	L4
	Q6 Explain the term Electro-magnetic forming? How it is different from normal metal forming process. Write its advantages, disadvantages and limitations of Electro-magnetic forming.	15	C02	L5



**MANAV RACHNA  
UNIVERSITY**  
Declared as State Private University vide Haryana Act 26 of 2014

**DEPARTMENT OF Mechanical Engineering**  
"End Term Examination, Jan-June-2023"

SEMESTER	4th	DATE OF EXAM	30/05/2023
SUBJECT	Fluid mechanics and	SUBJECT CODE	MEH207B-T
NAME	Machine		
BRANCH	B.TECH- ME	SESSION	I
TIME	180 Minutes	MAX. MARKS	100
PROGRAM	B.TECH	CREDITS	04
NAME OF FACULTY	SANJAY TANEJA	HOD	

*Note: Part A & B - All questions are compulsory. (10x2=20 marks)*  
*Part C & Part D-Attempt two questions each from Part C and Part D(4x20=80 marks)*

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A & B	Q1(A) Calculate the specific weight, density of 1 litre of a liquid which weighs 7 Newton.	2	CO1	BT3	1.4.1
	1(B) Define Newton law of Viscosity.	2	CO1	BT1	1.3.1
	1(C) If the velocity distribution over a plate is given by $u = \frac{2}{3} y - y^2$ in which u is velocity in m/s at a distance y meter above the plate. Calculate the shear stress at $y = 0.15$ meter. Take dynamic viscosity of fluid 8.63 Poise.	2	CO1	BT3	1.4.1
	1(D) Differentiate between Kinematic and Dynamic viscosities.	2	CO1	BT2	2.2.4
	1(E) Define the following :- (a) Laminar flow (b) Uniform flow	2	CO2	BT1	1.3.1, 12.1.1



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	Q2(A)	Differentiate between Steady and Unsteady flow with example.	2	CO2	BT2	2.2.4
	2(B)	Explain all the assumptions of Bernoulli's equation	2	CO2	BT2	2.3.2, 12.1.1
	2(C)	Water is flowing through a pipe of 5cm diameter under a pressure of 29.43N/cm <sup>2</sup> with a mean velocity of 2.0m/s. Find the total head or total energy per unit weight of the water at a cross section which is 5 meter above the datum line.	2	CO2	BT3	2.3.1
	2(D)	Define the purpose of Draft tube.	2	CO2	BT4	2.2.4
	2(E)	What is Hagen Poiseuille's Formula?	2	CO2	BT2	2.3.1
PART-C	Q3(A)	Derive an expression for maximum efficiency of Pelton wheel turbine by giving a relationship between jet speed and bucket speed.	10	CO4	BT6	2.3.1, 12.1.1
	3(B)	A Pelton wheel is having a mean bucket diameter of 1 meter and is running at 1000 r.p.m. The net available head on the Pelton wheel is 700 meter. If the side clearance angle is 15° and discharge through nozzle is 0.1 cubic meter per second, Find Power available at nozzle and Hydraulic efficiency of the turbine. Take Cv=0.985, Speed ratio=0.45	10	CO4	BT3	2.3.1
	Q4(A)	Explain working of Francis turbine with neat sketch.	10	CO4	BT2	2.3.2
	4(B)	A turbine is to operate under a head of 25 meter at 500 r.p.m. If the discharge of the turbine is 9 cubic meter per second and its overall efficiency is 90%. Determine its specific speed, power generated and also type of turbine.	10	CO4	BT3,BT5	2.3.1, 12.1.1
	Q5	A Kaplan turbine runner is to be designed to develop 7357.5 KW Shaft power. The net available head is 5.50 meter. Assuming a speed ratio 2.09 and flow ratio is 0.68. If the overall efficiency of the turbine is 60% and diameter of boss is 1/3 of diameter of the runner. Calculate the diameters of the runner, its speed and specific speed of the turbine and also justify the selection of the turbine.	20	CO4	BT3,BT5	2.3.1, 12.1.1

