Printed Pages : 3

EAG-504

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 180511

Roll No.

B. Tech.

(SEM. V) (ODD SEM.) THEORY EXAMINATION, 2014-15

MACHINE DESIGN

Time : **3** Hours] [Total Marks : **100**

Note : (1) The question paper is divided into **three** sections.
(2) Attempt each section.
(3) Need of steam tables must be fulfilled.

SECTION-A

1 Attempt the following short answer type questions: **(10×2=20)**

(a) What do you understand by FeE200 and 40C15S12 ?
(b) What is the suitable material for making valve spring, heavy duty gear, connecting rod and worm wheel ?
(c) Enumerate the suitable class of fit between(i) Pin and knuckle joint (ii) cam shaft and bearing ?
(d) What is the grain structure manufactured by casting ?
(e) Define resilience.
(f) Name any four examples of riveted joints.
(g) Define the pitch of screw of an bolt.

(h) Where does a cotter is used.? Give any one example ?
(i) Mention any four important functions of springs.
(j) Define bearing. What are right line bearings ?

SECTION-B

2 Attempt any **three** parts of the following: **(10×3=30)**

(a) Explain the types of springs along with their applications.
(b) A 8 cm shaft has on it an axial load of 3500 kg which is taken by collar thurst bearing made up of 7 collars, each with an outside diameter of 13 cm. The shaft runs at 150 r.p.m. (a) what is the average bearing pressure? (b) what is appropriate work of friction ?
(c) It is required to design a V-belt drive to connect a 7.5 K.W., 1440 r.p.m. induction motor to a fan, running at 480 r.p.m., for a service of 24 hours/day. space is available for centre distance of one metre ?
(d) Explain stress concentration using flow analogy. Mention all methods used to lower the stress concentration in a machined parts.
(e) Write a detailed note on alloy steel. Discuss the role of nickel, chromium, molybdenum and vanadium on the alloy steel properties.

SECTION-C

3 Attempt any **five** questions : **(10×5=50)**

(a) Design and draw a knuckle joint to connect two mild steel rods which transmit a tensile force of 25 kN. The safe working stress for tension, shear and crushing are 100 MPa, 60 MPa and 160 MPa respectively ?
(b) What do you mean by design machine parts ? Explain design considerations and phases of design evolved.

(c) Write short note on (i) Theories of failure (ii) Factor of safety (iii) Stress concentration and (iv) Fatigue and creep.

(d) A helical cast steel gear transmits 35 kW at 1500 r.p.m. If the gear has 24 teeth, determine the necessary module, pitch diameter and face width for 20^0 full depth teeth. The helix angle is 30^0. The static stress for cast steel may be taken as 56 MPa. The face width may be taken as 3 times the nominal pitch. Also calculate the end thurst on the gear.

(e) A circular bar of 6cm diameter is welded to a steel plate and the bar acts as a cantilever of length 20 cm, the load being 1000 kg. Determine the size of the weld if the allowable load is 1700 kg/cm.

(f) How will you design a valve gear for internal combustion engines? Explain in detail.
