Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2182004 **Date: 03/12/2018**

Subject Name: Design of Mechanisms - II

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	What are the mis-alignment between two connecting shaft? What are the advantages and disadvantages of rigid coupling and flexible coupling?	**03**
	(b)	Explain aesthetic consideration to be made in design engineering. Explain with examples.	**04**
	(c)	Design and draw a cast iron flange coupling forma mild steel shaft transmitting 90 KW at 250 r.p.m. The allowable shear stress in the shaft is 40 Mpa & the angle of twist is not to exceed 1^{o} in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 Mpa.	**07**
Q.2	**(a)**	Compare open & cross belt drive with neat sketch.	**03**
	(b)	What is Coupling? Types of Coupling. What is the difference between rigid and flexible coupling?	**04**
	(c)	A differential band break as shown in fig.1.1 has an angle of contact of 225^{o}. The band has a compressed woven lining & bears against a cast iron drum of 350mm diameter. The break is to sustain a torque of 350 N-m & the coefficient of friction between & band & t^{o}he drum is 0.3. Find: 1. The necessary force P for the clockwise & anticlockwise rotation of the drum. 2. The value of OA for the brake to be self locking, when the drum rotates clockwise.	**07**
		OR	
	(c)	Prove that a differential band brake can never be self locking for both directions of rotations of the drum.	**07**
Q.3	**(a)**	Define belt slip & Creep.	**03**
	(b)	Define Gear Terminology. Explain Clerance & Module.	**04**
	(c)	A cantilever beam of rectangular cross section is to be used to support a pulley as shown in figure 1.2. The tension in the wire rope is 4.5 kN. If the ratio of depth to width of cross section is 2.5. Determine the dimension of beam cross section. The material has been allowable tensile stress is 100 MPa & Compressive stress is 120 MPa.	**07**
		OR	
Q.3	**(a)**	What is bearing? Explain the criterion for static load carrying capacity and dynamic load carrying capacity of ball bearing.	**03**
	(b)	Explain the Hydrostatic lubrication in journal bearing with appropriate figure.	**04**

(c) A pair of straight teeth spur gears, having 20° invoute full depth teeth is to transmit 12 KW at 300 r.p.m. of the pinion. The speed ratio is 3:1 . The allowable static stresses for gear of cast iron & pinion of the steel 60 MPa & 105MPa respectively. The pinion has 16 teeth & its face width is 14 times the module. Determine: 1) Module 2) Face Width. 3) Pitch circles diameters of the gear from. Velocity factor $C_v = \frac{4.5}{4.5+V}$ The tooth form factor y can be taken as **07**

$$y = 0.154 - \frac{0.912}{no\ of\ teeth}$$

Q.4 **(a)** Define following Terms: i) Static load carrying capacity of bearing. ii) Dynamic load carrying capacity of bearing Iii) Boundary lubrication. **03**

(b) Differentiate between sliding contact bearing & Rolling contact bearing. **04**

(c) What is Bearing? Classify Bearings. A 80 mm long journal bearing supports a load of 2800 N on a 50 mm diameter shaft. The bearing has a radial clerance of 0.05 mm & the viscsity of the oil is 0.021 kg/m-s at the operating temperature. If the bearing is capable of dissipating 80 J/s, Determine the maximum safe speed. **07**

OR

Q.4 **(a)** What are the desirable properties of shoe friction material used for lining of brake shoe? **03**

(b) Briefly discuss the stresses in wire ropes with related equations. **04**

(c) What are the different type of the gear failures and discuss their remedies. **07**

Q.5 **(a)** What are the methods for reducing Stress –Concentrations? **03**

(b) Explain with the help of sketch how the coefficient of friction varies with the bearing characteristic number indifferent state of lubrication. **04**

(c) Write the complete design procedure for crane hoisting mechanism. **07**

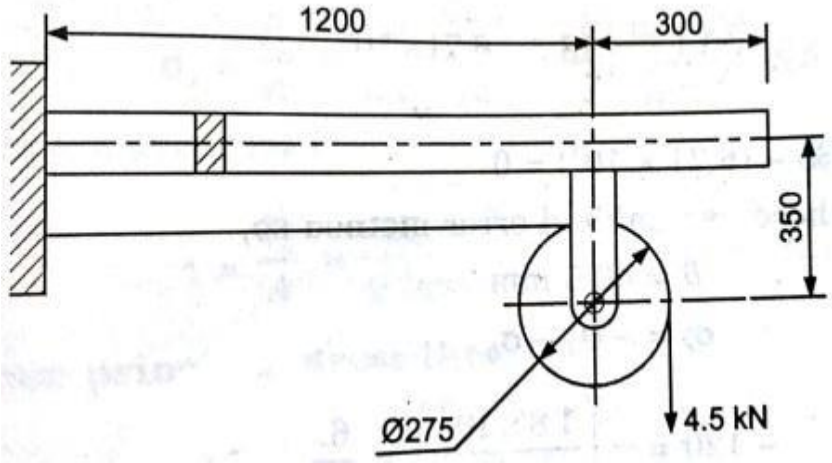
OR

Q.5 **(a)** Define Antifriction Bearing. Benefits of it. **03**

(b) Discuss the design considerations for finite and infinite life of a machine component subjected to complete reversed stresses with suitable equations. **04**

(c) Determine the thickness of a 120mm wide uniform plate for safe continuous operation if the plate is to be subjected to a tensile load that has a maximum value of 250 KN & a minimum value of 100 KN. The properties of the plate material are as follows: Endurance limit stress = 225Mpa & Yield point stress = 300Mpa. The factor of saftey based on yield point may be taken as 1.5. **07**

Fig 1.1



Figs 1.2