<b>PART-D</b>	<b>Q6(A)</b>	A centrifugal pump is to discharge 0.118 cubic meter per second at a speed of 1450 r.p.m against a head of 25 meter. The impeller diameter and width at outlet is 250 mm & 50mm. If manometric efficiency of the pump is 75%. Determine the vane angle at outer periphery of the impeller.	<b>10</b>	<b>CO3</b>	<b>BT3</b>	<b>2.3.1</b>
	<b>6(B)</b>	Derive an expression for minimum starting speed of a centrifugal pump.	<b>10</b>	<b>CO3</b>	<b>BT6</b>	<b>2.3.1</b>
	<b>Q7(A)</b>	Differentiate between Centrifugal and Reciprocating pump.	<b>10</b>	<b>CO3</b>	<b>BT2</b>	<b>2.2.4</b>
	<b>7(B)</b>	Describe the purpose of air vessel in reciprocating pump and also define its working with neat sketch.	<b>10</b>	<b>CO3</b>	<b>BT2</b>	<b>1.1.2</b>
	<b>Q8</b>	Write short notes on any four of the following. (1) Governing of turbine (2) Specific speed (3) Slip, negative slip (4) Cavitation (5) Types of similarities	<b>20</b>	<b>CO3,CO4</b>	<b>BT2,BT3</b>	<b>1.1.2</b>



DEPARTMENT OF MECHANICAL ENGINEERING

"PSC-End Term Examination, May-2023"

SEMESTER	5th	DATE OF EXAM	31/5/2023
SUBJECT NAME	Heat Transfer	SUBJECT CODE	MEH303B-T
BRANCH	ME-SMA	SESSION	II
TIME	3 Hrs. (01:00 - 04:00 PM)	MAX. MARKS	100
PROGRAM	B.Tech	CREDITS	04
NAME OF FACULTY	GIANENDER KAJAL	NAME OF COURSE COORDINATOR	GIANENDER KAJAL

Note: All questions are compulsory. Questions will be of descriptive type or numerical.

Q.NO.	QUESTIONS	MARKS	CO	BLOOM'S LEVEL	PI
PART (A)	1(A) Define the overall heat transfer coefficient? Obtain the expression for composite wall with three layers with convective conditions over the wall.	05	CO1	BT3	12.2.1
	1(B) What is meant by critical thickness of insulation? How it is calculated in case of cylinder?	05	CO1	BT2	12.3.1
PART (B)	2(A) Name and explain briefly the various modes of Heat transfer	05	CO2	BT2	10.3.1
	2(B) What do you mean by Prandtl No. and thermal conductivity? Name the materials which have higher thermal conductivity.	05	CO2	BT2,3	10.3.1

PART (C)	3(A)	Derive a general expression for three-dimensional heat transfer equation in Cartesian coordinate system.	10	CO3	BT3	3.1.4
	3(B)	How are the heat exchangers classified? Sketch the temp variations in (i) parallel flow heat exchanger (ii) counter-flow heat exchangers.	10	CO3	BT2	10.3.1 12.1.1
	3(C)	Define effectiveness of heat exchanger. Derive the equation for parallel flow heat exchanger using NTU method	20	CO3	BT2	1.1.2
PART (D)	4(A)	Derive an expression for log mean temperature difference of parallel flow heat exchanger.	10	CO4	BT2	12.2.1 12.2.2
	4(B)	Differentiate between mechanism of heat transfer by free and forced convection. Mention some of the areas where these mechanisms are predominant.	10	CO4	BT3	10.3.1
	4(C)	Write a short note on: (a) Physical significance of Biot and Fourier No. (b) Laminar and Turbulant flow (c) Physical significance of Reynolds, and Grashoff No.	20	CO4	BT3	10.3.1

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



DEPARTMENT OF MECHANICAL ENGINEERING  
"PSC-End Term Examination, May-2023"

SEMESTER	5th	DATE OF EXAM	31.5.2023
SUBJECT NAME	Heat Transfer	SUBJECT CODE	MEH303B-T
BRANCH	ME-SMA	SESSION	II
TIME	3 Hrs. (01:00 - 04:00 PM)	MAX. MARKS	100
PROGRAM	B.Tech	CREDITS	04
NAME OF FACULTY	GIANENDER KAJAL	NAME OF COURSE COORDINATOR	GIANENDER KAJAL

Note: All questions are compulsory. Questions will be of descriptive type or numerical.

