64 BE/Sem-VIII CBSGS/MECH/DMS 12/5/16

**Q. P. Code : 729201**

**(3 Hours)** **[Total Marks : 80**

NB: 1. Question No. 1 is compulsory.

2. Solve any three questions from remaining questions.

3. Assume suitable data with proper justification if required.

4. Use of standard design data book like PSG, Kale and Khandare is permitted.

1. Answer any ***four*** of the following 20

(a) What is morphology? Explain seven phases of morphology.

(b) Classify the wire ropes based on twisting of wires in a strand and state their specific use.

(c) Why cleaning of the belt is necessary for belt conveyor? List down the usual types of cleaners

(d) State the significance of specific speed and NPSH in the design of centrifugal pump.

(e) Explain why an I-section with $I_{xx} \leq 4\ I_{yy}$ is selected for connecting rod of I.C. engine.

2. An EOT crane is to be designed for the following specifications: 20

Lifting capacity: 150 KN

Hoisting speed: 8 m/min.

Span : 10 m

Class : II

(i) Select suitable type and size of the wire rope to last for about 12 months.

(ii) Select a standard hook and check for stresses induced at most critical section.

(iii) Design the cross piece and side plates

(iv) Select a suitable motor for hoisting mechanism.

3.

(a) A $20^0$ troughing belt conveyor has the following specifications: 15

Material to be conveyed : lime stone

Maximum lump size : 100 mm

Capacity : 300 TPH

Inclination : 10$^0$

Centre distance : 60 m

(i) Determine the width, number of plies and the thickness of the belt.

(ii) Select a proper motor for the conveyor.

(iii) Design the drive pulley along with its shaft and also select its bearings.

(b) Explain system concepts in design with suitable examples. 5

**[Turnover**

Q.4 A single cylinder four stroke cycle diesel engine develops 12 kW brake power when operating at 1000 rpm. Design the following components: 20

(i) Determine bore and stroke of the engine.

(ii) Design cylinder head and wet liner.

(iii) Design piston, piston rings and piston pin.

(iv) Selecting material and design stresses, determine cross-section of the connecting rod.

Q.5 Design a centrifugal pump (with layout) for the following specifications 20

Static suction head : 3 m

Length of suction pipe : 10 m

Static delivery head : 20 m

Length of delivery pipe : 35 m

Discharge ; 3000 lpm.

Fluid to be pumped is water at room temperature. Design should include selection of motor, design of impeller, impeller shaft, volute casing.

Q.6.

(a) It is required to design gear pump for flow of 50 LPM and pressure 30 bar. 10

The pump is to be driven from an electric motor by direct coupling. The design should include the design of gears, driver shaft and its bearings.

(b) A three-stage, twelve speed gear box is to be designed for spindle speeds varying between 50 r.p.m. and 3000 r.p.m. The second stage consists of three speed steps. If the gear box is driven by 7.5 KW, 1440 r.p.m. electric motor: 10

(i) draw the speed diagram and

(ii) draw the gearing diagram.

Assume same module for all gears.

---