

Printing Pages : 1

Paper Code : - BME-001

(B) (SVSU) : 2024-2025/R

Enrollment No.

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B.TECH (ME)

IV YEAR, VII SEMESTER EXAMINATION

NANOTECHNOLOGY AND SURFACE ENGINEERING

[Time : 03:00 Hours]

[Max. Marks : 70]

NOTE:- ATTEMPT ALL THE QUESTIONS AS PER GIVEN INSTRUCTIONS AND SCIENTIFIC CALCULATOR IS ALLOWED.

QUESTION NO.-1: ATTEMPT ANY TWO PARTS.

(2*7=14)

- The unit cell of KBr has one of the three cubic crystalline structures. If the density of KBr is 2.77 gm cm^{-3} and has an edge length $655 \times 10^{-3} \text{ nm}$, find the number of atoms present in the unit cell of KBr. Does the unit correspond to a NaCl or a CsCl structure
- Explain in details about the Differential thermal analysis (DTA).
- Write short notes on VSEPR.

QUESTION NO.-2: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Write the difference between Thermal Gravimetric Analysis (TGA) and Differential Thermal Analysis (DTA).
- In the X-ray diffraction of a set of crystal for which the distance between the planes of crystal is $1.80 \text{ \AA}$, a wavelength of $1.35 \text{ \AA}$ of the X-rays was employed. If the reflection was obtained at an angle of 22 degrees, what type of reflection was it?
- How the electron microscopic techniques are useful in characterization of nano materials?

QUESTION NO.-3: ATTEMPT ANY TWO PARTS.

(2*7=14)

- The density of Rubidium metal is 1.53 gm cm^{-3} and has a body- centered cubic structure. From this information calculate the edge length of the unit cell. Now assume that the Rubidium atoms are spheres. Each corner sphere of the unit cell touches the body-centered sphere. Calculate the radius of Rubidium-atom
- Discuss about the Field Emission Scanning Electron Microscope (FESEM)
- Write the difference between Schottky and Frenkel defect

QUESTION NO.-4: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Draw the flow chart of the recent history of nanotechnology
- In the X-ray diffraction of a set of crystal planes for which distance between the planes of crystal is $1.08 \text{ \AA}$, a wavelength of $1.35 \text{ \AA}$ of the X-rays were employed. If the reflection was obtained at an angle of 22° , what type of reflection was it?
- Write the difference between optical microscope, SEM, and FESEM

QUESTION NO.-5: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Discuss about the seven crystal system with neat sketch figure
- The distance between layers of NaCl crystal is $2.79 \times 10^{-8} \text{ cm}$. X-rays are diffracted from these layers at the angle of 25.8° . Assuming that $n=1$, calculate the wavelength of the X-rays (in nm).
- Write the difference between optical microscope, SEM, and FESEM.

Printing Pages : 1

Paper Code : - BME-701

(B) (SVSU) : 2023-2024/R

Enrollment No.

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B.TECH (ME)

IV YEAR, VII SEMESTER EXAMINATION

AUTOMATION IN MANUFACTURING

[Time : 03:00 Hours]

[Max. Marks : 70]

NOTE:- ATTEMPT ALL THE QUESTIONS AS PER GIVEN INSTRUCTIONS.

Q.1. Attempt any two of the following.

(7x2) = 14

- Discuss briefly various graphics display devices.
- Explain the function of MCU in NC machine tools. What is the role of PLC in CNC system?
- What are the benefits of Computer Aided Design over the conventional design? What are the application areas of CAD?

Q.2. Attempt any two of the following.

(7x2) = 14

- What do you mean by solid modeling? What are the different techniques of solid modeling used in 3D graphics? Explain with suitable examples.
- What is automation? Explain different types of Automation.
- Discuss the various types of NC motion control system with the help of suitable diagrams.

Q.3. Attempt any two of the following.

(7x2) = 14

- How the computer is useful in design and manufacturing of a product? Explain briefly the following in CAD environment – CAE, CAM, CIM.
- What is DNC & Differentiate between CNC & DNC?
- What is Computer Integrated Manufacturing (CIM)? Mention various elements of CIM and functions of CIM.

Q.4. Attempt any two of the following.

(7x2) = 14

- What is servo principle? Which characteristics of servomotors make it suitable for feed drives of CNC machines?
- Write short note on Constructive Solid Geometry (CSG).
- What is control system? Differentiate between an open loop and closed loop control system. Explain the working of an NC machine having provision for velocity and positioning feedback.

Q.5. Attempt any two of the following.

