

**G. H. Raison Institute of Engineering & Business Management, Jalgaon**  
(An Autonomous Institution)

**CAE-I EXAM AY: 2023-24,**

**Class: T.E. MECH. ENGG.**

**SEM: Odd**

**Mechanics of Composite Materials (Elective-IV) [UMEL420]**

**[Time: 1.00 hrs.]**

**[Max. Marks: 15]**

**Course Outcomes (COs):**

CO1. Identify and understand the basic mechanical behavior of composite materials and make sound prediction on the likely behavior of new combinations of materials.

CO2. Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.

CO3. Compute the stresses and strains relation in composites materials

CO4. Analyze the micromechanical properties of fibre reinforced composites.

**Instructions:**

1) Attempt any ONE from each question

2) Each question carries equal marks

**Q. No. Questions**

		Marks	CO's
1	A Define and write applications of Composite Materials.	5	CO1
	B Explain classification of composite materials.	5	CO1
2	A Write a note on Glass fibers.	5	CO1
	B Explain Typical Commercial material properties.	5	CO2
3	A Explain the properties of Carbon Fibers.	5	CO2
	B Explain Generalized Hooke's Law	5	CO2



Roll No:

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 (An Autonomous Institute affiliated to Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon)  
 Accredited by NAAC with 'A' Grade  
**Department of Mechanical Engineering**  
**Continuous Assessment Examination II Winter-2023**

**Program Name: B.TECH**

**Subject Name: MCM**

**[Time: 01hrs.]**

**Semester: VII**

**Subject Code: UMEL420**

**[Max. Marks: 15]**

**Course Outcomes (COs):**

At the end of the course the student should be able to:

CO1. Identify and understand the basic mechanical behavior of composite materials and make sound prediction on the likely behavior of new combinations of materials.

CO2. Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.

CO3. Compute the stresses and strains relation in composites materials

CO4. Analyze the micromechanical properties of fibre reinforced composites.

**Instructions:**

- 1) Attempt any One from each question
- 2) Each question carries equal marks
- 3) Use of non-programmable scientific calculation is permitted.
- 4) Do not write anything on question paper except Roll No

Q. No.	Questions	Marks	COs	BL
1	A What are the assumptions of Classical Lamination Theory.	5	CO3	2
	B Explain the Classification of Laminates.	5	CO3	5
2	A Analyze Laminate Constitutive Equations for Balanced Laminates OR Symmetric Laminates OR Angle Ply Laminates	5	CO3	4
	B Explain Modification of Laminate Constitutive Equations.	5	CO4	3
3	A Classify the following laminates: (ii) $[-30/45/-45/-30]$ (ii) $[-30/30/-30/30]$ (iii) $[30/-30/30]$ (iv) $[0/90/0/90/0/90/90]$ (v) $[0/18/36/54/72/90/-18/-36/-54/-72]$	5	CO4	2
	B Give an example of a laminate with zero coupling stiffness matrix.	5	CO4	6

=====Best of Luck=====

BL- Bloom's Taxonomy Levels s (1- Remembering, 2- Understanding, 3 - Applying, 4 - Analysing, 5 - Evaluating, 6 - Creating



ESE Winter 2023-24

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Accredited by NAAC with 'A' Grade

**Department of Mechanical Engineering**  
**End Semester Examination Winter-2023-24**

Roll No:

Program Name: B.Tech.

Semester: VII

Subject Name: Mechanics Of Composite Materials

Subject Code: UMEL420

[Time: 02hrs.]

[Max. Marks: 50]

**Course Outcomes (COs):**

At the end of the course the student should be able to:

CO1: Identify and understand the basic mechanical behavior of composite materials and make sound prediction on the likely behavior of new combinations of materials.

CO2: Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.

CO3: Compute the stresses and strains relation in composites materials

CO4: Analyze the micromechanical properties of fibre reinforced composites.