Q.NO.	QUESTIONS	MARKS	CO	BLOOM'S LEVEL	PI
PART (A)	1(A) Define thermal diffusivity? What is the significance of thermal diffusivity in heat conduction process?	05	CO1	BT3	12.2.1
	1(B) Derive a general equation of heat transfer through cylindrical in one dimensional only. And also derive equation of heat transfer through composite cylinders.	05	CO1	BT2	12.3.1
PART (B)	2(A) Derive the relation of temperature distribution and heat transfer for rectangular fin tip is insulated. How the fin thickness influences the efficiency of a fin	05	CO2	BT2	10.3.1
	2(B) Distinguish between steady-state conduction and unsteady-state conduction.	05	CO2	BT2,3	10.3.1

PART (C)	3(A)	Derive a general expression for three-dimensional heat transfer equation in cylindrical coordinate system.	10	CO3	BT3	3.1.4
	3(B)	Derive an expression for log mean temperature difference of counter flow heat exchanger.	10	CO3	BT3	10.3.1 12.1.1
	3(C)	Write a short note on: (a) Physical significance of Biot and Fourier No. (b) Laminar and Turbulant flow	10+10	CO3	BT2	1.1.2
PART (D)	4(A)	Distinguish between natural and forced convection heat transfer. Also Define velocity & thermal boundary layer thickness. Using dimensional analysis, obtain a general form of equation for forced Convective heat transfer	10	CO4	BT3	12.2.1 12.2.2
	4(B)	The inner surface of a plane brick wall is at 40°C and the outer surface is at 20°C. Calculate the rate of heat transfer per m <sup>2</sup> of surface area of the wall, which is 250 mm thick. The thermal conductivity of the brick is 0.52 W/m°C.	10	CO4	BT4	10.3.1
	4(C)	Write explanatory notes on any two: a) The Stefan-Boltzmann law b) Wein's Displacement Law	10+10	CO4	BT3	10.3.1

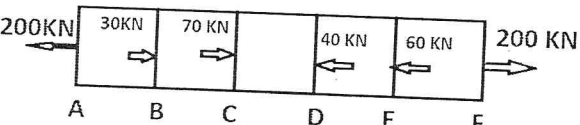
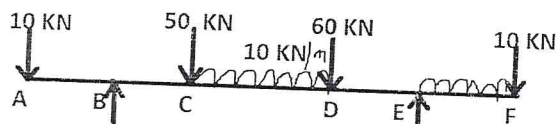
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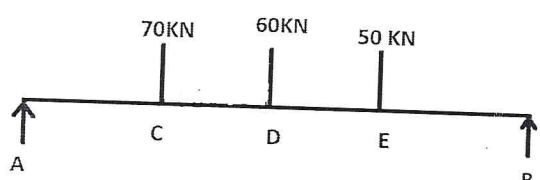
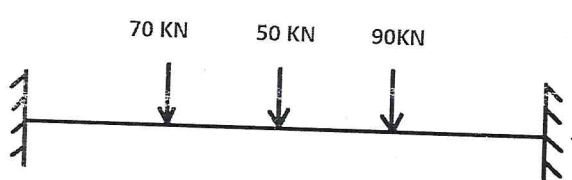


DEPARTMENT OF MECHANICAL ENGG.  
"End Term Examination, May-2023"

SEMESTER	4 <sup>th</sup>	DATE OF EXAM	03.06.2023
SUBJECT NAME	STRENGTH OF MATERIAL	SUBJECT CODE	MEH205B-T
BRANCH	MECHANICAL	SESSION	MORNING
TIME	3 Hrs. (9:00-12:00 PM)	MAX. MARKS	100
PROGRAM	B.TECH	CREDITS	5
NAME OF FACULTY	PRADEEP Kr. MOURIA	NAME OF COURSE COORDINATOR	PRADEEP Kr. MOURIA

Note : All questions are compulsory.

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL
1(A)	<p>Determine the stress induced in different section of the beam length of AB=BC=CD=DE=EF= 500mm and E= 200 GPa.</p> 	10	CO1	L1
1(B)	<p>Draw the shear force and bending moment diagram of the beam shown below:</p> 	10	C02	L2

PART-B	2	Find out the deflection at the different point of the beam shown below: 	20	C03	L3
	3	Drive the Torsion Equation also write the Assumptions.	20	C03	L4
PART-C	4	Draw the SFD and BMD of the fixed beam drawn below 	20	C04	L4
	5	Drive the Expression for Buckling force for the column having both end Fixed.	20	C04	L3



