

(Three Hours)

Total Marks: 80

Instructions:

- *Q. 1 is compulsory.*
- *Attempt any THREE questions from the remaining questions*
- *Assume suitable data wherever necessary*
- *Draw figures wherever required*
- *Figures to the right indicate full marks.*
- *Non programable calculators are permitted.*

- Q.1 Write short notes on. (Any Four). 20**
- a. What is the SCOR model? Why is it needed?
 - b. Why is Reverse Logistics (RL) needed?
 - c. Concept of Green Supply Chain Management (GSCM)?
 - d. Describe the role of RFID in warehouse management.
 - e. Explain in brief: lead-time, takt-time and cycle-time.
 - f. Types of risks in supply chains.
- Q.2 a. Define Global Supply Chain. What are the various challenges in establishing a global supply chain? 10**
- b. Discuss how to create a supplier score card in supply chain performance. 10**
Who use the score card?
- Q.3 a. What is meant by Bullwhip Effect? How is it caused? What measures can be taken to reduce the Bullwhip Effect? 10**
- b. Suppose that the annual requirement of a particular raw material item is expressed as 2,000 units per week. The existing policy of the company is to order the item in lots of 10,000 units which gets replenished the instant the order is placed. Subsequently, the company comes to know about the concept of EOQ. 10**
- Holding cost = Rs. 0.8/unit/year
Ordering cost = Rs. 20/order
- Determine for both the scenarios, the following:
1. Quantity to be ordered at a time.
 2. The total incremental cost.
 3. The number of orders placed per year.
 4. The time interval between two consecutive orders.
 5. Should the company continue to place orders in lots of 10,000 units?

- Q.4 a.** Compare 3PL and 4PL service providers. **05**
- b.** What is a Capacitated Vehicle Routing Problem (CVRP)? **05**
- c.** What is meant by Containerization? What are its different types? State advantages of containerization? **10**
- Q.5 a.** A television company works 5 days a week with 3 shifts a day. Each shift is 480 min. the break for lunch is 30 min. in the period of 9 weeks the customers' request is 4338 televisions. Calculate the takt time in the period. **05**
- b.** How do RFID and Bar Code technology differ? **05**
- c.** Define Distribution Network Design. Compare the various design options for Distribution Networks. **10**
- Q.6 a.** Explain Transport Management System (TMS)? What are the benefits of a Transport Management System (TMS)? **10**
- b.** Define and explain Cross-docking concept with a neat sketch. Mention its advantages and disadvantages. **10**

Time: 3 hour

Max Marks:80

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- Note: 1. Q1 is compulsory
2. Solve any three from remaining

- Q1 A. Evolution of Models for Product Life Cycle Cost Analysis 20
 B. Importance & Benefits of PLM
 C. Explain Product design for manufacturability.
 D. What is PLM? State its need and scope and phases.
 E. What is digital mockup? State its benefits and list software used for
 it.
- Q.2 A. Explain the concept of New Product Development (NPD) and its Strategies. 20
 B. Explain Life Cycle Environmental Strategies and Considerations for
 Product Design.
- Q.3 A. Explain the general framework of LCCA. 20
 B. What is sustainable development? Explain role of science & technology in
 it.
- Q.4 A. List down at least ten reasons for implementing a PDM system and 20
 explain barriers to PDM implementation.
 B. Explain cost analysis and life cycle approach in detail.
- Q.5 A. Explain the strategies for recovery at the end-of-life cycle 20
 B. What is the virtual product development process? Write its applications
 and advantages.
- Q.6 A. Explain Modeling and simulations in Product Design with suitable examples. 20
 B. Explain the process of Developing PLM Vision and PLM Strategy.
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 2. Solve any three from remaining.
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- Q1. Solve any Four** **20**
- A State advantages of condition-based monitoring.
 B Explain piezoelectric accelerometer.
 C Define averaging
 D Define natural frequency and resonance.
 E State different application of laser doppler vibrometry.
 F Explain soft foot condition.
- Q2.**
- A Explain working and constructional details of a laser doppler vibrometer. **10**
 B Describe Fast Fourier Transform (FFT) with its advantages and disadvantages. **10**
- Q3.**
- A Explain unbalance in detail, its causes and step by step balancing procedure with the help of vector diagram. **10**
 B Explain classification of signals in data acquisition and signal processing. **10**
- Q4.**
- A Explain misalignment and its different types with unique vibration characteristics. **10**
 B Explain in detail faults related to gears. **10**
- Q5.**
- A Explain different faults associated with rolling element bearing with their unique vibration characteristics. **10**
 B Elaborate case study of sugar mill condition monitoring in detail. **5**
 C Differentiate time domain and frequency domain analysis **5**
- Q 6.**
- A Elaborate case study of turbine problem from sensor selection and mounting, measurement, plot, and fault identification. **10**
 B Explain spectral amplitude scaling with scale up and scale down operation. **5**
 C Explain criteria for selection of sensor. **5**
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- N.B. :** (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1** Solve any four **20**
- a** State the role of non-conventional energy sources in the current energy scenario of the India.
 - b** Discuss the I-V characteristics of a solar PV cell.
 - c** Illustrate the working principle of liquid dominated geothermal power plant.
 - d** State the factors considered for site selection to install wind power plant.
 - e** Define the following angles with a neat sketch,
 - i. Zenith angle
 - ii. Surface azimuth angle
 - iii. Latitude angle
 - iv. Solar declination angle
- 2 a** Illustrate the working principle of KVIC biogas plant with the neat sketch. **10**
- b** Determine the Local Solar time and declination at a location latitude $23^{\circ} 15' N$, longitude $77^{\circ} 30' E$ at 12.30 IST on Sep. 28. Equation of time correction is given from table or chart = $-(1^m 01^{s})$. **10**
- 3 a** Discuss types of fuel cells briefly. **10**
- b** Solar thermal power plant system installation is expected to minimize the plant's annual energy bill by Rs. 14 lacs. If the capital cost of new solar thermal power plant installation is Rs. 89 lacs and the annual operating and maintenance cost is 5 lacs. Determine, **10**
- (a) The expected payback period for the proposed project.
 - (b) The initial rate of return / return on investment.
- 4 a** Show that the ideal maximum theoretical efficiency is 59% (Bet'z coefficient) for a horizontal axis wind turbine. **10**
- b** Illustrate the working principle of ocean thermal energy conversion (OTEC) system with the neat sketch. **5**
- c** Classify the types of energy audit processes. **5**

