

Time: 3 Hours

Total Marks: 80

Note

I Question No. 1 is **Compulsory**

II Attempt any three out of remaining five

III Elaborate each answer with the help of an **example**

Question

Marks

No.

Q1 a) Explain the Supply chain performance measuring SCOR model with neat diagram **10**

Q1 b) What is definition of supply chain management? Explain with neat block diagram. And What is significance of supply chain management in manufacturing industries? **10**

Q2 a) Forecasting roles in supply chain management and forecasting methods **10**

Q2 b) Explain Aggregate planning in supply chain management **10**

Q3 a) Explain performance measurement of Supply chain Management model (Supply Chain Operation Reference) Model **10**

Q3 b) What is a role of warehouse in supply chain management? What are the types of ware house in supply chain? What are the functions of warehousing?

Q4 a) List out Types of purchase procedures and policies and Explain bidding policy and standard purchase order terms and conditions. **10**

Q4 b) Explain different issues of supply chain management in FMCG Companies **10**

Q5 a) Design of supply chain network channels and distribution modes and list out the supply chain factors consider facility location, capacity allocation, transportation facility in the network design. **10**

Q5 b) An item is used at a uniform rate of 50,000 units per year. No shortage is allowed and delivery is at an infinite rate. The ordering, receiving and hauling cost is Rs. 13 per order, while inspection cost is Rs. 12 per order. Interest costs Rs. 0.056 and deterioration and obsolescence cost Rs. 0.004 respectively per year for each item actually held in inventory plus Rs. 0.02 per year per unit based on the maximum number of units in inventory. Calculate the EOQ. If lead time is 20 days, find re-order level. **10**

Q6 Answer any Four questions **20**

- a) Explain role of transportation in supply chain and Measure performance of transportation in supply chain management?
- b) Vendor Managed Inventory
- c) Reverse logistics management with detail block diagram
- d) Green Supply Chain Management
- e) Customer Order Decoupling Point (CODP)
- f) Third Party Logistics

Duration: 03 Hrs

Maximum marks: 80 marks

Note :

- Question No.1 is compulsory.
- Solve ANY THREE questions from the remaining five questions.
- Figure to the right indicates full marks.
- Assume suitable data wherever required, but justify the same.
- Design data book by PSG, Mahadevan and ICE design data book by Kale and Khandare is permitted to use.

- | Q. 1 | Solve ANY FOUR questions from following. | Marks |
|-------------|---|--------------|
| | a) Explain flow chart for design morphology with suitable examples | (5) |
| | b) Derive relation between average module and transverse module for bevel gear. | (5) |
| | c) Differentiate between the involute tooth profile and cycloidal tooth profile. | (5) |
| | e) Explain optimum design and system concept in design. | (5) |
| | f) Derive the hydraulic force equation for the gear pump. | (5) |
| Q. 2 | a) A worm and wormwheel drive is to be designed for the following specification.
Power to be transmitted: 12 kW
Worm speed: 900 rpm
Velocity ratio: 30 | |
| | i) Determine the axial module of worm based on the wear failure under static condition by selecting suitable material. | (10) |
| | ii) Check the worm wheel for bending failure under static load. | (5) |
| | iii) Determine the estimated projected area for the gear box using AGMA relation. | (5) |
| Q. 3 | a) Explain the pulleys for gain in speed and gain in force. | (5) |
| | b) Design a hoisting rope for lifting load of 8 tonne. Select suitable sheave and check for fleet angle. | (15) |

- Q. 4** a) Explain the construction of wire rope and its designation. (5)
- b) A belt conveyor to be designed for the following specification:
- Capacity : 120 TPH
- Material to be conveyed : Coal
- Inclination : 10 degree
- Lump size : 80 mm
- Centre to Centre distance : 100 m
- i) Determine the width of the belt (5)
- ii) Select suitable motor power and speed. (5)
- iii) Determine number of ply for the conveyor belt. (5)
- Q. 5** a) State the types of gear tooth failure and corrective measure for it. (5)
- b) A single cylinder, water cooled four stroke diesel engine is to be designed for the following specification.
- Brake power : 22 kW
- Speed : 1500 rpm
- Compression ratio : 14
- By making suitable assumptions,
- i) Determine a standard cylinder bore diameter. (5)
- ii) Determine minimum liner thickness. Also, check for pressure and thermal criteria. (5)
- iii) Determine cover thickness of the cylinder head. (5)
- Q. 6** a) With neat sketch, explain the working of external gear pump. (5)
- b) A centrifugal pump is to be designed for 1000 LPM discharge and 25 m total manometric head. Determine,
- i) Inlet and tip diameter of an impeller. (5)
- ii) Inlet and exit blade angle. (5)
- iii) Number of blades. (5)

(3 Hours)

[Total Marks : 80]

Please check whether you have got the right question paper.