**Instructions:**

- 1) Attempt any Two from each question
- 2) Each question carries equal marks
- 3) Use of non-programmable scientific calculation is permitted.
- 4) Do not write anything on question paper except Roll No

Q. No.	Questions	Marks	COs	BL
1	A Explain how composite materials are grouped and what they are used for.	5	CO1	2,3
	B Explain Metal Matrix Composites (MMCs)	5	CO1	2
	C Differentiate between thermoplastic and thermosetting materials.	5	CO1	4
2	A Explain Typical Commercial material properties.	5	CO2	1
	B Discuss various Lamina Assumptions from a Macroscopic Perspective.	5	CO2	6
	C Reduce the monoclinic stress-strain relationships to those of an orthotropic material.	5	CO2	5
3	A What are the assumptions of Classical Lamination Theory.	5	CO3	4
	B Explain Quasi-Isotropic Laminates	5	CO3	2
	C Simplify stiffness and the compliance matrix for an isotropic lamina.	5	CO3	4
4	A Does a symmetric quasi-isotropic laminate have [A], [B], and [D] stiffness matrices like that of an isotropic material?	5	CO4	6
	B Explain Modification of Laminate Constitutive Equations.	5	CO4	2
	C Explain any one special case of Laminates.	5	CO4	3
5	A Explain Maximum Stress Failure Theory.	5	CO2	2
	B Explain Tsai-Wu Failure Theory.	5	CO4	2
	C Explain Tsai-Hill Failure Theory.	5	CO4	2

BL- Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 - Applying, 4 - Analysing, 5 - Evaluating, 6 - Creating)



A.Y. :2023-24

**G H Raisoni Institute of Engineering and Business Management,  
Jalgaon**

(An Autonomous Institute and NAAC "A" grade accredited)

**Department of Mechanical Engineering**

**College Assessment Examination – I**

**Subject Name: Energy Storage System**

**Subject**

**code: UMEL421**

**Program Name: B.Tech(Mechanical)**

**Semester: VII**

**Time: 1.00 hr**

**Max. Marks: 15**

**Course Outcomes (COs):**

CO1: To analyze the characteristics of energy from various sources and need for storage.

CO2: To classify various types of energy storage and various devices used for the purpose

CO3: To identify various real time applications.

**Instructions:**

- 1) Attempt any one sub-question from each Question. Each question carries equal marks
- 2) Clearly mention Seat number, PRN No, Course Name and Course Code on answer sheet
- 3) Draw a neat and labeled diagram, if required
- 4) Assume suitable data wherever necessary
- 5) Only non-programmable calculator is allowed

Q. No.	Questions	Marks	COs	Bloom's Level
1	A Classify Different energy storage systems.	5	1	2
	B Explain pumped storage system with neat sketch.	5	1	3
2	A Explain in brief Mechanical storage systems.	5	1	3
	B Classify and explain different types of fuel cells.	5	3	3
3	A Explain different components of fuel cell.	5	3	3
	B Explain Alkaline fuel cell.	5	3	3

**Bloom's Level**

1-Remembering 2-Understanding 3-Appealing 4-Analyzing 5-Evaluating 6-Creating



ESE Winter 2023-24

Roll No: 21205022

**G H Raisoni Institute of Engineering and Business Management, Jalgaon**

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**Department of Mechanical Engineering**  
**End Semester Examination Winter-2023-24****Program Name: B-Tech**  
**Subject Name: Energy storage system (Elective-V)**  
**[Time: 02hrs.]****Semester: VII**  
**Subject Code: UMEL 421**  
**[Max. Marks: 50]****Course Outcomes (COs):**

Upon the successful completion of course, the students will be able :

**CO1.** To analyze the characteristics of energy from various sources and need for storage.**CO2.** To classify various types of energy storage and various devices used for the purpose**CO3.** To identify various real time applications.**Instructions:**

- 1) Attempt any Two from each question
- 2) Each question carries equal marks
- 3) Do not write anything on question paper except Roll No

