

(3 Hours)

Total Marks: 80

- N.B.** 1) **Question No. 1 is compulsory**
 2) Solve **Any Three** from remaining **Five** questions.
 3) Use of standard data book like PSG, Mahadevan and Kale Khandare is permitted
 4) Assume suitable data if necessary, giving justification

- Q1 Answer any **Four** from the following
- What are the advantages of multifall system in hoisting mechanism? **5**
 - Draw a flow chart for the Morphology of design and explain each phase. **5**
 - State the significance of specific speed and NPSH in the design of a centrifugal pump? **5**
 - Explain why an I – section with $I_{xx} \leq 4 I_{yy}$ is selected for connecting rods of an I.C. Engine? **5**
 - Write the different types of piston rings and its functions **5**
- Q2 The following specification refers to an EOT crane. **20**
- Application - Class II
 load to be lifted - 120 KN
 Hoisting Speed - 6 m/min
 Maximum lift - 10 m
 Velocity of cross travel - 20 m/min.
 Velocity of long travel - 30 m/min.
- Select a standard hook, material and design stresses and find the induced stresses at the most critical section.
 - Select suitable type and size of the wire rope for an expected life of 12 months.
 - Design the pulley axle and select suitable bearing.
 - Design the rope drum.
- Q3 A centrifugal pump directly coupled to a motor is required to deliver $50 \text{ m}^3/\text{hour}$ of water at 30°C against a total head of 32 m. **20**
- Select the type of motor speed and determine the power.
 - Determine the impeller diameter, inlet and outlet vane angles and no. of vanes.
 - Design the impeller shaft.
 - Design the shape of the volute casing.
 - Decide diameters of the suction and delivery pipes.
- Q4 Design the complete 20° troughing belt conveyer including drive for the following application. **20**
- Material to be conveyed =Coal.
 Maximum lump size = 100 mm.
 Capacity = 250 TPH.
 Inclination = 12° .
 Center to center distance = 100 m.

- Q 5 a) Design the gear pump to deliver 80 LPM of SAE 30 oil at a pressure of 70 bar. Design should include the design of gear **10**
- a) Gear, drive shaft
 - b) Suitable motor for gear pump.
- Q 5 b) A three stage, twelve speed gear box is to be designed for spindle speed varying between 50 rpm and 3000 rpm. The second stage consist of three speed steps. If the gear box is driven by 7.5 KW, 1440 rpm electric motor. Assume same module for all gears. **10**
- a) Draw the speed diagram and
 - b) Draw the gearing diagram.
- Q 6 a) A four stroke single cylinder water cooled Diesel engine develops 7.5 KW brake power when operating at 1000 rpm. **15**
- a) Determine the size of engine (bore and stroke)
 - b) Design wet liner and cylinder.
 - c) Design piston with pin and piston rings
- Q 6 b) Illustrate the working of external gear pump with neat sketches. **5**

Time: 3 hours

Max. Marks: 80

- Note:**
1. Assume suitable data if necessary
 2. Figures to the right indicate full marks
 3. Question No. 1 is compulsory
 4. Solve any three out of the remaining five questions

Q1. Solve any four

- | | | |
|---|--|----------|
| A | What is the difference between Magnetostrictive and Piezoelectric transducers? | 5 |
| B | Explain Carbon Nanotube with properties. | 5 |
| C | Explain EDM process with its application | 5 |
| D | What do you mean by Thermoelectric materials? | 5 |
| E | Explain carbon Nanotube. | |
| F | What is Soft Matter? List the properties of it | 5 |

Q2.

- | | | |
|---|--|-----------|
| A | Explain different types of non polymer based nanocomposites. | 5 |
| B | Classify the different types of Electroactive polymers. | 5 |
| C | Explain various tuning strategies for Split Ring Resonators. | 10 |

Q3.

- | | | |
|---|--|-----------|
| A | Explain selective powder binding (SPB) process with neat sketch | 5 |
| B | List the application of Magneto-rheological Fluids. | 5 |
| C | Explain Stereo lithography (STL) process in detail with suitable diagrams. | 10 |

Q4.

- | | | |
|---|---|-----------|
| A | Elaborate the application of smart materials. | 5 |
| B | Explain with neat sketches the one-way and two-way shape memory effect. | 5 |
| C | Explain the LIGA process in detail. | 10 |

Q5.

- | | | |
|---|--|-----------|
| A | Write down the advantages of the Generative manufacturing processes. | 5 |
| B | Explain thermoelectric Energy Harvesting Technique with diagram. | 5 |
| C | Explain Hysteresis Loop and state advantages, disadvantages and application of Hysteresis Loop | 10 |

Q 6.

- | | | |
|---|---|-----------|
| A | Explain Ion based Actuation in detail. | 5 |
| B | What is the difference between traditional and smart manufacturing? | 5 |
| C | Explain USM process and write advantages and disadvantages of USM | 10 |

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Note :

- Question No.1 is compulsory.
- Solve ANY THREE questions from the remaining five questions.
- Assume suitable data wherever required, but justify the same.