**DEPARTMENT OF MECHANICAL ENGINEERING**  
"End-Term Examination, May-2023"

SEMESTER	6 <sup>th</sup>	DATE OF EXAM	19.05.2023
SUBJECT NAME	Internal combustion engine & Gas Turbines	SUBJECT CODE	MEH320B-T
BRANCH	Mechanical engineering	SESSION	II
TIME	3 Hrs (01:50 - 4:50 PM)	MAX. MARKS	100
PROGRAM	B.Tech	CREDITS	3
NAME OF FACULTY	PIYUSH MAHENDRU	NAME OF COURSE COORDINATOR	PIYUSH MAHENDRU

Note: Part A & B: All questions are compulsory. Part C & D: Attempt any two in each section

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A) In an SI engine working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27°C respectively. The peak pressure is 30 bar. Determine the pressure and temperature at the salient points, the air standard efficiency and the mean effective pressure. Assume ratio of specific heats to be 1.4 for air.	10	CO1	2	2.1. 2
	Q2(A) What do you mean by injection system in Engines? Classify it and briefly explain any one of them	10	CO2	2	2.1. 1
PART-B	Q3(A) What are the different factors are to be classified in evaluating the performance of an engine. Explain indicated mean effective pressure, indicated power & brake power with their expression.	20	CO1	1	1.3. 1
	3(B) An eight cylinder, 4 stroke engines of 9 cm bore and 8cm stroke with a compression ratio of 4 is tested at 4500 rpm on a dynamometer which has 54 cm arm. During a 10 minute test the dynamometer scale beam reading was 42 kg and the engine consumed 4.4 kg of	20	CO1	4	4.2

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PART-D		gasoline having a calorific value of 44000 KJ/kg. air 27°C and 1 bar was supplied to the carburetor at the rate of 6 kg/min. Find (i) The brake power delivered (ii) The brake mean effective pressure (iii) The brake specific fuel consumption (iv) The brake thermal efficiency and (v) The air fuel ratio				
	Q3(C)	Explain dual fuel engines and compare its performance torque vs. speed, BSFC, brake thermal efficiency and CO emission vs. compression ratio.	20	CO3	2	2.1. 2
	Q4(A)	An open cycle gas turbine plant has a single stage compressor and a single stage expander incorporating a heat exchanger. The air suction temperature is 17 °C and the pressure is 1 bar. For and overall pressure ration of 4.5 and shaft output of 4000 KW, the mass flow is 40kg/s. if the thermal ratio of the heat exchanger is 0.6 and the isentropic efficiency of compressor is 0.84, calculate the isentropic efficiency of the gas turbine for a thermal efficiency of 0.29. Take for air $\gamma = 1.4$ , $C_{pa} = 1.005$ KJ/Kg K; for gas $\gamma = 1.365$ , $C_{pg} = 1.07$ KJ/Kg K.	20	CO4	4	4.2
	Q4(B)	Explain open cycle gas turbine. Also explain different methods of improving thermal efficiency of open cycle gas turbine	20	CO3	2	2.1. 1
	Q4(C)	What do you mean by Lubrication system and its purpose? Classify them and explain anyone in brief with block diagram.	20	CO4	1	1.3. 1
***** END *****						



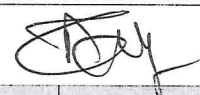
## DEPARTMENT OF MECHANICAL ENGINEERING

"End Term Examination, MAY-2023"

SEMESTER	VI	DATE OF EXAM	22.05.2023
SUBJECT NAME	OPERATION RESEARCH	SUBJECT CODE	MEH 310-B
BRANCH	ME	SESSION	I
TIME	9:00-12:00 PM	MAX. MARKS	100
PROGRAM	B.TECH SMA	CREDITS	4
NAME OF FACULTY	MNDEEP BHADANA	COURSE COORDINATOR	MANDEEP BHADANA

Note: Part A&B: Questions will be of 10 Marks each.

Part C&D: Each question will be of 20 marks. Attempt all questions.



