

(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

- Q 1** Answer any **Four** from the following
- a) Explain system concepts in design with suitable examples. 5
  - b) Explain different types of gear tooth failures. 5
  - c) Explain different types of take-up arrangement in belt conveyor. 5
  - d) Draw a neat sketch of centrifugal pump and explain its Working Principle. 5
  - e) Explain why an I – section with  $I_{xx} \leq 4 I_{yy}$  is selected for connecting rods of an I.C. Engine? 5
- Q 2** A two-stage gear box is used to transmit 10 KW power from an electric motor running at 1440 rpm to a machine with overall reduction ratio of 20. For the second stage spur gear pair, 20
- 1) Determine the module using bending failure.
  - 2) Check the gear for dynamic load by using Buckingham's method.
  - 3) Check the gears for wear strength.
  - 4) Work out constructional details of gears.
- Q 3 (a)** The following specifications refer to an EOT crane. 20
- Load to be lifted: 200 KN.
  - Hoisting speed: 12 m/min.
  - Application: Class-II.
- 1) Select suitable wire rope, find its diameter and check it for expected life.
  - 2) Select standard hook and check the induced stress only at  $45^\circ$  inclined plane
  - 3) Design the pulley axle and select suitable bearing.
  - 4) Design the cross piece, side plate and shackle plate.
- Q 4 (a)** Explain how assumptions made in Lewis equation are taken in account during design? 5
- (b)** The Specification of belt conveyer system are, 15
- Capacity = 250 TPH.
  - Material to be conveyed = Lime stone.
  - Maximum lump size = 70 mm.
  - Inclination =  $12^\circ$ .
  - Center to Center distance = 60 m. (Assume troughing angle  $25^\circ$ )
- 1) Design conveyor belt.
  - 2) Find motor capacity.



- Q 5 (a)** A centrifugal pump is to be designed for following specifications: 10  
Static suction head = 4m  
Length of suction pipe = 11m  
Static delivery head = 19m  
Length of delivery pipe = 40m  
Discharge = 2500 LPM  
Fluid to be lifted = water at room temperature.
- 1) Design impeller.
  - 2) Design impeller shaft.
- (b)** It is required to design the gear pump for flow 70 LPM and pressure 50 bar. 10
- 1) Select suitable motor power, determine gear module & check it for bending.
  - 2) Design the driver gear shaft.
- Q.6** A four-stroke single cylinder water cooled Diesel engine develops 10KW brake power 20  
when operating at 1000rpm.
- 1) Determine the size of engine (bore and stroke)
  - 2) Design wet liner and cylinder.
  - 3) Design piston with pin and piston rings
  - 4) Design the connecting rods
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## BE sem VII Mechanical R-19 C scheme

Time: 3 Hours

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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.

- Q. 1 Attempt **any four** questions from following. (Each question carries 5 marks)
- a) Differentiate between an Efficient Supply Chain and a Responsive Supply Chain.
  - b) Compare the various design options for a Distribution Network in a Supply Chain.
  - c) Differentiate between Bar Codes and RFID used in Supply Chains.
  - d) State the assumptions underlying the basic EOQ model.
  - e) Compare 3PL and 4PL with respect to Supply Chain Management.
- Q. 2
- a) Describe are the functions served by inventories. What are the various types of inventories? 10
  - b) State the various risks a Supply Chain is subjected to. How can the various risks be overcome in a supply chain? 10
- Q. 3
- a) What is meant by Selective Inventory Control? Classify various Selective Inventory Control Techniques and describe them in brief. 10
  - b) Describe the SCOR Model in Supply Chain Management. 10
- Q. 4
- a) Sujata Fan Manufacturing Company uses 2,40,000 bearings per year and the usage is fairly constant at 20,000 bearings per month. Each bearing costs the company Rs. 3. The carrying cost for the company has been estimated at 15% of the average inventory investment. The cost to place an order and process the delivery is Rs. 60. 10
    - a. Calculate the economic order quantity.
    - b. What is the stock turnover rate ignoring safety stock if the EOQ is ordered frequently?
    - c. What will be the effect on total cost if stock turnover rate is reduced to one-third by infrequent ordering?
  - b) What is the objective of Logistics Management? Describe the main components of Logistics. 10
- Q. 5
- a) What is the functional role of IT in a Supply Chain? 10
  - b) Describe a Transport Management System (TMS) with the help of a neat labelled sketch. 10
- Q. 6
- a) Describe the factors affecting distribution network design. 10
  - b) What is a resilient supply chain? How does supply chain resilience work? 10

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BE VIT<sup>th</sup> sem R-19 c scheme mechanical QP code 110057108

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1. Question no. 1 **compulsory**.
2. Answer any three questions out of remaining five
3. Attempt sub questions in order
4. Figures to the right indicate full marks.

1. Explore the following topics (**any 4**):

[20]

- a) Evolving approaches to disaster management in India.
- b) Urban flooding: Implications for major cities.
- c) Leveraging technology for disaster preparedness.
- d) Global aid organizations in crisis response.
- e) Guidelines for earthquake safety.
- f) Human repercussions of natural calamities.

2. a) Outline the functions and duties of NIDM

[06]

2. b) Evaluate the impact of disasters on infrastructure and their hindrance to developmental projects.

[06]

2. c) Define early warning systems and illustrate their benefits through recent instances of flood, cyclone, and tsunami alerts.

[08]

3. a) Examine NDMA's directives for disaster preparedness in India.

[06]

3. b) Examine the collaborative efforts of government bodies and NGOs in disaster management.

[06]

3. c) Explain Triage. Analyze the importance of initial response in disaster management.

[08]

4. a) Investigate the contributions of international aid agencies during extreme crises.

[07]

4. b) Explore the applications of GPS and GIS in drought mitigation strategies.

[07]

4. c) Describe non-structural measures for pandemic containment.

[06]

5. a) Assess the involvement of different stakeholders in mass casualty situations.

[06]

5. b) Delve into the paradox of industrialization: economic progress versus the threat of industrial mishaps.

[08]

5. c) Highlight the protective role of natural ecosystems against disasters, with examples

[06]

6. a) Define liquefaction and debate the merits of retrofitting versus relocation in landslide-prone areas.

[06]

6. b) Define vulnerability and its significance in disaster management.

[04]

6. c) Enumerate preparedness measures for minimizing chemical disaster losses.

[05]

6. d) Propose strategies for funding disaster relief efforts and discuss legal considerations

[05]