(7x2) = 14

- Explain FMS and also write the advantages and disadvantages of FMS.
- What are preparatory and miscellaneous functions? Write main G and M codes used in manual part programming.
- Explain the operating characteristics and some application of plasma panels, liquid crystal display.

QUESTION NO.-3: ATTEMPT ANY TWO PARTS.**(2*7=14)**

- a) A vapor compression refrigerator uses methyl chloride (R-40) and operates between temperature limits of -10°C and 45°C , at entry to the compressor, the refrigerant is dry saturated and after compression, it acquires a temperature of 60°C . Find the C.O.P. of the refrigerator. The relevant properties of methyl chloride are as follows:

Saturation temperature $^{\circ}\text{C}$	Enthalpy kJ/kg		Entropy, kJ/kgK	
	Liquid	Vapour	Liquid	Vapour
-10	45.4	460.7	0.183	1.637
45	133	483.6	0.485	1.587

- b) Using a psychrometric chart, describe how you would determine the relative humidity of air when its dry bulb temperature and wet bulb temperature are known.
- c) Explain the working principle of the Vapor Compression Refrigeration Cycle. How does the refrigerant undergo phase changes during the cycle?

QUESTION NO.-4: ATTEMPT ANY TWO PARTS.**(2*7=14)**

- a) Discuss the effect of a system leak in a VCRS. How would the system performance be affected if refrigerant levels drop below the required charge?
- b) Explain the function of the absorbent (such as lithium bromide or ammonia) in a VARS. How does it interact with the refrigerant?
- c) A vapor compression refrigerator works between the pressure limit of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no undercooling of the liquid before the expansion valve. Determine the COP of the cycle.

Pressure (Bar)	Saturation temperature K	Enthalpy kJ/kg		Entropy, kJ/kg K	
		Liquid	Vapour	Liquid	Vapour
60	295	151.96	293.29	0.55	1.03
25	261	56.32	322.58	0.22	1.24

QUESTION NO.-5: ATTEMPT ANY TWO PARTS.**(2*7=14)**

- a) Write the difference between VCRS and VARS.
- b) What are the major advantages and disadvantages of Vapor Absorption Refrigeration Systems when compared to Vapor Compression Systems?
- c) What is the role of the generator and absorber in a VARS? Explain their functions in detail concerning the absorption cycle.
- d) What is relative humidity? How does relative humidity affect the comfort level in indoor environments?

Printing Pages : 1

Paper Code : - BME-721

(C) (SVSU) : 2023-2024/R

Enrollment No.

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B.TECH (ME)
IV YEAR, VII SEMESTER EXAMINATION
POWER PLANT ENGINEERING

[Time : 03:00 Hours]

[Max. Marks : 70]

NOTE:- ATTEMPT ALL THE QUESTIONS AS PER GIVEN INSTRUCTIONS.**QUESTION NO.-1: ATTEMPT ANY FOUR PARTS.**

(4*3=12)

- What is fuel and how the fuel is classified?
- Explain basic of Carnot cycle.
- Draw & explain modern layout of modern steam power plant.
- How does nuclear energy impact the environment?
- Define following terms (i) primary energy (ii) secondary Energy (iii) Nuclear Energy.
- Define following terms (i) Biomass (ii) Biogas (iii) Bio Diesel

QUESTION NO.-2: ATTEMPT ANY THREE PARTS.

(3*4=12)

- Define two Boiler Mountings & two boiler Accessories.
- Define following terms (i) Ocean energy (ii) Tidal Energy (iii) Hydrogen Energy.
- How you define Load estimation & load curves also write the Effect of variable load on power plant operation.
- Explain basic of Rankine vs Carnot cycle and its modifications.

QUESTION NO.-3: ATTEMPT ANY THREE PARTS.

(3*6=18)

- Explain Tariff (Energy Rates) & its types; also define Depreciation in terms of PPE.
- Define following terms (i) Pollution & its Type (ii) Pollution Control Technology.
- Draw & explain (i) Open Gas cycle with help of Diagram (ii) Close Gas cycle with help of Diagram.
- Define Economics of plant selection, other considerations in plant selection, Define cost electricity.

QUESTION NO.-4: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Differentiate Mountings Vs Accessories.
- Load Curve v/s Load Duration Curve, Important Points about LDC.
- How could power plant cause pollution? Which power plant causes more pollution?

QUESTION NO.-5: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Define fuel cells & types of fuel cells, advantage of fuel cell.
- How is nuclear energy created & used? Define Nuclear energy, Nuclear Reactor & its components.
- A power station has the following daily load cycle: Draw the load curve, & the load duration curve as shown below.

Time in Hours	6 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 6
Load in MW	20	40	60	20	50	20
