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

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC-Semester –V (May-2012) Examination

SUBJECT CODE: X51903

Subject Name: Machine Design- I

Date:1605/2012

Time: 10.30 am – 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 manufacturing consideration in design.	**07**
	(b)	What is preferred number series? State their advantages and application.	**07**
Q.2	**(a)**	For belt drive derive the condition for maximum power.	**06**
	(b)	Design V Belt drive to connect a 8 KW Power , 1440 rpm induction motor to fan, running at approximately 500 rpm, for a service of 24 hour per day .Space is available for a centre distance of about 1m.Assume Service factor 1.3 Assume a suitable value of correction factor.	**08**
		OR	
	(b)	Write a design procedure of roller type chain drive.	**08**
Q.3	**(a)**	Explain compounding of cylinder with their relative importance.	**06**
	(b)	The hydraulic press having a working pressure of water as 10 MPa.and exerting a force of 100KN is required to press materials up to maximum size of 100 mmx100mmand 200mm high., the stroke length is 90 mm .Design following parts Ram, Cylinder, Pillars.	**08**
		OR	
Q.3	**(a)**	Explain the terms related to helical spring. 1. Spring Rate 2. Spring Index 3. Free Length 4. Wahl's Stress factor	**06**
	(b)	Design a helical spring for maximum load of 1200 N for a deflection of 20 mm using the value of spring index as 5. Maximum permissible shear stress in the wire is 400 N/mm^2 Modulus of rigidity of shaft material is 84 KN/mm^2	**08**
Q.4	**(a)**	Explain design procedure of centrifugal clutch.	**06**
	(b)	The multi disc clutch consists of five steel plates and four bronze plates .The inner and the outer diameter of the friction disks are 70 mm and 140 mm respectively. The coefficient of friction is 0.1 and the intensity of pressure on friction lining is limited to 0.3 N/mm^2 Assuming uniform pressure theory calculate (1) required force to engage the clutch (2) power transmitting capacity at 800 rpm.	**08**
		OR	
Q.4	**(a)**	Explain self energizing and self locking of the brake.	**05**
	(b)	Explain internal expanding shoe brake with its neat sketch.	**09**
Q.5	**(a)**	Explain following with respect to bearing. Static load carrying capacity , Dynamic load carrying capacity, Rating life of bearing	**06**
	(b)	A single row deep groove ball bearing 6002 is subjected to an axial trust of 9500 N and radial load of 2100 N. Find the expected life that 50 % of the bearing will complete under this condition. Static capacity C_0 = 2500 N Dynamic capacity C= 5590 N	**08**
		OR	

Q.5 **(a)** What is Bearing Characteristic number for journal bearing? Explain its dependency on various parameters with graph. **06**

(b) A 150 mm diameter shaft supporting a load of 12 KN has a speed of 1400 rpm The shaft run in bearing whose length is 1.5 times the shaft diameter. If the diameteral clearance is 0.15 mm and the absolute viscosity of oil at the operating temperature is 0.011 kg/m.s, find the power wasted in the friction. **08**

****