BE/Sem VIII/Mech (I) Design of Mech. System

25.11.2016

(3hours)
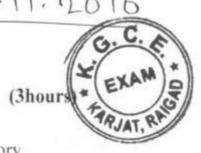
Max.Marks: 80

Instructions: 1) Question *No. 1* is compulsory.

2) Answer any *three* from the remaining five questions.

3) Use of *Design data book* is permitted.

4) Use your judgment for unspecified data, if any.

Q.1) Answer any *four* of the followings: (4 x 5 =20)

a) Give the basic constructional details of different types ropes used in EOT crane. And what do you understand by 6 x 37 rope?.

b) Explain different types of take-up arrangement used in belt conveyors.

c) What are the different types of piston rings ?. Explain the functions of them.

d) What are the materials used for the following I.C. Engine components. Justify
   i) Cylinder block   ii) Crank shaft   iii) Connecting rod   iv) Gudgeon pin

e) Explain with diagrams, how the structure and ray diagrams are different from each other in multi-speed gear box.

f) What do you mean by morphology of mechanical design ? Explain any two phases of it.

Q 2. a) A 20^0 troughing belt conveyor has the following data: (16)

Material conveyed	: Coal (from mine)
Inclination of conveyor	: 10^0
Lump size	: 80 mm
Capacity	: 400 tph
Length of conveyor	: 120 m

Design the conveyor for

i) Motor power capacity   ii) Belt width   iii) No. of troughing idlers and return idlers
   iv) Belt drive pulley

b) What are the different types of gear pumps. Explain with sketch, the working of any one of them. (04)

Q.3. a) A four stroke, single cylinder, water cooled, vertical, petrol engine has the following data:

Brake power = 50 kW

Compression ratio = 7

Mass of reciprocating parts = 1.5 kg

Over speed = 2400 rpm

Speed = 2000 rpm

Design the following components of I.C.Engine and sketch them with dimensions.

i) Crank shaft ii) Crank pin iii) Main bearings. (15)

b) Explain how the design approach of petrol and diesel engines differs from each other.

(05)

Q.4) The following specifications refers to an EOT Crane:

Application	:	Class-II
Load to be lifted	:	120 kN
Hoisting speed	:	5 m/min
Maximum lift	:	15 m

a) Select suitable type and size of wire rope for an expected life of 12 months. (04)

b) Design the following components of EOT crane.

      i) Hook ii) Cross-piece of the hook iii) Shackle plate iv) Rope drum (16)

Q.5) The Centrifugal pump has to work with the following specifications:

Static suction head	:	3 m
Static delivery head	:	8 m
Length of suction pipe	:	7 m
Length of delivery pipe	:	50 m
Discharge	:	850 lpm
Working fluid	:	water at 30^0 C

The pump is directly connected to an electric motor. Design the pump completely for pumping water.

(20)

Q.6 a) Find the rpm values and diameter range served by each rpm in Geometric , Harmonic and Logarithmic Progressions and compare them based on the following conditions: (15)

      Minimum speed, n_1 = 30 rpm

      Maximum speed, n_z = 400 rpm

      Number of speed steps, z = 12

      Cutting speed, v = 20 m/min

And draw the gearing (kinematic) diagram as per the Geometric Progression.

b) Explain the design methodology and Optimum Design. (05)