Q. No.	Questions	Marks	COs	BL
1	A Explain pumped storage system with neat sketch.	5	1	3
	B Explain Compressed air energy storage system.	5	1	3
	C Classify Different energy storage systems.	5	1	2
2	A Explain different uses of smart grids.	5	2	3
	B Explain the role of electrical energy storage form viewpoint of consumers.	5	2	3
	C Explain emerging needs of ESS.	5	2	3
3	A Explain and analyze characteristics of electricity.	5	1	1,4
	B Explain and analyze high generation cost during peak demand period.	5	2	1,4
	C Explain role of energy storage system in electricity.	5	1	1,4
4	A Explain requirements of batteries.	5	3	2
	B Explain features of SLI batteries.	5	3	2
	C Explain and classify features of Li-ion batteries.	5	2	2
5	A Explain proton exchange membrane fuel cell.	5	3	3
	B Explain phosphoric acid fuel cell.	5	3	3
	C Classify and explain different types of fuel cells.	5	3	3

BL- Bloom's Taxonomy Levels s (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 – Creating)



**G. H. Rasoni Institute of Engineering & Business Management, Jalgaon**

(An Autonomous Institution)

**CAE-I EXAM AY: 2023-24,**

**Class: BE**

**SEM: Odd**

**Industry 4.0**

**[Time: 1.00 hrs.]**

**[Max. Marks: 15]**

**Course Outcomes (COs):**

- 1. Understand IOT architecture and its building block**
- 2. Applications in the business world**
- 3. Introduction to different IOT platform**
- 4. Understanding technology and skill required in building IOT product**
- 5. Understand IOT application across various segment**

**Instructions:**

- 1) Attempt any one from each question
- 2) Each question carries equal marks

<b>Q. No.</b>	<b>Questions</b>	<b>Marks</b>	<b>CO's</b>	<b>BL</b>
1	A Discuss the challenges and opportunities in cyber physical systems	5	4	2
	B State and explain concept of Digital Twin related to Industry 4.0	5	4	1
2	A Explain the Applications of Cyber-Physical Systems.	5	4	2
	B Define and explain applications of Artificial Intelligence (AI) and Machine Learning (ML)	5	5	2
3	A What do you understand by smart factory management, explain with example	5	5	3
	B Define and explain man-machine-computer interfacing.	5	5	2

BL- Bloom's Taxonomy Levels s (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 – Creating

Institute of Engineering & Business Management, Jalgaon  
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CAE-I EXAM AY: 2023-24,  
Class: BE SEM: Odd  
Industry 4.0

[Time: 1.00 hrs.]

[Max. Marks: 15]

Course Outcomes (COs):

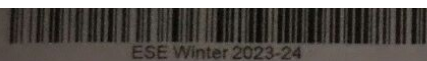
1. Understand IOT architecture and its building block
2. Applications in the business world
3. Introduction to different IOT platform
4. Understanding technology and skill required in building IOT product
5. Understand IOT application across various segment

Instructions:

1. Attempt any one from each question
2. Each question carries equal marks

Q No.	Questions	Marks	C
1	A. Discuss the general frame work of Industry 4.0	5	1
	B. State and explain principles of Industry 4.0	5	1
2	A. What are technological pillars of Industry 4.0 Discuss in detail	5	2
	B. Define automation and Explain the elements of automation.	5	1
3	A. Define Industry 4.0. List any Five application area of Industry 4.0	5	2
	B. What are the Challenges and Opportunities of Industry 4.0	5	2



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**Department of Mechanical Engineering  
End Semester Examination Winter-2023****Program Name: B-Tech****Course Name: Industry 4.0****[Time: 02hrs.]****Semester: VII****Course Code: UMEL 405****[Max. Marks: 50]**

At the end of the course the student should be able to:

CO1. Understand the drivers and enablers of Industry 4.0

CO2. Identify the smartness in Smart Factories, Smart cities, smart products and smart services in industry.

CO3. Apply the basic knowledge of Android, IOT and IIOT, Cloud Computing in an Industry.