Q.NO.		QUESTIONS	MARKS	CO ADDRESS ED	BLOOM'S LEVEL																																				
PART-A&B	Q1	What is Break Even Analysis? Draw the break even curve and explain it.	10	CO1	L1																																				
	Q2	A firm is producing 1000 units. At this level of output AC and AVC are respectively equal to Rs 240 & Rs 200. Find TFC, TVC, TC, AFC.	10	CO2	L2																																				
PART-C	Q3	Find an initial basic feasible solution to the following transportation problem using NWCR Method And optimize it by MODI method. <table><tr><td></td><td>W1</td><td>W2</td><td>W3</td><td>W4</td><td>SUPPLY</td></tr><tr><td>F1</td><td>5</td><td>3</td><td>6</td><td>2</td><td>19</td></tr><tr><td>F2</td><td>4</td><td>7</td><td>9</td><td>1</td><td>37</td></tr><tr><td>F3</td><td>3</td><td>4</td><td>7</td><td>5</td><td>34</td></tr><tr><td>DEMAND</td><td>16</td><td>18</td><td>31</td><td>25</td><td></td></tr></table>		W1	W2	W3	W4	SUPPLY	F1	5	3	6	2	19	F2	4	7	9	1	37	F3	3	4	7	5	34	DEMAND	16	18	31	25		20	CO3	L3						
		W1	W2	W3	W4	SUPPLY																																			
F1	5	3	6	2	19																																				
F2	4	7	9	1	37																																				
F3	3	4	7	5	34																																				
DEMAND	16	18	31	25																																					
	Q4	Briefly explain the Hungarian Method procedure with example. Solve the assignment problem by Hungarian method to assign the different jobs to different operators so that the time should be minimized. <table><tr><td>JOB/OPERATOR</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>1</td><td>4</td><td>6</td><td>7</td><td>5</td><td>11</td></tr><tr><td>2</td><td>7</td><td>3</td><td>6</td><td>9</td><td>5</td></tr><tr><td>3</td><td>8</td><td>5</td><td>4</td><td>6</td><td>9</td></tr><tr><td>4</td><td>9</td><td>12</td><td>7</td><td>11</td><td>10</td></tr><tr><td>5</td><td>7</td><td>5</td><td>9</td><td>8</td><td>11</td></tr></table>	JOB/OPERATOR	1	2	3	4	5	1	4	6	7	5	11	2	7	3	6	9	5	3	8	5	4	6	9	4	9	12	7	11	10	5	7	5	9	8	11	20	CO3	L3
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4	9	12	7	11	10																																				
5	7	5	9	8	11																																				

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PART-D	Q5	<p>What do you mean by Dual Simplex method?</p> <p>Solve the given LPP by using Dual Simplex method Minimize <math>Z=2X_1+4X_2+6X_3</math>, subject to constraints</p> <p><math>4X_1-2X_2+2X_3 \geq 8</math>,</p> <p><math>2X_1+2X_2+4X_3 \leq 16</math></p> <p><math>2X_2-2X_3 \geq 4</math>,</p> <p>and <math>X_1, X_2, X_3 \geq 0</math>.</p>	20	CO4	L4
	Q6	<p>What is Big M method?</p> <p>Solve the given LPP by using Big M method Minimize <math>Z=14X_1+30X_2+40X_3</math>, subject to constraints</p> <p><math>4X_1+8X_2+12X_3 \geq 48</math></p> <p><math>6X_1+18X_2+12X_3 \geq 60</math></p> <p>And <math>X_1, X_2, X_3 \geq 0</math>.</p>	20	CO4	L4



**DEPARTMENT OF MECHANICAL ENGINEERING**  
*"T3 Examination, May-2023"*

<b>SEMESTER</b>	6th	<b>DATE OF EXAM</b>	24.05.2023
<b>SUBJECT NAME</b>	Refrigeration & Air Conditioning	<b>SUBJECT CODE</b>	MEH311B-T
<b>BRANCH</b>	ME-SMA	<b>SESSION</b>	II
<b>TIME</b>	3 Hrs. (01:00 - 4:00 PM)	<b>MAX. MARKS</b>	100
<b>PROGRAM</b>	B.Tech	<b>CREDITS</b>	04
<b>NAME OF FACULTY</b>	GIANENDER KAJAL	<b>NAME OF COURSE COORDINATOR</b>	GIANENDER KAJAL

*Note: All questions are compulsory. Questions will be of descriptive type or numerical.*

