Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2182004 **Date: 09/05/2018**

Subject Name: Design of Mechanisms - II

Time: 10:30 AM to 01:00 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)**	Explain the importance of reliability in DOM.	**03**
	(b)	Why the section of the arms in pulley is usually elliptical? In which plan the major axis of arm section is placed & why?	**04**
	(c)	Design a cast iron protective type flange coupling to transmit 15 KW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used : Shear stress for shaft , bolt & key material = 40 MPA Crushing stress for bolt & key = 80 MPA. Shear stress for cast iron = 8 MPA	**07**
Q.2	**(a)**	Explain the importance of Ergonomics with examples.	**03**
	(b)	Explain step by step design procedure of flat belt pulley with neat sketch.	
	(c)	A Differential band brake, as shown in fig. 1.1 has drawn diameter of 600 mm & angle of contact 240 °. The brake is 5mm thick & 100 mm wide. The coefficient of friction between the band and the drum is 0.3. If the band is subjected to a stress of 50 MPa , Find : 1. The least force required at the end of 600 mm lever , and 2. The torque applied to the brake drum shaft.	**07**
		OR	
	(c)	Write all design steps for cast iron pulley to transmit power P.	**07**
Q.3	**(a)**	Explain with the help of sketch how the co-efficient of friction varies with bearing characteristics number of different state of lubrication	**03**
	(b)	What is condition for self –locking in differential band brake? Give Advantages & Disadvantages of differential band brake.	**04**
	(c)	Design a journal bearing for a centrifugal pump from the following data: Load on the journal = 20,000N, Speed of the journal =900rpm, type of oil is SAE10, For which absolute viscosity at 55°C=0.017kg/m-s, ambient temperature of oil=15.5°C, Maximum bearing pressure for the pump=1.5N/mm^2. Calculate also mass of lubricant oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient=1232W/m^2/°C	**07**
		OR	
Q.3	**(a)**	Differentiate coupling & clutch.	**03**
	(b)	Explain the Hydrodynamic lubrication in journal bearing with appropriate figure.	**04**

(c) A pair of straight teeth spur gear , having 20° involutes 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 steel are 60 MPA & 105 MPA respectively. Assume the following: Number of teeth of pinion = 16 ; Face width = 14 times module ; Velocity factor(Cv) = $y = \frac{4.5}{4.5+v}$ The tooth form factor y can be taken as **07**

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

Determine the module, face width & pitch diameters of gears.

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 rope with examples. **04**

(c) Derive the Lewis equation for design of spur gear. **07**

OR

Q.4 **(a)** Define Gear Terminology. Explain any two of them. **03**

(b) What is Brake? Enlist Brakes. Differentiate Self –Energizing & Self – locking brake. **04**

(c) A Cantilever Beam mad eof cold drawn carbon steel of circular cross section as shown in fig.1.2 is subjected to a load which varies from –F to -3F. Determine the maximum load that this member can withstand for an identified life using a F.S = 2 . the stress concentration factor is 1.42. & notch sensitivity is 0.9 . Ultimate stress -= 550 MPA Yield stress= 470 MPA , Endurance limit = 275 MPA , Size factor = 0.85 & Surface finish factor =0.89 . **07**

Q.5 **(a)** What is Antifriction Bearing? Classify journal bearing. **03**

(b) What do you mean by Stress –concentration & Notch –Sensitivity? **04**

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

OR

Q.5 **(a)** What is Split Muff coupling? Give Application & Advantages of it. . **03**

(b) What is meant by Endurance strength of a material? Explain the influence of various factors on endurance limit of a ductile material. **04**

(c) A machine component is subjected to flexural stress which fluctuates between + 300MN/m^2 & - 150 MN/m^2. Determine the value of minimum ultimate strength according to 1. Gerber relation. 2. Soderberg relation. Take Yield strength = 0.55 Ultimate strength; Endurance strength = 0.5 Ultimate strength; & factor of safety = 2. **07**

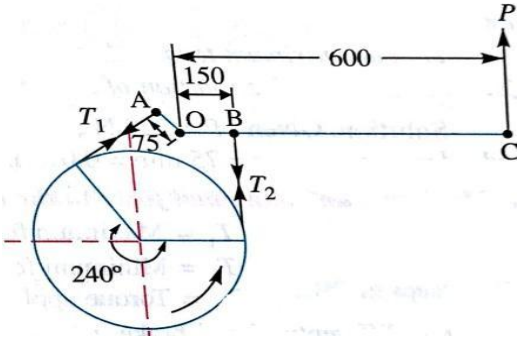

Fig 1.1

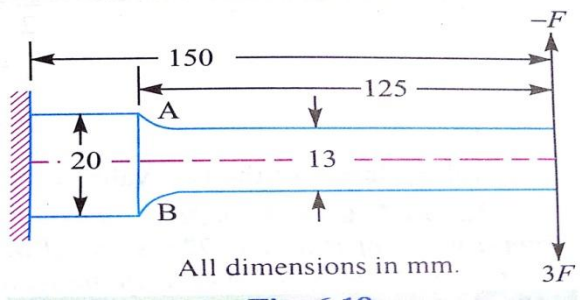

Fig 1.2

****