CO4. Compare and analyze different decision support systems and decision making models for Industry.

**Instructions:**

1) Attempt any Two from each question

2) Each question carries equal marks

3) Use of non-programmable scientific calculation is permitted.

4) Clearly mentioned Seat Number, PRN No, Course name and Course code on the top of answer sheet

5) Draw a neat and labeled diagram if required.

Q. No.	Questions	Marks	COs	BL
1	A Explain Industry 4.0 with its impact related to society and economic point of view of our country	5	CO1	2
	B List the various pillars on which industry 4.0 depend, explain with the help of diagram.	5	CO1	4
	C State and explain the various design principles on which Industry 4.0 depend.	5	CO1	1,2
2	A Define Automation and explain levels of automation related to Industry 4.0.	5	CO2	1,2
	B Explain with neat diagram Supervisory control and data acquisition (SCADA) with its advantages and disadvantages.	5	CO2	2
	C Explain with neat diagram three types of automation available in an industry.	5	CO2	2
3	A List out various applications of Industrial Internet of Things and explain any one with detailed.	5	CO3	4
	B Explain all six levels of internet of things.	5	CO3	2
	C List out various Fundamentals and working principle of Android.	5	CO3	4



4	A	Explain all steps involved in Digital twin conceptual architecture.	5	CO2	2
	B	Discuss the various challenges are faced by a new technology as a Digital Twin.	5	CO3	4
	C	Define and explain Schematic functioning of industrial Cyber physical systems [CPS].	5	CO4	1,2
5	A	Explain the role of AI in industry 4.0 with its advantages and disadvantages.	5	CO5	3
	B	Define and explain man-machine-computer interfacing.	5	CO5	2
	C	Decision support systems: Explain the concept and definition.	5	CO5	2

#### **Bloom's Level**

1-Remembering 2-Understanding 3-Applying 4-Analyzing 5 -Evaluating 6-Creating

CO-Course Outcomes

BL-Bloom's Level

A.Y. :2023-24

**G H Raisoni Institute of Engineering and Business Management, Jalgaon**  
(An Autonomous Institute and NAAC "A" grade accredited)  
**Department of Mechanical Engineering**  
**College Assessment Examination – I**

**Subject Name:** Advanced Tool Design (Elective-III)  
**Program Name:** B.Tech (Mechanical Engineering)  
**Time:** 1.00 hr

**Subject code:** UMEL412  
**Semester:** VII  
**Max. Marks:** 15

**Course Outcomes (COs):**

- CO1: Interpret the geometrical and dimensional details of a production drawing  
CO2: Understand principles of locating and clamping systems.  
CO3: Design jigs and fixtures for conventional and NC machining.  
CO4: Select and design progressive, compound or combination dies for press working operations.  
CO5: Design single point and multipoint cutting tools.

**Instructions:**

- 1) Attempt **any one** sub-question from each Question. Each question carries equal marks.
- 2) Clearly mention Seat number, PRN No, Course Name and Course Code on answer sheet
- 3) Draw a neat and labeled diagram, if required.
- 4) Assume suitable data wherever necessary.
- 5) Only non- programmable calculator is allowed.

Q. No.	Questions	Marks	COs	Bloom's Level
1	A Any 5 advantages of Tool Strength and Rigidity.	5	CO1	2
	B Describe Single Point Cutting Tool Geometry in Detail.	5	CO1	2
2	A Explain types of Locators with neat Sketch.	5	CO1	3
	B Difference between Jigs and Fixtures.	5	CO2	3
3	A Define DOF. Describe Planes of movement with neat Sketch.	5	CO2	3
	B Describe Six-point Principle or 3-2-1 Location.	5	CO2	5



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Semester: VII

**Subject Code:**

**[Time: 01 hrs.]**

**[Max. Marks:**

15]

At the end of the course the student should be able to:

**CO2.** Understand principles of locating and clamping systems

CO3. Design jigs and fixtures for conventional and NC machining.

CO4. Select and design progressive, compound or combination dies for press working operations.