Q.NO.	QUESTIONS	MARKS	CO	BLOOM'S LEVEL	PI
<b>PART (A)</b>	1(A) What do you mean by COP? Derive expression for the refrigeration system, heat pump and heat engine with neat sketch.	05	CO1	BT3	12.2.1
	1(B) State the chemical formula of R-12, R-11 and R-22. What do you mean by ozone layer depletion?	05	CO1	BT2	12.3.1
<b>PART (B)</b>	2(A) Explain the term SHF & BPF in the psychrometric process with different condition. What would be the effect of BPF on the coil?	05	CO2	BT2	10.3.1
	2(B) Write short notes on: (i) How are the refrigerants classified? Discuss the desirable properties of a good refrigerant. (ii) Explain the term "tonne of refrigeration".	05	CO2	BT2,3	10.3.1

PART (C)	3(A)	The moist air at 1.013 bar and 40°C contain 10gm of vapour per kg of dry air. Saturation pressure of vapour at 40°C is 3.167KPa. Find relative humidity	10	CO3	BT4	3.1.4
	3(B)	120 m <sup>3</sup> /min of air at 35 °C dry bulb temperature and 45% relative humidity is mixed with 325 m <sup>3</sup> /min of recirculated air at 20°C dry bulb temperature and 10 °C DPT. Determine the enthalpy, specific volume, humidity ration and DPT of the mixing stream.	10	CO3	BT4	10.3.1 12.1.1
	3(C)	Define and explain the following terms in relation to psychrometry (i) Dry bulb, wet bulb and dew point temperatures (ii) Relative humidity and specific humidity	10+10	CO3	BT3	1.1.2
PART (D)	4(A)	Define Psychrometric chart. Explain the following psychrometric process (i) Adiabatic mixing of two streams (ii) heating & Dehumidification (iii) Cooling & Humidification (iv) heating & humidification	10	CO4	BT2	12.2.1 12.2.2
	4(B)	Write short notes on: (i) Types of Condensor (ii) Types of Throttling devices	10	CO4	BT3	10.3.1
	4(C)	(i) Derive an expression for the COP of a Bell-Coleman air refrigeration cycle with the help of schematic, (P-V) and (T-S) diagram. (ii) In an air-craft refrigeration system, air enter compressor at 0.2MPa at 4 °C and it is compressed to 0.4MPa. The isentropic efficiency of compressor is 72%. The air is then cooled to 55 °C and constant pressure & is then expanded in turbine to a pressure of 0.1Mpa and isentropic efficiency of turbine is 75%. The refrigeration load is 3TR. Find:  a) C.O.P of the system b) P <sub>in</sub> in kW Given: $\gamma=1.4, C_p=1.005 \text{ kJ/kg K}, C_v=0.7 \text{ kJ/kg K}$ for air	10+10	CO4	BT3,5	10.3.1

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DEPARTMENT OF MECHANICAL ENGINEERING  
"T3 Examination, May - June 2023"

SEMESTER	6 <sup>th</sup>	DATE OF EXAM	26.05.2023
SUBJECT NAME	Product design and development	SUBJECT CODE	ME308-B
BRANCH	ME	SESSION	II
TIME	01:00 - 04:00 PM	MAX. MARKS	100
PROGRAM	B.TECH	CREDITS	5
NAME OF FACULTY	J P SHARMA	NAME OF COURSE COORDINATOR	J P SHARMA

Note: Part A, B & D: All questions are compulsory.

Part C: Attempt any two question

Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A) What are the objectives of a product design? Explain features that are beneficial for good product design with step and its analysis.	10	C01	BT1	1.2.1
	Q2(A) Discuss FAST technique with their type with an example through block diagram.	5	C02	BT1	1.2.1
PART-B	2(B) Write steps for material selection for a product on the basis of its performance. Explain Ashby's method.	5	C02	BT1	1.2.1
	Q3(A) Explain Quality function deployment. Also explain the phases of QFD with block diagram of House of quality through an example	10	C03	BT2	1.3.1
PART-C	3(B) Explain the conventional Design process in brief through block diagram. What are the advantages of using CAD in design process?	10	C03	BT2	1.2.1
	Q4(A) Discuss three stage processes for performance and quality in products with an example.	10	C03	BT2	1.2.1
	4(B) Define Design for manufacturing. What are the different manufacturing costs involved in manufacturing system. Also write different between DFA & DFM.	10	C03	BT2	1.2.1
	Q5(A) Define Ergonomics with their benefits. Write different type of ergonomics and explain all of them. Explain with an example for design of	20	C04	BT2	1.2.1

