PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 6   Date: 04/05/2019
Subject Code: 03113354   Times:10:30am to 1:00 pm
Subject Name: Computer Aided Design   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions . (All are compulsory) (Each of one mark)   **(15)**
1. _____ is a rigid body transformation that moves objects without deformation.
2. The phenomenon of decreased resistance of the materials to fluctuating stresses is the main characteristic of _____ failure.
   (A) Fracture   B) Fatigue   (C) Yielding   (D) None of the mentioned
3. A _____ sweep is dependent on the location of the axis/vector relative to the profile.
   (A) Path – Based   (B) Linear   (C) Revolved   (D) Blend
4. The V-belts are particularly suitable for_____ drives.
   (A) Short   (B) Long
   (C) Medium   (D) None of the above
5. In a boundary lubricated bearing, there is a..............of lubricant between the journal and the bearing.
   (A) thick-film   (B) thin-film
6. The endurance or fatigue limit is defined as the maximum value of the stress which a polished standard specimen can withstand without failure, for infinite number of cycles, when subjected to
   (A) Static Load   (B) Dynamic Load
   (C) Static as well as dynamic load   (D) Completely reversed load
7. The Function of automotive multi-leaf spring is
   (A) to measure the force   (B) to store and release energy
   (C) to absorb shocks and vibrations   (D) to active the mechanism
8. Which of the following devices do not produce a hard copy?
   (A) impact printers   (B) plotters   (C) CRT terminals   (D) non-impact printers
9. The load required to produce a unit deflection in the spring is called
   (A) Modulus of Rigidity   (B) Spring stiffness   (C) Flexural rigidity   (D)Tensional rigidity
10. DVST stands for_____.
11. In which transformation, the mirror image of an object can be seen with respect to x-axis, y-axis, and z-axis as well as with respect to an arbitrary line?
12. How many modes are there for crack propagation**?**
13. Which gear is used to convert rotary motion into translating motion?
14. A spur gear with pitch circle diameter D has number of teeth T. the module m is defined as _____.
15. Find the Wahl's factor if spring index is 6.

Q.2 Answer the following questions. (Attempt any three)   **(15)**
A) Generate a straight line connecting two points (1, 2) and (8, 6) using DDA Algorithm.
B) Explain Goodman's criteria with neat sketch.
C) Draw the Gear Terminology and explain any five.
D) Construction of Leaf Spring. Explain with neat sketch.

**Q.3** A) What is Gear Train and classification of gear train? Explain any one with neat sketch.   **(07)**
B) Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750   **(08)**
N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 Mpa and modulus of rigidity, G = 84 KN/mm^2. Neglect the effect of stress concentration. Draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils.

B) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20- **(08)** teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material for the pinion is plain carbon steel Fe 410 (Sut = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (Sut =200 N/mm^2).

The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load.

**Q.4** A) The layout of a leather belt drive transmitting 15 kW of power is shown in Fig. The centre **(07)** distance between the pulleys is twice the diameter of the bigger pulley. The belt should operate at a velocity of 20 m/s approximately and the stresses in the belt should not exceed 2.25 N/mm^2. The density of leather is 950 kg/m^3 and the coefficient of friction is 0.35. The thickness of the belt is 5 mm. Calculate: (i) the diameter of pulleys; (ii) the length and width of the belt; and (iii) the belt tensions.
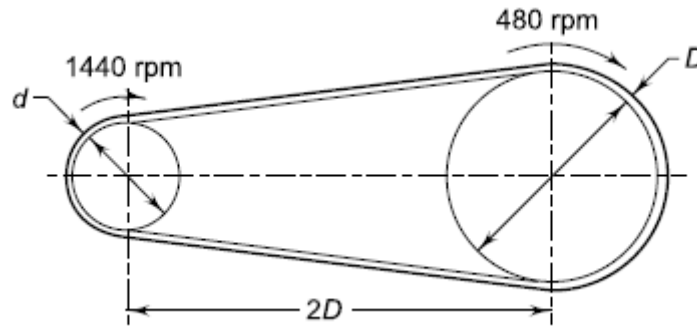
A) A transmission shaft rotating at 720 rpm and transmitting power from the pulley P to the spur gear **(07)** G is shown in Fig. The belt tensions and the gear tooth forces are as follows: P1 = 498 N P2 = 166 N Pt = 497 N Pr = 181 N The weight of the pulley is 100 N. The diameter of the shaft at bearings B1 and B2 is 10 mm and 20 mm respectively. The load factor is 2.5 and the expected life for 90% of the bearings is 8000 h. Select single row deep groove ball bearings at B1 and B2.

(Stare bearing No.s suitable at B_1 and B_2)
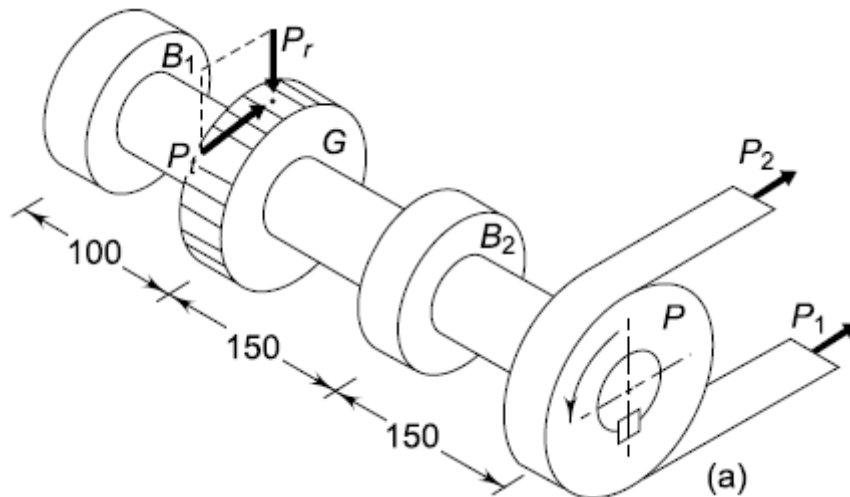
B) What are rolling contact bearings? Types of rolling contact bearings explain with neat sketch. **(08)**