Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code: 152504 Date:05/12/2015

Subject Name: Dynamics of Machine & Production Engg. Drawing

Time: 10:30am to 1:00pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions (Including dimensions) wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use answer book for analytical & drawing sheet for graphical solution for drawing or sketches. (Follow first angle projection method)**

Q.1 **(a)** The cylinders of a twin V-engine are set at 60° angle with both pistons connected to a single crank through their respective connecting rods. Each connecting rod is 600 mm long and the crank radius is 120 mm. The total rotating mass is equivalent to 2 kg at the crank radius and the reciprocating mass is 1.2 kg per piston. A balance mass is also fitted opposite to the crank equivalent to 2.2 kg at a radius of 150 mm. Determine the maximum and minimum values of the primary and secondary forces due to inertia of the reciprocating and the rotating masses if the engine speed is 800 rpm. **07**

(b) Describe the function of a pivoted cradle balancing machine with the help of neat sketch. **07**

Q.2 **(a)** Derive an equation of velocity & acceleration of piston considering dynamic analysis of slider-crank mechanism. **07**

(b) What is the function of 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) The turning-moment diagram for a petrol engine is drawn to a vertical scale of 1mm= 500 N.m & a horizontal scale of 1 mm = 3°. The turning-moment diagram repeats itself after every half revolution of crankshaft. The areas above & below the mean torque line are 260,-580, 80,-380,870, and -250 mm^2. The rotating parts have a mass of 55 kg and radius of gyration of 2.1m.If the engine speed is 1600 rpm, determine the coefficient of fluctuation of speed. **07**

Q.3 **(a)** Find the natural frequency of a vibratory system having a mass suspended from the free end of mass less spring. What is the effect of the inertia of the spring mass? **07**

(b) A vibrating system consists of a mass of 50 kg, a spring with a stiffness of 30 kN/m and a damper. The damping provided is only 20% of the critical value. Determine the (i) damping factor (ii) critical damping coefficient (iii) natural frequency of damped vibrations (iv) ratio of two consecutive amplitudes. **07**

OR

Q.3 **(a)** Describe a three rotor vibratory system & find the ratio of their amplitudes. **07**

(b) A machine supported symmetrically on four springs has a mass of 80 kg. The mass of the reciprocating parts is 2.2 kg which move through a vertical stroke of 100 mm with SHM. Neglecting damping, determine the combined stiffness of the springs so that the force transmitted to the foundation is $1/20^{th}$ of the impressed force. The machine crankshaft rotates at 800 rpm. If, under actual working conditions, the damping reduces the amplitudes of successive vibrations by 30%, Find the force transmitted to the foundation at 800 rpm. **07**

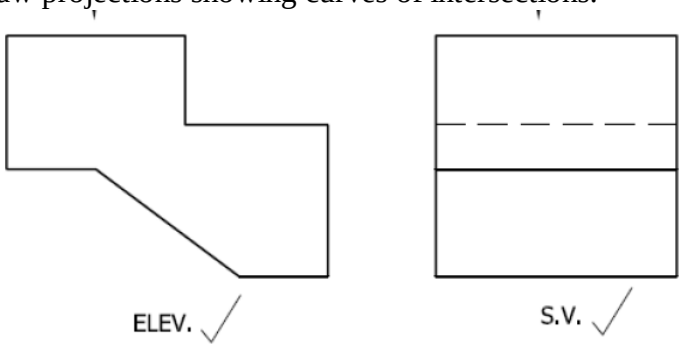
Q.4 **(a)** Draw any SEVEN welding symbols. **07**

(b) Draw any THREE types of foundation bolt. **07**

OR

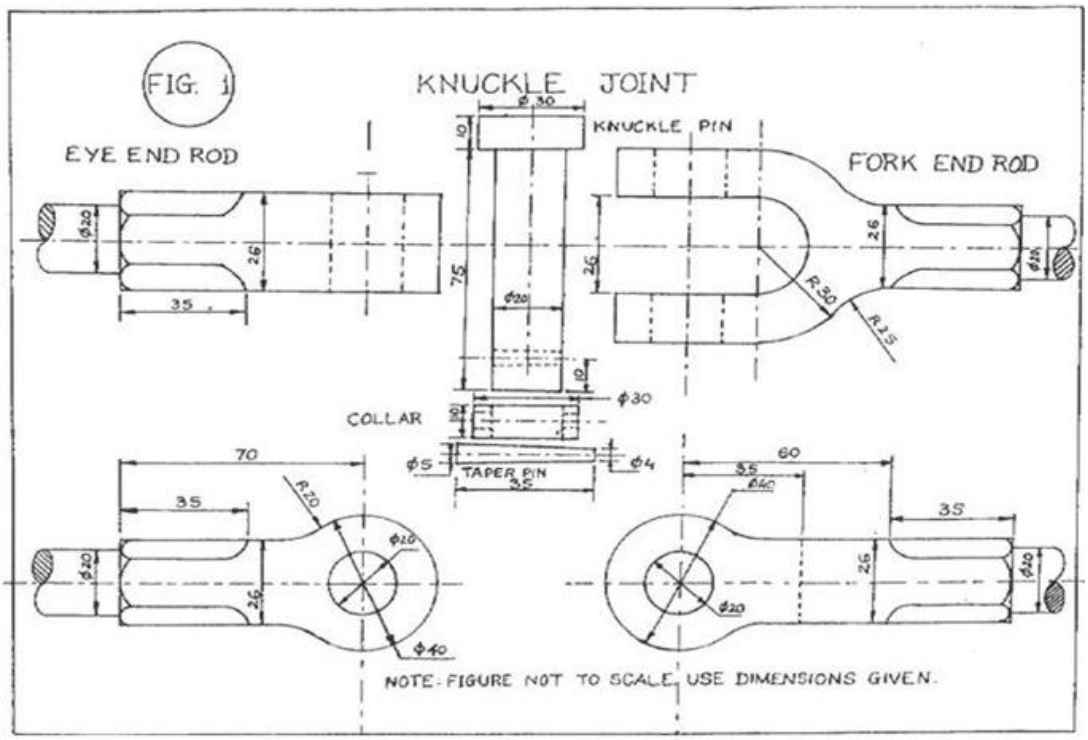
Q.4 **(a)** A cylinder 50 mm diameter & 70 mm axis is completely penetrated by another of 40 mm diameter & 70 mm axis horizontally. Both axes intersect & bisect each other. Draw projections showing curves of intersections. **07**

(b) **07**



For the above figure draw missing plan in 1^{st} angle projection method assuming suitable dimensions.

Q.5 **14**



Prepare an assembly drawing for the above figure 1 using first angle projection method.

OR

Q.5 **(a)** Why reciprocating masses are partially balanced? Explain any ONE effect of partial balancing in locomotives. **07**

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

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