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PART-D		ergonomically efficient office chair.				
	Q6(A)	Write full form of DFMA and What identifies DFMA? Explain DFMA guidelines with example of components.	10	CO4	BT2	1.3.1
	6(B)	Explain the general guidelines for manual assembly. Also write steps for Rapid prototyping system with their advantages.	10	CO4	BT2	1.3.1
	Q7(A)	While conducting structural analysis of components in analysis software, what conclusion we got with contours of von-mises stresses, total deformation & modal analysis. Explain with an example.	10	CO4	BT6	3.4.2
	7(B)	Write the steps involved for simulation in Hypermesh for a cantilever beam in Hypermesh. Also write the outcome we got in post processing of Results.	10	CO4	BT4	3.1.6
***** END *****						



Set-A

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**DEPARTMENT OF Mechanical Engineering**  
"End Term Examination, Jan-June-2023"

SEMESTER	6th	DATE OF EXAM	30/05/2023
SUBJECT	Automobile	SUBJECT CODE	MEH313B-T
NAME	Engineering		
BRANCH	B.TECH- ME (SMA)	SESSION	II
TIME	180 Minutes	MAX. MARKS	75
PROGRAM	B.TECH	CREDITS	03
NAME OF FACULTY	SANJAY TANEJA	HOD	

*Note: Part A & B - All questions are compulsory. (15 marks)*  
*Part C & Part D-Attempt two questions each from Part C & Part D. (4x15=60marks)*

Q.NO.		QUESTION S	MARKS	CO ADDRESSE D	BLOOM' S LEVEL	PI
PART-A & B	Q1(A)	Define working principle of clutch.	2	CO2	BT2	2.2.4
	1(B)	List out all the requirements of a good clutch.	2	CO2	BT2	1.3.1
	1(C)	What are the advantages of epicycle gear box?	2	CO2	BT1	1.3.1, 12.1.1
	1(D)	What is the drawback of constant mesh gear box?	2	CO2	BT1	2.2.4
	1(E)	List out future trends in Automobile.	2	CO1	BT2	1.3.1

	Q2(A)	Define control systems of Automobiles.	1	CO3	BT1	1.3.1
	2(B)	Define the term Toe in & Toe out.	2	CO3	BT1	1.3.1
	2(C)	What is the necessity of Power Transmission?	2	CO2	BT2	1.3.1
PART-C	Q3(A)	Explain all the salient features of Front engine front wheel drive and also draw its layout.	08	CO1	BT2,BT4	2.3.1, 12.1.1
	3(B)	What are the advantages of Diaphragm clutch over single plate clutch?	07	CO2	BT5	2.2.4
	Q4(A)	How differential works, Explain with neat sketch?	08	CO2	BT2,BT4	2.2.4, 12.1.1
	4(B)	Describe function of Synchro mesh gear box with its benefits.	07	CO2	BT2	2.2.4
	Q5(A)	What is the purpose of suspension in automobiles and also describe importance of Macpherson suspension system?	08	CO3	BT2,BT4	2.2.4, 12.1.1
	5(B)	Define the term Castor, Camber and wheel balancing.	07	CO3	BT2,BT4	1.3.1, 12.1.1



<b>P A R T- D</b>	<b>Q6(A)</b>	Compare Radial tyre with ordinary cross ply tyres.	<b>08</b>	<b>CO4</b>	<b>BT5</b>	<b>2.2.4</b>
	<b>6(B)</b>	Describe advantages of Tubeless tyre over normal tyre.	<b>07</b>	<b>CO4</b>	<b>BT2</b>	<b>2.3.1</b>
	<b>Q7(A)</b>	Compare disc brake with drum brake with their limitations.	<b>08</b>	<b>CO4</b>	<b>BT5</b>	<b>2.3.1, 2.2.4</b>
	<b>7(B)</b>	What are the advantages of Hydraulic brakes over mechanical brakes?	<b>07</b>	<b>CO4</b>	<b>BT2</b>	<b>2.2.4</b>
	<b>Q8</b>	Write short notes on any three of the following. (1) Four wheel drives (2) Safety trends in Automobiles (3) Wheel balancing (4) Power steering (5) Multi plate clutch.	<b>15</b>	<b>CO1,CO2, CO4</b>	<b>BT2,BT4</b>	<b>2.2.4, 12.1.1</b>