CO5. Design single point and multipoint cutting tools.

1) Attempt **Any One** from each question.

2) Each question carries equal marks.

3) Use of non-programmable scientific calculation is permitted.

4) Do not write anything on question paper except Roll No.

[illegible]





ESE Winter 2023-24

Roll No: 2120503

**G H Raisoni Institute of Engineering and Business Management, Jalgaon**

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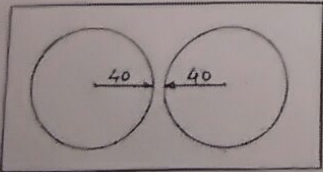
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**Department of Mechanical Engineering****End Semester Examination Winter 2023-24****Program Name: B. Tech****Semester: VII****Subject Name: Advanced Tool Design (Elective-III)****Subject Code: UMEL412****[Time: 02hrs.]****[Max. Marks:50 ]****Course Outcomes (COs):**

At the end of the course the student should be able to:

**CO1.** Interpret the geometrical and dimensional details of a production drawing.**CO2.** Understand principles of locating and clamping systems.**CO3:** Design jigs and fixtures for conventional and NC machining.**CO4.** Select and design progressive, compound or combination dies for press working operations.**CO5.** Design single point and multipoint cutting tools.**Instructions:**

- 1) Attempt **any Two** from each question.
- 2) Each question carries equal marks.
- 3) Use of non-programmable scientific calculation is permitted.
- 4) Do not write anything on question paper except Roll No.

Q. No.	Questions	Marks	COs	BL
1	A Define DOF. Describe Planes of movement with neat Sketch	5	CO1	1,2
	B Describe Single Point Cutting Tool Geometry in Detail.	5	CO1	2
	C Explain 1. Fixed V Locator 2. Pin and Button Locator	5	CO1	3
2	A Explain the Methods of Locating Components.	5	CO2	3
	B Illustrate Six-point Principle or 3-2-1 Location Principle.	5	CO2	4
	C Explain any 5 types of Clamps used in jig and fixtures with neat Sketch.	5	CO2	3
3	A Compare Jigs and Fixtures.	5	CO3	5
	B Explain any 5 materials used for making jigs and fixtures.	5	CO3	3
	C List any 10 advantages of Jigs and fixtures in detail.	5	CO3	1
4	A Evaluate Economic factor and which strip layout Applicable for given sheet. Thickness $t = 2\text{mm}$ , Radius = 40 mm.	5	CO4	5
				
	B Show the neat and Labelled Sketch of press tool Die set.	5	CO4	1
	C Define Press Tool. Describe various non cutting operations with neat Sketch.	5	CO4	1,2
5	A Conclude various Tool holding methods for NC (Numerically Controlled) machines in detail.	5	CO5	5
	B Describe various cutting tools for NC machine in detail.	5	CO5	3



C Describe Automatic Tool Changer (ATC) and Automatic Pallet  
Changer (APC) for NC Machines 5 CO5 3

BL- Bloom's Taxonomy Levels: 1 - Remembering, 2 - Understanding, 3 - Applying, 4 - Analyzing, 5 -  
Evaluating, 6 - Creating)



Subject Name: Refrigeration and Airconditioning

Subject code: UMEL427

Program Name: B.Tech(Mechanical)

Semester: VII

Time: 1.00 hr

Max. Marks: 15

Course Outcomes (COs):

CO1: Understand the principles of refrigeration and remember the application of air refrigeration

CO2: Learn the working of single stage, multistage and multi-Evaporator using vapour compression refrigeration system with different type of refrigerants.

CO3: Study the working principles and its application of vapor absorption refrigeration system.

CO4: Apply the knowledge of psychrometry to various psychrometric processes in Airconditioning system.

CO5: Learn different types of Air-Conditioning system used for Human comfort and Use P-h, T-S and Psychrometric charts to solve refrigeration and Air conditioning design problems.

