Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Vth Semester–Examination – Nov-Dec- 2011

Subject code: 152504

Subject Name: Dynamics of Machines and Production Engineering Drawing

Date:29/11/2011 **Time: 02:30 pm – 05:30 pm**

Total Marks: 70

Instructions:

1. **Read questions carefully & Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Be very specific while answering Questions.**
5. **Don't Write irrelevant matter.**

Q.1 **(a)** Define: Inertia force and Inertia torque. What is meant by dynamically equivalent system? **07**

(b) What is the function of a flywheel? Explain the turning moment diagram of a four stroke cycle internal combustion engine. **07**

Q.2 **(a)** A petrol engine runs at 1800 RPM. Its turning moment diagram gave the following area measurement in mm^2 taken in order above and below the mean torque line: 500, -250, 270, -390, 190, -340, 270, -250. The scale for the turning moment is 1 mm = 5 N-m and for crank angle is 1 mm =5°. The rotating parts are equivalent to mass of 36 kg at a radius of gyration of 150 mm. Determine the coefficient of fluctuation of speed. **07**

(b) Prove that the maximum fluctuation of energy , **07**
$\Delta E = E \times 2 Cs$; where E= Mean Kinetic energy of the flywheel and Cs = Coefficient of fluctuation of speed

OR

(b) Define and explain the terms: Piston effort, crank effort, thrust on the sides of cylinder walls and thrust on the crank shaft bearing **07**

Q.3 **(a)** Define: Static balancing & Dynamic balancing. Why is balancing of rotating parts necessary for high speed engines? **07**

(b) Four masses A, B, C & D are attached to a shaft and revolve in the same plane. The masses are 12 kg, 10 kg, 16 kg, and 15 kg respectively and their radii of rotations are 40 mm, 50 mm, 60 mm and 35mm. The angular position of the masses B, C and D are 60°, 125° and 270° from mass A. Determine the magnitude and position of the balancing mass at a radius of 90 mm. **07**

OR

Q.3 **(a)** Define: Variation in tractive force, Swaying couple, Hammer Blow **07**

(b) A number of masses (say four masses) are attached to a shaft which is rotating at an angular speed of ω rad/sec. If all the masses are in the same plane, describe the analytical method of balancing these masses by a single mass only. **07**

Q.4 **(a)** Define and explain the terms: Vibration, free vibration, forced vibration and damped vibration **07**

(b) A vertical shaft 150 mm in diameter and 1 m in length has its upper end fixed at the top. At the other end, it carries a disc of weight 6000 N. The modulus of elasticity of the material of the shaft is $2X10^5$ N/mm^2. Neglecting the weight of the shaft, determine the frequency of longitudinal and transverse vibrations. **07**

OR

Q.4 **(a)** What are the important types of free vibrations? What type of stresses are produced in case of free vibrations of different types? **07**

(b) A vertical shaft is fixed at the top and carries a flywheel of weight 6000 N welded at its bottom. The diameter of the shaft is 120 mm and its length is 1 m. The modulus of elasticity of the material of the shaft is $9X10^4$ N/mm^2 . If the radius of gyration of flywheel is 300 mm, determine frequency of torsional vibration. **07**

Q.5 **(a)** Draw various symbols showing geometric features with their meaning. **07**

(b) Explain "Bill of materials" and its importance in Detail and Assembly drawing. **07**

OR

Q.5 **(a)** Draw various Lay Symbols with explanation. **07**

(b) State and explain few practical applications of intersection of surfaces. **07**

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