3783

BOARD DIPLOMA EXAMINATION, (C-09)
OCTOBER/NOVEMBER-2018
DME-SIXTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS

Time : 3 Hours]   [Total Marks: 80

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PART-A

3X10=30

Instructions   :   1. Answer **All** questions.

2. Each question carries **Three** marks.

3. Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define Durability and Reliability.

2. Draw the hexagonal nut with proportionate dimensions.

3. Two machine parts are fastened together tightly by means of M28 tap bolt. Find the stress hat is set up in this bolt by initial tightening.

4. A square key has a breadth equal to one-fourth of shaft diameter. The shaft and key are made of same material with compression stress equal to twice the shear stress. Find the required length of key in term of shaft diameter necessary to transmit the shaft torque.

5. State the difference between a shaft and an axle.

6. Write down the expression for the length of the Belt in (a) Open belt drive (b) Cross belt drive (c) Ratio of tensions.

7. State the applications and advantages of epicycle gear train.

8. How do you classify the followers of Cams?

9. Define: (a) stability and (b) Sensitiveness of governor.

10. List any three differences between in Fly wheel and a Governor.

PART-B

Instructions : 1. Answer any **Five** questions
2. Each question carries **ten** marks.
3. Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. The steam engine cylinder of 250 mm effective diameter is subjected to a steam pressure of 1.2 N/mm^2. The cylinder cover is connected by means of 6 bolts . The bolts are tightened with initial load of 1.5 times that of steam load. A copper gasket of stiffness factor 0.5 is used to make the joint leak proof. Find the size of the bolts so that the stress induced in the bolts is not to exceed $100 N/mm^2$.

12. A steel spindle transmits 4 kW at rpm. The angular deflection should not exceed 0.25^0. per meter length of spindle. If the modulus of rigidity for the material of the spindle is 84 x 10^3 N/mm^2; find the diameter of the spindle and the shear stress induced in the spindle.

13. (a) Sketch a Gib headed key suitable for a shaft of 60 mm diameter. Show all proportional dimensions.
(b) Design and draw a cast iron muff coupling using the following data. MS shaft transmits 80 kW at 150 rpm. Take allowable shear and crushing stresses for the shaft and key materials are 40 N/mm^2. The permissible shear stress in the muff is 15 N/mm^2. Maximum torque transmitted is 25% greater than the mean torque.

14. Find the width the belt necessary to transmit 10 kW to a pulley 300 mm diameter, if the pulley makes 1600 rpm and the co-efficient of friction between the belt and the maximum tension in the belts is not to exceed 8 N/mm width.

15. Design a reverted gear train of four gear is to have less than 14 teeth. Draw a simple sketch of the arrangement of gears.

16. A lathe back gar arrangement is to provide total speed reduction of about 12:1 from the cone pulley to the spindles which are co-axial. The module of height speed and low speed Paris are 4 mm and 6mm respectively. Determine the number of teeth and the exact total reduction on the different wheels if the pinions have nearly equal teeth. The centre distance is 240mm.

17. A cam is to be designed, for Roller Follower with the following data.
i. Outward stroke during $1/3^{rd}$ of cam rotation.
ii. Dwell for the $1/12^{th}$ of cam rotation.
iii. Return stroke during next $1/6^{th}$ of cam rotation.
iv. Dwell for the remaining part of the cam rotation.
The minimum radius of the cam is 25 mm. the line of stroke of the follower passes through the centre of the cam axis and the outward and Return stroke takes place with Uniform acceleration and retardation.

18. (a) What are the steps involved in design procedure.
(b) An electric machine weighing 25 kN is provided with a steel eye bolt for lifting it. If the ultimate tensile strength of steel is $480 N/mm^2$ and the factor of safety is 6. Find the size of the bolt. Draw dimensional sketch.

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