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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 152504 **Date: 06/05/2016**

Subject Name: Dynamics of Machines & Production Engineering Drawing

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

Instructions:

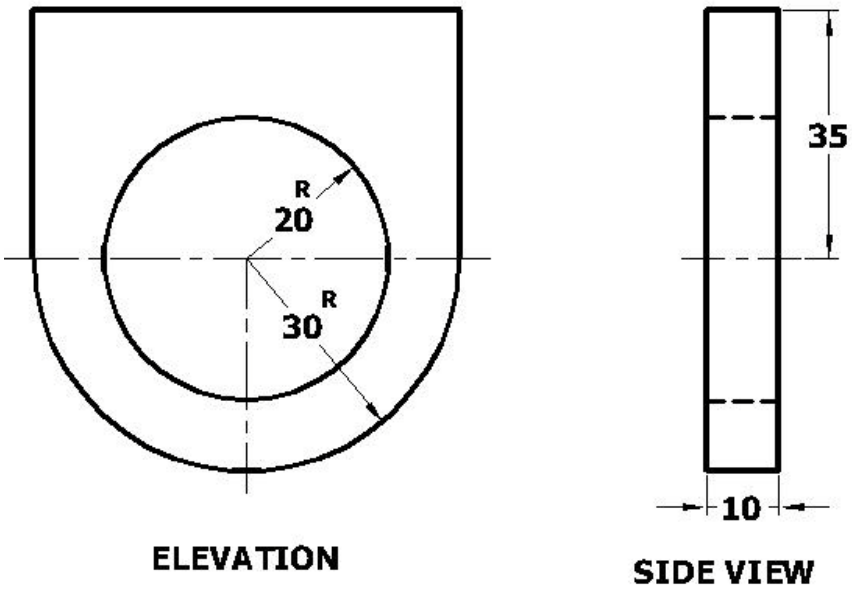
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use answer book for analytical and drawing sheet for graphical solutions & Production Engg. Drawing's answers. [Follow first angle projection method]**

Q.1	**(a)**	The axes of a three-cylinder air compressor are at 120° to one another & their connecting rods are coupled to a single crank. The length of each connecting rod is 240 mm & the stroke is 160 mm. The reciprocating parts have a mass of 2.4 kg per cylinder. Determine the primary & secondary forces if the engine runs at 2000 rpm.	**09**
	(b)	What do you mean by primary & secondary unbalance in reciprocating engines?	**05**
Q.2	**(a)**	A double acting steam engine develops 56 kW of power at 210 rpm.The maximum & minimum speeds do not vary more than 1% of the mean speed & the excess energy is 30% of the indicated work per stroke. Determine the mass of the flywheel if the radius of gyration of the flywheel is 500 mm.	**07**
	(b)	What is a flywheel? Find a relation for the coefficient of fluctuation of speed in terms of maximum fluctuation of energy & the kinetic energy of the flywheel at mean speed.	**07**
		OR	
	(b)	Derive expressions for displacement, velocity and acceleration of piston in a Reciprocating engine considering dynamic analysis.	**07**
Q.3	**(a)**	Explain following terms in context of vibration (i) Resonance (ii)Longitudinal Vibration (iii) Degree of Freedom	**07**
	(b)	In a single degree damped vibrating system, a suspended mass of 8 kg makes 30 oscillations in 18 seconds. The amplitude decreases to 0.25 of the initial value after 5 oscillations. Determine (i) stiffness of the spring (ii) logarithmic decrement (iii) Damping factor	**07**
		OR	
Q.3	**(a)**	Find the ratio of amplitudes of rotors of torsional vibrations of a two rotor system.	**07**
	(b)	The following data relate to a shaft held in long bearings. (i) Length of shaft = 1.2 m (ii) Diameter of shaft = 14 m (iii) Mass of rotor at midpoint = 16 Kg (iv) Eccentricity of centre of mass of rotor = 0.4 mm (v) Modulus of Elasticity of shaft material = 200 GN/m^2 (vi) Permissible Stress in shaft material = 70×10^6 N/m^2 Determine the critical speed of the shaft.	**07**
Q.4	**(a)**	Draw the geometric tolerance symbol for (i) Straightness (ii) Flatness (iii) Roundness (iv) Cylindricity (v) Angularity (vi) Perpendicularity (vii) Parallelism	**07**
	(b)	Draw welding symbol with illustration for (i) Square butt weld (ii) Single V butt weld (iii) Single bevel butt weld	**07**

OR

Q.4 **(a)** A square prism 30 mm base sides and 70mm axis is completely penetrated by another square prism of 25 mm sides and 70 mm axis, horizontally. Both axes Intersects & bisect each other. All faces of prisms are equally inclined to VP. Draw projections showing curves of intersections. **07**

(b) Draw Missing Plan for the below figure as per first angle projection method. **07**



Q.5 **(a)** What is a detail drawing? What are an assembly drawing and a set of working drawings? **07**

(b) Draw freehand sketch for the thread profile (i) Acme thread (ii) Buttress thread (iii) Square thread

OR

Q.5 **(a)** A shaft supported in bearings that are 1.6 m apart projects 400 mm beyond bearings at each end. It carries three pulleys one at each end and one at centre of its length. The masses of the end pulleys are 40 kg & 22 kg & their centre of mass are 12 mm & 18 mm respectively from the shaft axes. The mass of centre of mass is 15 mm from the shaft axis. The pulleys are arranged in a manner that they give static balance. Determine the relative angular positions of pulley. **07**

(b) State & explain D'Alembert's principle. What do you mean by dynamically equivalent system? **07**

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