N.B.:

1. Solve any four questions.
2. Assume suitable data if any.

1. Explain any four 20
 - A. ISO 1400 framework
 - B. Simultaneous engineering
 - C. What is digital mockup? State its benefits and list software use for its
 - D. Explain Product design for environment.
 - E. PLM Vision and Strategies.
2. A) What do you mean by Design for X. How will you use design for X tools in the design process? 20
B) Explain useful life extension strategies. 20
3. A) Explain the general framework of LCCA. 20
B) What is sustainable development? Explain role of science & technology in it. 20
4. A) Discuss new product development process. 20
B) Explain cost analysis and life cycle approach in detail. 20
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. 20
6. A) With Suitable example explain various product life cycle phases. Explain importance and benefits of PLM. 20
B) Explain various reasons for implementation of PDM system. Explain various barriers for PDM implementation. 20

Duration: 3hrs

[Max Marks:80]

- 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
- Describe the current scenario of non-conventional energy sources of the World.
 - Describe the types of solar photovoltaic systems.
 - Describe the working principle of vapour dominated geothermal power plant.
 - Describe the working principle of solar paraboloid concentrating collector.
 - State the factors considered for site selection to install wind power plant.
- 2 a Illustrate the working principle of fixed dome biogas plant with the neat sketch. 10
- b Estimate the monthly average of daily global radiation on a horizontal surface at Baroda, 22° N, $73^\circ 10'$ E on 15th September. If the average sunshine hour/day is 11, $a = 0.31$, $b = 0.47$. (Assume $I_{sc} = 1367 \text{ W/m}^2$) 10
- 3 a A solar photovoltaic plant system installation is expected to minimize the plant's annual energy bill by Rs. 15 lacs. If the capital cost of new solar photovoltaic plant installation is Rs. 85 lacs and the annual operating and maintenance cost is 4 lacs. Determine, 8
- The expected payback period for the project
 - The initial rate of return / return on investment.
- b Describe the different methods of hydrogen production and storage. 6
- c Describe the working principle of oscillating water column wave energy conversion technique. 6
- 4 a A propeller type horizontal wind turbine having wind characteristics, speed of wind is 18 m/s at 1 standard atmospheric pressure and 17°C . The rotor has diameter of 100 m and its operating speed is 42 rpm at maximum efficiency. Determine: 8
- the total power density in the wind
 - the maximum obtainable power density assuming $\eta = 42\%$
 - the torque and axial thrust
- b Illustrate the working principle of single and double basin tidal system with the neat sketch. 8
- c Discuss the I-V characteristics of a solar PV cell. 4

- 5 a Discuss the factor which affects the efficiency and life cycle of solar PV cell. 8
- b Describe the working of a natural circulation solar water heater with a help of neat sketch. 8
- c Calculate the solar declination angle and day length at a location, latitude 35°N on March 20. 4
- 6 a Describe the working principle of solar cooker and drier system with a neat sketch. 8
- b Following data is given for a family biogas digester; 8
C.V. of methane = 26 MJ/m^3 , Burner efficiency = 65 %, Number of cows = 6, Retention period = 28 days, Temperature of fermentation = 30°C , Day matter collected/cow/day = 2.5 kg, Density of matter in the fluid in the digester = 50 kg/m^3 Biogas yield = $0.25 \text{ m}^3/\text{kg}$ of dry input, Methane production in Biogas = 0.8.
Determine volume of Digester and power available from biogas digester.
- c State the dissimilarity between horizontal axis wind turbine and vertical axis wind turbine. 4

Time: 3 hour

Max Marks: 80

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

- Q1 Solve any Four out of Six 20**
- A. Write a short note on health monitoring of industrial pumps.
 - B. Describe the different applications of Laser Doppler vibrometry (LDV).
 - C. Explain the Unique reasons for mechanical looseness.
 - D. Discuss the importance of continuous pump vibration monitoring.
 - E. Explain the essential settings in the Data Acquisition System (DAS).
 - F. Explain the benefits of Vibration based condition monitoring?
- Q2**
- A. What is Fast Fourier Transform (FFT)? What are its applications, advantages and disadvantages? **10**
 - B. Explain the methods to diagnose the vibrations due to bearing faults? Also explain the vibration generated by defective rolling bearings. **10**
- Q3**
- A. Explain the main methods used for attaching sensors to monitoring locations in predictive maintenance. **10**
 - B. What are the methods for shaft alignment and how do you diagnose a misalignment situation? **10**
- Q4**
- A. What are the unique vibration characteristics for faults in gearboxes? **10**
 - B. What are different faults associated with rolling element bearing? What are their unique vibration characteristics? **10**
- Q5**
- A. What are the challenges that need to be addressed by the vibration monitoring system in sugar mills? **10**
 - B. Explain the four classes of fourier transforms with graphs. **10**
- Q6**
- A. Explain vibration-based condition monitoring and fault diagnosis in rotating machines. **10**
 - B. Explain the importance of signal conditioning with examples. **10**