Q. 1 Solve ANY FOUR questions

- a) Explain the 'Customer as Participant' and 'Customer as Product' service operations. 5
- b) What are the factors influencing effective capacity? 5
- c) Differentiate between CPM and PERT. 5
- d) Define the following terms for assembly line: 5
 i) Workstation ii) Cycle Time iii) Task iv) Predecessor Task v) Balance Delay
- e) Explain the JIT concept and highlight the seven wastes considered in it. 5

- Q. 2 a) Illustrate the Production System with its characteristics. Explain the different types of Production Systems. 10
- b) A firm uses a simple exponential smoothing method with a smoothing constant of 0.15 for estimating the demand for a particular product. The actual demand for six months is available. The forecast for June is 500 units. Estimate the forecast for December. Calculate Mean Absolute Deviation (MAD) and BIAS if the actual demand for December is 510 units. 10

| Months | Jun | Jul | Aug | Sep | Oct | Nov |
|---------------|-----|-----|-----|-----|-----|-----|
| Actual Demand | 450 | 505 | 516 | 488 | 467 | 554 |

- Q. 3 a) Use a graphical method to minimize the time required to process the following jobs on the machines. For each machine specify the job which should be done first. Also, calculate the total elapsed time to complete both jobs. 10

| | | Machines | | | | |
|-------|------------|----------|---|---|----|----|
| Job 1 | Sequence | A | B | C | D | E |
| | Time (Hrs) | 6 | 8 | 4 | 12 | 4 |
| Job 2 | Sequence | B | C | A | D | E |
| | Time (Hrs) | 10 | 8 | 6 | 4 | 12 |

- b) Explain the step-by-step evolution of ERP and give its features and limitations. 10
- Q. 4 a) A project scheduled has the following characteristics as shown in the table. Draw the network diagram, find the total float for each activity and find the critical path. 10

| Activity | 1-2 | 1-3 | 2-4 | 3-4 | 3-5 | 4-9 | 5-6 | 5-7 | 6-8 | 7-8 | 8-10 | 9-10 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| Time | 4 | 1 | 1 | 1 | 6 | 5 | 4 | 8 | 1 | 2 | 5 | 7 |

- b) Draw a Travel Chart for a workshop that manufactures three products P, Q & R by using the same manufacturing facilities arranged in 6 departments A, B, C, D, E & F. The material handling is done by forklift truck. Pallets designed for material handling can carry 200, 300 & 150 pieces of the products P, Q & R respectively. The annual demand for each product is 12,000 numbers. The sequence of operation of the product demand that the products move is given in the table below. 10

| Product | Movements |
|---------|-------------|
| P | A-E-B-D-C-F |
| Q | A-B-C-D-E-F |
| R | C-B-A-E-D-F |

- Q. 5 a) The following table gives the details of the workstations. Show the precedence diagram and determine the balance delay by Rank Positional Weight Method. 10

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------------|-----|-----|-----|-----|-----|------|------|-----|-------|------|------|------|
| Time (Mins) | 0.2 | 0.4 | 0.7 | 0.1 | 0.3 | 0.11 | 0.32 | 0.6 | 0.27 | 0.38 | 0.5 | 0.12 |
| Preceded by | -- | -- | 1 | 1,2 | 2 | 3 | 3 | 3,4 | 6,7,8 | 5,8 | 9,10 | 11 |

Assume cycle time as 0.92 minutes.

- b) Explain the principles of Lean and Agile manufacturing. 10

- Q. 6 a) Illustrate forward scheduling and backward scheduling. 5

- b) Explain the strategies in aggregate planning. 5

- c) Explain the concept of a Relationship chart. 5

- d) Complete the material requirement plan for an item shown below. The order quantity is 50 units, lead time is 2 weeks with no safety stock required. 5

| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------------------|----|----|----|----|----|----|----|----|----|
| Projected Requirement | 10 | 12 | 15 | 18 | 20 | 22 | 25 | 28 | 30 |
| Receipts | | | | | | | | | |
| On hand at the end of the period (30) | | | | | | | | | |
| Planned Order Release | | | | | | | | | |

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Time: 3 hour

Max. Marks: 80

Note-

1. Question one is compulsory.
2. Solve any three out of remaining five.

- Q.1 Explain any four of the following. 20**
- a Definition TQM and explain TQM concept
 - b Seven QC tools and short explanation
 - c Supplier selection
 - d Bench Marking
 - e Explain Win –Win policy with supplier.
- Q.2 a OC Curve for $n=80$, $c=2$, $AQL=1\%$, $LTPD=5\%$, $\alpha =0, 0466$, $\beta =0, 2306$, and Probability of Acceptance $= (1-\alpha)=0,9534$. Draw OC Curve 10**
- b Describe Business Process Re-Engineering in connection with TQM. 10**
- Q.3 a Explain PDCA Cycle with examples 10**
- b Explain various steps in implementing quality management system. 10**
- Q.4 a What is six sigma? Explain six sigma approach DMAIC. 10**
- b Describe the contribution of Juran and Crosby to quality management. 10**
- Q.5 a Explain the purpose of giving Malcom Baldrige quality award. 10**
- b Explain the following charts 10**
- (i) X-bar – R chart
 - (ii) P-chart
 - (iii) C-chart
- Q.6 a 1.Explain the Barriers of TQM' 5**
- 2.Write note on cost of quality 5**
- b What is Bench Marking concept? List out the process involves in the Bench Marking concept implementation 10**