- 5 a** Describe the following briefly, **10**
- (i) Factors affects the efficiency of PV cells and
 - (ii) Factors affects the Life cycle of solar PV cell.
- b** Following data is given for a family biogas digester; **10**
C.V. of methane = 25 MJ/m³, Burner efficiency = 55 %, Number of cows = 7,
Retention period = 27 days, Temperature of fermentation = 30⁰C, Day matter
collected/cow/day = 1.5 kg, Density of matter in the fluid in the digester = 50
kg/m³, Biogas yield=0.25 m³/ kg of dry input, Methane production in Biogas =
0.8.
Determine volume of Digester and power available from biogas digester.
- 6 a** Describe the solar space heating and cooling. **10**
- b** Differentiate between the vertical and horizontal axis wind turbine. **5**
- c** Describe the working principle of Solar PV cells. **5**

Time: (3 Hours)

[Total Marks: 80]

N.B.: (1) Question **No.1** is **Compulsory**.

(2) Attempt **any three** questions from the **remaining** questions.

(3) Assume **suitable** data wherever required but **justify** the same.

(4) **Figures** to the **right** indicate **full marks**.

(5) Answer to each new question must start on a **fresh page**.

1. (a) What type of data analytics is used in healthcare? [5]
(b) Which imaging technologies do not use radiation? Explain those technologies in brief. [5]
(c) What you mean by the term Natural Language Processing for clinical/medical text data. [5]
(d) Define Advanced Data Analytics for Healthcare with six real-world applications. [5]
2. (a) Define Phenotyping Algorithms with key aspects. [10]
(b) What is visualization? Explain different types of visualization techniques, tools with advantages and disadvantages. [10]
3. (a) Illustrate Predictive Modelling in Healthcare with at least two examples. [10]
(b) Describe the following: - [10]
 1. BAN
 2. Dense/Mesh area network for smart living environment
 3. Sensor Technology
 4. Image Registration
 5. Feature Extraction
4. (a) What are the components of EHR? What are the barriers for adopting EHR? [10]
(b) Explain types of Fraud detection in healthcare with the help of example. [10]
5. (a) What are the challenges one may face while processing Covid clinical reports? [10]
(b) Define Data science with applications of healthcare data analytics. [10]
6. (a) How will we analyze Mental health status of someone using their tweets on twitter? [10]
(b) Define Biomedical Imaging Modalities with their Applications. [10]

(3 hrs.)

Maximum Marks = 80

- NB:**
- 1. Question No. 1 is compulsory and solve any THREE questions from remaining questions**
 - 2. Assume suitable data if necessary**
 - 3. Draw clean and neat diagrams**

- Q1.**
- Explain Hyperledger sawtooth. [05 Marks]
 - Explain uses and limitations of python in blockchain. [05 Marks]
 - Describe the features in Ethereum that are not available in Bitcoin. Also discuss what is Whisper and Swarm. [05 Marks]
 - What are the best practices for blockchain dApp Testing [05 Marks]
- Q2**
- Describe each Component of Ethereum. [10 Marks]
 - With a neat diagram explain the components of the dApp architecture. [10 Marks]
- Q 3.**
- Explain built in and user defined functions in solidity with example. [10 Marks]
 - Explain Chaincodes For Developers and Operators In Blockchain [10 Marks]
- Q 4.**
- With a neat diagram explain Transaction Flow in Hyperledger Fabric [10 Marks]
 - What is Decentralized Autonomous Organization? Discuss its benefits and limitations. [10 Marks]
- Q 5.**
- Explain ERC20 token standard with its functions. Compare how ERC721 tokens are different than ERC20 tokens. [10 Marks]
 - Explain contract inheritance and modifiers in solidity with example. [10 Marks]
- Q .6.**
- Explain use of blockchain for Supply Chain Management. [10 Marks]
 - Describe IPFS with reference to file storage in Blockchain. [10 Marks]

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- (1) Question No.1 is Compulsory
- (2) Attempt any three questions out of remaining five.
- (3) All questions carry equal marks
- (4) Assume suitable data, if required and state it clearly.

