TED (15/19) - 5021
(REVISION-2015/19)

A24 - 7837

Reg.No……
Signature…….

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL - 2024

DESIGN OF MACHINE ELEMENTS

(Maximum Marks:100) (Time: 3 Hours)

PART - A
(Maximum Mark : 10)

Marks

I. Answer **all** the questions in one or two sentences. Each question carries 2 marks.

1. Define factor of safety.
2. Define pitch of a screw thread.
3. State the functions of couplings.
4. What is hunting in governors?
5. Mention the function of idle gear. (5 x 2 = 10)

PART - B
(Maximum Mark: 30)

II Answer ***any five*** questions from the following. Each question carries 6 marks.

1. Two screws for a pipe hanger must hold a tensile load of l0kN. Calculate the most suitable size of screw. Take the working stress in tension is 50MPa.
2. List the important types of keys.
3. What are the assumptions made in the theory of pure torsion?
4. State the torsion equation and explain each term.
5. Explain the difference between flywheel and governor.
6. Compare Rope drive with belt drive.
7. Write short notes on circular pitch, module and addendum.

(5 x 6 = 30)

P.T.O

PART – C

(Maximum Mark: 60)

(Answer ***one full*** question from each unit. Each full question carries 15 marks.)

UNIT - I

III. a) A cylinder has an effective diameter 250mm. It is subjected to a maximum steam pressure of 2MPa. Cylinder cover is fixed by means of 16 studs. Permissible tensile stress in the studs is limited to 50MPa. Determinethe size of studs. (9)

b) A screw jack has a square threaded screw of mean diameter 50mm and pitch l0mm. The coefficient of friction between the screw and nut is 0.13. Negleting collar friction calculate the torque required to be applied on the screw for lifting a load of 25kN. (6)

OR

IV. a) Design the rectangular key for a shaft of 45mm diameter. The shearing and crushing Stresses in the key are limited to 80MPa and 240MPa. (9)

b) Two machine parts are fastened together tightly by means of a 30mm tap bolt. If the load tending to separate them is neglected, find the stress that is set up with in the bolt by the initial tightening. (6)

UNIT – II

V. a) A hollow shaft of external and internal as 125mm 50mm is transmitting power at 100 rpm. Find the power transmitted by the shaft, if the shearing stress is not to exceed 45MPa. (9)

b) Derive an expression for the torque transmitted by a hollow shaft subjected to twisting moment only. (6)

OR

VI a) Design a muff coupling which is used to connect two shafts transmitting 40KW at 350rpm. Design shaft and muff, if the permissible shear stresses of shaft, muff are 30MPa and 15MPa respectively. Assume maximum torque 25% greater than the average torque. (9)

b) Compare strength of a hollow shaft and solid having same material, length and weight. (6)

UNIT – III

VII a) An axial thrust of 40kN is carried by a plain collar type thrust bearing, having inner and outer diameters of 250mm and 400mm respectively. Assuming the coefficient of friction between the thrust surfaces is 0.02. Calculate the power lost in friction at a speed of 120rpm. (9)

b) A journal bearing whose diameter is 200 mm is subjected to a load of 50kN and the shaft makes 100 rpm. Find the heat generated, if coefficient of friction is 0.02. (6)

OR

VIII a) Draw the profile of a cam operating a knife edged follower from the following data:

1. Follower to move outwards through 40mm during 60 of cam rotation
2. Follower to dwell for the next 45
3. Follower to return its original position during next 90
4. Follower to dwell for the rest of the rotation

The displacement of the follower is to take place with simple harmonic motion during both the outward and return stroke. The least radius of the cam is 50 mm. (9)

b) Explain with neat sketch, the different types of cam followers used. (6)

UNIT – IV

IX a) Two pulleys 600mm and 400mm diameters are connected by a belt. Central distance between the pulleys is 6 meters. Find the length of belt required for

(i) Open belt drive, and (ii) Cross belt drive (9)

b) Explain the advantages and disadvantages of belt drive. (6)

OR

X a) The driving wheels of a car are 1000mm in diameter and the engine runs at a speed of 50rpm. Find the gear ratio of the train of wheels in the gear box for a car speed of 30km/hr. (9)

b) Explain with sketch reverted gear train. (6)

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