Time: 3 hour

Max. Marks: 80

Note:

1. Question No.1 is compulsory.
2. Attempt any three questions from the remaining.
3. Assume suitable data if required.

- Q1. Solve any four out of five. 20**
- a** Define Adiabatic flame temperature &, Enthalpy of formation. **5**
 - b** Differentiate between boiler Mountings and accessories. **5**
 - c** Discuss methods to improve the thermal efficiency of the gas turbine cycle **5**
 - d** Classify Jet Propulsion engines. **5**
 - e** Differentiate between impulse and reaction water turbines. **5**
- Q2. a** A Pelton wheel is required to develop 6MW when working under a head of 300 m. It rotates at 550 rpm. Assuming Jet ratio of 10 and overall efficiency of 85%, Calculate: i) the diameter of the wheel ii) the quantity of water required, and iii) the Number of Jets. Take $CV = 1.0$ and speed ratio = 0.45. **10**
- b** The piston area of a single-acting reciprocating pump is 0.15 m^2 and the stroke is 30 cm. The water is lifted through a total head of 15 m. The area of the delivery pipe is 0.03 m^2 . If the pump is running at 50 rpm, find the coefficient of discharge, percentage slip, and power required to derive the pump. The actual discharge is 35 lit/sec. Take mechanical efficiency = 0.85 **10**
- Q3. a** A boiler plant supplies 5400 kg of steam per hour at 7.5 bar and 0.98 dry from feed water at 41°C . The boiler uses 670 kg of coal per hour having a calorific value of 31000 KJ/Kg i) Degree of superheat and temperature of steam generated ii) Calorific Value of Coal in KJ/ Kg. Determine: i) The thermal efficiency of the Boiler ii) Equivalent evaporation **10**
- b** What is the use of air vessels? Discuss the cavitation its effects and remedies for a pump. **10**
- Q4.a** Explain velocity compounding of impulse turbines. **6**
- b** Calculate the Enthalpy of combustion of gaseous Propane at 500K. The average value of specific heat of propane between 25°C and 500K is 2.1 KJ/Kmol-K **6**
- c** A gas turbine installation works on Brayton cycle between the temperature limits of 35°C and 715°C . For the maximum work developed calculate temperature at the end of compression, pressure ratio and thermal efficiency. **8**
- Q5.a** Discuss with sketch impact of jet on stationary curved plate and derive an expression for the same. **8**
- b** Explain construction and working of Rocket Engine. Also write its application. **8**
- c** Discuss different types of casing used in centrifugal pumps. **4**
- Q6. a** In a De-Laval turbine, steam issues from the nozzle with a velocity of 850 m/s. The nozzle angle is 20° . Mean blade velocity is 350 m/s and the blades are equiangular. The mass flow rate is 1000 kg/min. The friction factor is 0.8. Determine the blade angles, Power developed in KW, blade efficiency, stage efficiency if nozzle efficiency is 93%. **10**
- b** Derive an expression for maximum efficiency of Pelton wheel turbine. **10**

Time :(3 Hours)

Total Marks: 80

Note:

1. Question No. 1 is compulsory.
2. Attempt any THREE out of the remaining FIVE questions.
3. Assume suitable data if necessary.

- Q. 1.** Answer any FOUR of the following: (20)
- (a) What are the key components of Sales Budget?
 - (b) Write in short about MSMED Act 2006.
 - (c) What factors influence customer behavior?
 - (d) Explain any three characteristics of sole proprietorship.
 - (e) What is idea germination in entrepreneurship?
- Q. 2.** (a) Discuss on five critical problems faced by new business owners. (10)
- (b) What are the biggest challenges to being an entrepreneur? (10)
- Q. 3.** (a) Enlist two points as to why private company is more desirable than a public company. (10)
- (b) State any four primary activities that are essential for a firm to have a competitive advantage as given by Porter. (10)
- Q. 4.** (a) What are the four types of Firm-level growth strategies? (10)
- (b) Write short note on PMEGP and its advantages. (10)
- Q. 5.** (a) Explain the factors affecting channels of distribution with relation to market Considerations. (10)
- (b) What is meant by Venture Capital? State the features of Venture Capital. (10)
- Q. 6.** Attempt the following:- (20)
- (a) Discuss on risk management.
 - (b) Explain in short about Industrial Investment Bank of India Ltd. (IIBI)
 - (c) What is Business Plan? State the importance of writing business plan for the Entrepreneur Group.
 - (d) Write short note on Women Entrepreneurship Development with 3 examples.