1. Attempt **any FOUR** **[20]**
 - a. Discuss CIA Triad in Information Security.
 - b. Explain concept of High Availability.
 - c. Illustrate various XSS attacks
 - d. Explain Information Security issues in Cloud computing
 - e. Explain various threats to Access Control.
 2.
 - a. Describe Risk assessment techniques outlined in ISO31010 framework. **[10]**
 - b. Define Intrusion Detection System. Explain in detail IDS techniques. **[10]**
 3.
 - a. Explain Availability, Mean Time Between Failure (MTBF), Mean Time to Repair (MTTR), and Calculate the Availability for a product has MTBF of 200hrs and MTTR of 10 hrs. **[10]**
 - b. Explain in detail COBIT Framework. **[10]**
 4.
 - a. Describe various Disaster Recovery Techniques. **[10]**
 - b. Explain any two different Access Control Models from the following. **[10]**
 - a. Discretionary,
 - b. Mandatory,
 - c. Role based
 - d. Rule-based.
 5.
 - a. Compare the quantitative and qualitative risk assessment approaches. **[10]**
 - b. Explain various types of Audits in Windows Environment. **[10]**
 6.
 - a. What are the key characteristics of OCTAVE approach? **[10]**
 - b. What are the objectives of IT ACT? Explain in detail IT ACT 2000 and IT ACT 2008. **[10]**
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- Question 1 is compulsory.
- Attempt any three questions from remaining.
- Design data book PSG, Mahadevan, Kale and Khandare are permitted to use.

Q1. Answer any four from the following.

- | | | |
|----|--|---|
| a) | What do you mean by morphology of mechanical design? Explain any three phases of it. | 5 |
| b) | What are the different types of piston rings? Explain the function of them. | 5 |
| c) | Why cleaning of belt is necessary in belt conveyor? list down different types of cleaners. | 5 |
| d) | Draw a neat sketch of centrifugal pump and explain its principle of working? | 5 |
| e) | State the assumptions made in Lewis's bending strength equation and its significance. | 5 |

Q2. A single stage helical gear box is used to transmit 12.5 kw power at 1440 rpm of pinion. The desire transmission ratio is 5:1. Assume 20-degree FD tooth profile and material C50 for pinion and gear.

- | | | |
|----|--|---|
| a) | Determine the module. | 5 |
| b) | Check gear for dynamic load. | 5 |
| c) | Check gear for contact stresses. | 5 |
| d) | Determine the gear teeth proportions and write constructional details. | 5 |

Q3. The following specification refers to an EOT crane. **(20 Marks)**

Application - Class II
load to be lifted - 100 KN
Hoisting Speed - 10 m/min
Maximum lift – 5 m

- | | | |
|----|--|---|
| a) | Design 6*37 type of rope and find its life. | 5 |
| b) | Select a standard hook, material and design stresses induced at the most critical section. | 5 |
| c) | Select suitable motor for hoisting. | 5 |
| d) | Design the rope drum. | 5 |

Q4 a) Define Lead, Lead Angle, Normal pitch and Helix angle with respect to the worm gearing. 5

- Q 4 b) The specification of belt conveyer system are
 Capacity = 300 TPH,
 Material to be conveyed = Lime stone,
 Maximum lump size = 80 mm,
 Inclination = 12°,
 Center to Center distance = 50 m,
 Troughing angle 25°,
 I. Design conveyor belt. 10
 II. Find motor capacity 5
- Q5.a) A centrifugal pump directly coupled to a motor is required to deliver 1000 LPM of water at 30 degree C against a total head of 25 m.
 I. Select the suitable type of motor power and speed. 5
 II. Determine the impeller diameter, inlet and outlet vane angles and no. of vanes. 5
- Q5. b) A Gear pump required to deliver 25 LPM of SAE20 oil at a pressure of 25 bar. Efficiency of the gear pump is 80 %.
 I. Select suitable standard motor. 5
 II. Design gear and check for bending failure. 5
- Q6. a) Explain why an I – section with $I_{xx} \leq 4 I_{yy}$ is selected for connecting rods of an I.C. Engine? 5
- Q6. b) A four-stroke single cylinder water cooled Diesel engine develops 7.5 KW brake power when operating at 1000rpm.
 I. Determine the bore and stroke of a cylinder. 5
 II. Design wet liner. 5
 III. Design piston with pin and piston rings. 5
