(Hours 3)   [Total Marks: 80]

- Question No. 1 is compulsory.
- Attempt any three questions from the remaining.
- Assumption made should be clearly stated.
- Design Data Book by PSG, Mahadevan, Kale & Khandare are permitted to use.

Q.1   **Answer any four**

(a)   Draw flow chart for design methodology and explain with example.   5

(b)   What is mean by 6 X 37 rope in hoisting mechanism, elaborate with neat sketch.   5

(c)   List different types of piston rings and their functions.   5

(d)   Draw a neat sketch of centrifugal pump and explain its principle of working.   5

(e)   List the various laws of speed range distribution, explain arithmetic progression law   5
      with example.

Q.2   (a)   What is cavitation in centrifugal pump? How to avoid it.   5

      (b)   For the specification of an EOT Crane ,
            Application   - Class II
            Load to be Lifted - 100 KN
            Hoisting speed   - 10 m/min
            Maximum Lift   - 5 m

            i.   Design a 6 X 37 type of rope and find its life.   8

            ii.   Design hook and check it at most critical cross section.   8

            iii. Select suitable motor for hoisting.   4

Q.3   (a)   State the advantages of multi fall pulley systems.   4

      (b)   Belt conveyor system is to be designed for the following specifications:
            Material conveyed up : Coal
            Capacity : 200 TPH
            Lump size : 80mm
            Horizontal distance : 20m
            Vertical distance :3m
            Troughing angle : 15 degree

            i.   Design conveyor belt.   8

            ii.   Select suitable motor for conveyor.   4

            iii. Design the upper roller and bottom roller.   4

TURN OVER

Q.4   Design following components of single cylinder, two stroke, and water cooled Petrol Engine to develop 40 KW at a speed of 1000rpm by making suitable assumption and neat sketches. Assume Compression Ratio as 7.

    i.   Find the standard bore and length of a cylinder.   5

    ii.   Calculate the design pressure considering explosion ratio as 3.25 and FOS as 1.3.   5

    iii.   Design connecting rod and check it for bending.   10

Q.5   (a)   It is required to design a 2 X 2 machine tool gear box with following specification.   10
N_{min} = 100rpm, N_{motor} = 960 rpm, GP ratio = 1.26

    i.   Draw structural diagrams,
    ii.   Draw ray diagram and speed chart,
    iii.   Find the number of teeth of each gear.

    (b)   A centrifugal pump is required to design for the total manometric head of 20 m and discharge of 900LPM of water at room temperature.

    i)   Find the inlet and outlet diameter of an Impeller of the centrifugal pump. (Draw neat sketch of impeller and assume $D_2 = 2D_1$)   6

    ii)   Find the inlet and outlet diameter of pipes.   4

Q.6   A Gear Pump required to deliver 75LPM of SAE20 oil at a pressure of 120 bar. By making suitable assumption,

    i.   Select suitable standard Motor.   3

    ii.   Select suitable flexible bush pin coupling.   3

    iii.   Design gear and check for bending failure.   10

    iv.   Design casing of the gear pump.   4

_____

55378