Instructions:

- 1) Attempt any one sub-question from each Question. Each question carries equal marks
- 2) Clearly mention Seat number, PRN No, Course Name and Course Code on answer sheet
- 3) Draw a neat and labeled diagram, if required
- 4) Assume suitable data wherever necessary
- 5) Only non- programmable calculator is allowed

Q. No.	Questions	Marks	COs	Bloom's Level
1	A Discuss air conditioning in hospital. OR B Discuss the role of refrigeration system in dairy plant.	5	1	2
2	A Derive COP expression of Bell Coleman cycle in terms of compression ratio. OR B Explain desirable properties of refrigerant.	5	2	3
3	A A heat pump is used to keep a room at 25°C by rejecting heat to an environment at 5°C. The total heat loss from the room to the environment is estimated to be 45000 kJ/h and the power input to the compressor is 4.5 Kw. Determine (i) the rate of heat absorbed from the environment in kJ/h. (ii) COP of heat pump. (iii) the maximum rate of heat supply to the room for the given power input. OR A domestic refrigerator used R134a refrigerant and runs on VCC to keep inside temperature at -10°C by rejecting heat to an environment at 50°C. The heat leakage from the environment is estimated to be 1200 kJ/h and the vapour is super-heated before compression by 4°C outside the evaporator. Determine (i) the rate of heat rejection in condenser. (ii) the COP of refrigerator (iii) power input to compressor. Properties of R134a is as follows.	5	2	3

B

R134-a Data								
T	P	$v_g$	$h_f$	$h_g$	$s_f$	$s_g$	$C_{p,g}$	$C_{p,oil}$
°C	bar	m <sup>3</sup> /kg	kJ/kg	kJ/kg	kJ/kgK	kJ/kgK	kJ/kgK	kJ/kgK
-10	2.0052	0.09553	186.75	—	0.9509	1.7337	—	0.842
-6	2.3413	0.08591	192.03	395.35	0.9707	1.7310	—	0.858
2	3.145	0.0647	—	—	—	1.7263	1.341	0.892
17	4.4289	0.04635	—	405.51	1.0579	1.7215	1.374	0.939
24	6.4566	0.03169	233.05	411.93	—	1.7169	—	1.006
30	7.7008	0.02667	241.55	414.94	1.1432	1.7149	—	1.044
50	13.177	—	271.59	423.63	1.2373	1.7078	1.569	1.218

5

2

Bloom's Level

1-Remembering 2-Understanding 3-Applying 4-Analyzing 5-Evaluating 6-Creating



A.Y. :2023-24

**G H Raisoni Institute of Engineering and Business Management, Jalgaon**

(An Autonomous Institute and NAAC "A" grade accredited)

**Department of Mechanical Engineering**

**Continuous ~~College~~ Assessment Examination – II**

Subject Name: Refrigeration and Airconditioning

Subject code: UMEL427

Program Name: B.Tech(Mechanical)

Semester: VII

Time: 1.00 hr

Max. Marks: 15

**Course Outcomes (COs):**

CO1: Understand the principles of refrigeration and remember the application of air refrigeration.

CO2: Learn the working of single stage, multistage and multi-Evaporator using vapour compression refrigeration system with different type of refrigerants.

CO3: Study the working principles and its application of vapor absorption refrigeration system.

CO4: Apply the knowledge of psychrometry to various psychrometric processes in Airconditioning system.

CO5: Learn different types of Air-Conditioning system used for Human comfort and Use P-h, T-S and Psychrometric charts to solve refrigeration and Air conditioning design problems.

**Instructions:**

- 1) Attempt any one sub-question from each Question. Each question carries equal marks
- 2) Clearly mention Seat number, PRN No, Course Name and Course Code on answer sheet
- 3) Draw a neat and labeled diagram, if required
- 4) Assume suitable data wherever necessary
- 5) Steam Table, Psychrometric Chart and non- programmable calculator are allowed

Q. No.	Questions	Marks	COs	Bloom's Level
1	A Discuss advantages and disadvantages of multistage vapor compression refrigeration system over single stage vapor compression refrigeration system. OR B Discuss Cascade system with p-h diagram.	5	2	2
2	A WBT and DBT of air are 18°C and 30°C. Calculate specific humidity, relative humidity, and DPT of air using steam table. The barometric pressure was observed to be 756 mm of Hg. OR B Discuss "Evaporative Cooling" process in desert cooler. Draw process on psychrometric chart.	5	4	3
3	A Discuss Chemical Dehumidification. Draw process on psychrometric chart. OR B Explain RSHF, GSHF and ESHF.	5	4	3

**Bloom's Level**

1-Remembering 2-Understanding 3-Appealing 4-Analyzing 5-Evaluating 6-Creating



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**Department of Mechanical Engineering  
End Semester Examination Winter-2023-24****Program Name: B. Tech****Semester: VII****Subject Name: Refrigeration & Air conditioning****Subject Code: UMEL427****[Time: 02hrs.]****[Max. Marks: 50 ]****Course Outcomes (COs):**

At the end of the course the student should be able to:

**CO1.** Illustrate the fundamental principles and applications of refrigeration and air conditioning.**CO2.** Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems.**CO3:** Present the properties, applications and environmental issues of different refrigerants.**CO4.** Operate, analyze and calculate cooling load for refrigeration and air conditioning systems.**CO5.** Design of Air distribution system for air conditioning applications.**Instructions:**

- 1) Attempt any Two from each question
- 2) Each question carries equal marks
- 3) Use of non-programmable scientific calculator, Steam Table, Psychrometric Chart are permitted.
- 4) Do not write anything on question paper except Roll No

Q. No.	Questions	Marks	COs	BL												
1	A Discuss Human Comfort and Effective Temperature.	5	1	2												
	B Explain desirable properties of refrigerants	5	1	2												
	C Discuss Commercial Air Conditioning-Hospitals.	5	1	2												
2	A The temperature limits of an ammonia refrigeration system are 25°C and -10°C. If the gas is dry at the end of a compression. Calculate COP of the cycle assuming no undercooling of the liquid ammonia. Use property chart of ammonia as follows.	5	2	2												
	<table><tr><th>Temperature °C</th><th>h<sub>f</sub> (kJ/kg)</th><th>h<sub>fg</sub> (kJ/kg)</th><th>s<sub>f</sub> (kJ/kg K)</th></tr><tr><td>25</td><td>298.90</td><td>1166.94</td><td>1.1242</td></tr><tr><td>-10</td><td>135.37</td><td>1297.68</td><td>0.5443</td></tr></table>	Temperature °C	h <sub>f</sub> (kJ/kg)	h <sub>fg</sub> (kJ/kg)	s <sub>f</sub> (kJ/kg K)	25	298.90	1166.94	1.1242	-10	135.37	1297.68	0.5443			
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25	298.90	1166.94	1.1242													
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	B Explain two methods to improve COP of Vapor Compression Refrigeration cycle with P-h diagram.	5	2	3												
	C Compare Vapor Compression Cycle & Vapor Absorption Cycle.	5	2	2												
3	A Differentiate Kyoto Protocol & Montreal Protocol.	5	3	2												
	B Explain primary and secondary refrigerants.	5	3	2												
	C Explain Anti-Freeze Solutions with examples.	5	3	2												
4	A Discuss "Evaporative Cooling" process in desert cooler. Draw process on psychrometric chart.	5	4	2												
	B WBT and DBT of air are 20°C and 32°C. Calculate specific humidity, relative humidity, and DPT of air using steam table. The barometric pressure was observed to be 756 mm of Hg.	5	4	3												
	C Discuss (i) RH (ii) WBT (iii) ADP	5	4	2												



5	A	Discuss types of filters used in Air conditioning systems.	5	5	2
	B	Discuss method for designing of Duct.	5	5	2
	C	Explain (i) Grills & Register (ii) Floor Outlet	5	5	2

BL- Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 – Creating)