GUJARAT TECHNOLOGICAL UNIVERSITY
BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 152504   **Date: 05/06/2012**
Subject Name: Dynamics of Machines & Production Engineering Drawing
Time: 02:30 pm – 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. **Read questions carefully and be Very specific while answering.**
5. **Answer Q.5 in the drawing sheet.**

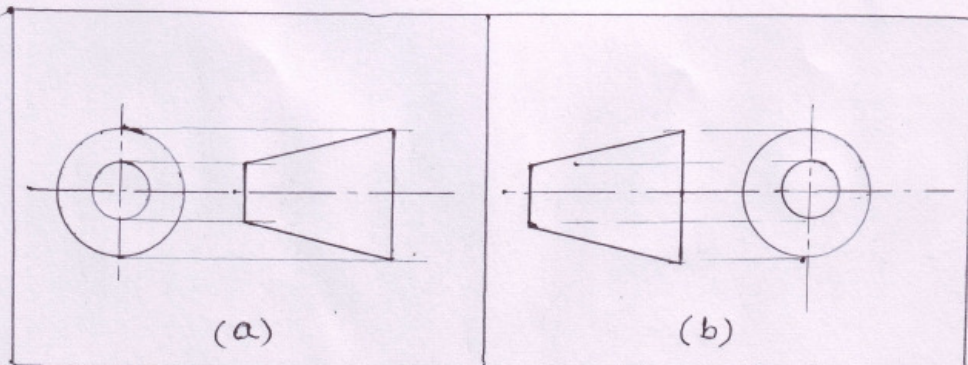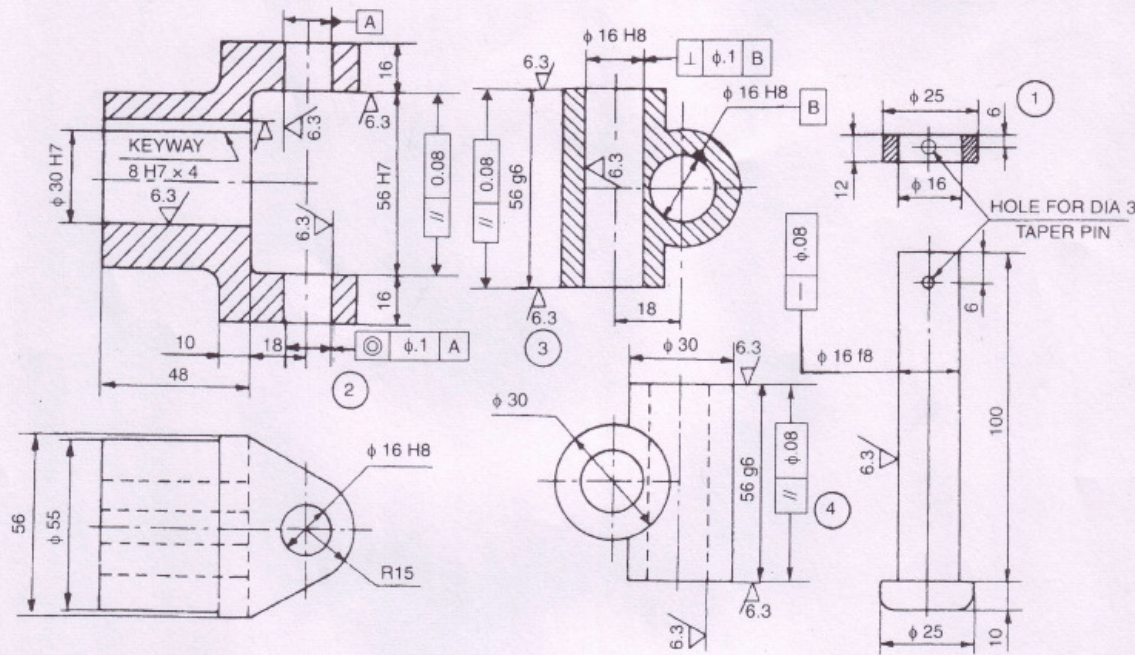**Q.1**   Do as Directed: **14**
   (i) A rotor of 2000 kg mass and 1 meter diameter rotates with 1800 RPM and its centre of gravity is displaced by 2 mm from the axis of rotation. Determine the unbalanced force acting on the axis of rotation.
  (ii) Two flywheels say X and Y of same material are fitted to two different engines of same HP. Size of X is bigger than that of Y. Can you say which engine can be a two stroke and which one can be a four stroke engine? How?
 (iii) In Vibration Analysis, under what circumstances, the shafts are considered as fixed beam and simply supported beams?
  (iv) Hexagonal Bolt M20X1.5X75NL stands for_____.
  (v) An Electricity Board Charge for 1 unit of electrical energy   is Rs.8/-, determine the cost of Operating a Lathe with 2 HP motor for 3 hours. Neglect the losses.
  (vi) If during certain period of cycle, Turning Moment>Mean Torque, what will be its effect on the flywheel?
 (vii) Draw Welding Symbols for Single-V Butt Weld, Fillet Weld, Spot Weld and Seam Weld.

Q.2   **(a)** Five Masses P, Q, R, S & T revolve in the same plane at equal radii. Masses P, Q and R are 10 kg, 5 kg & 8 kg respectively. The angular positions of Q, R , S & T measured in Clock Wise direction from P are 60°, 130°, 215° and 270° respectively. Determine the masses S & T if force polygon of the system is closed polygon.   **07**
   (b) Derive an equation for Maximum swaying Couple.   **07**
<div align="center">OR</div>
   (b) A single cylinder vertical reciprocating engine rotates at 2 revolutions per second. Its stroke is 320 mm, Mass of reciprocating parts is 45 kg and Mass of Revolving parts at crank radius is 35 kg. If 70% of the reciprocating parts and all the revolving parts are to be balanced, then determine   **07**
1. The balance mass required at a radius of 250 mm
2. The unbalanced force when crank has turned 45° from
   TDC.

Q.3   **(a)** The two mass system (m_1, m_2) is Dynamically Equivalent to a rigid body of mass m. Prove that $L_1 \times L_2 = k^2$. Where L_1 and L_2 are Distances of Mass m_1 and m_2 respectively from C.G. of body and k =Radius of gyration.   **07**

(b) A shaft is simply supported at the ends and is of 25 mm diameter and 600 mm in length. The shaft carries a load of 30 N at its centre. The weight of the shaft per meter length is 275 N. Determine the critical speed of the shaft. Assume Young's Modulus=200 GN/m^2 for shaft material.   **07**

OR

Q.3 **(a)** State Different methods to determine Natural Frequency of free longitudinal vibration. Explain any One.   **07**

(b) A vertical petrol engine 150 mm diameter and 200 mm stroke has a connecting rod 350 mm long. The mass of the piston is 1.75 kg and engine speed is 1800 RPM. On the expansion stroke with crank angle 45° from TDC, the gas pressure is 750 KN/m^2. Determine the net thrust on the piston.   **07**

Q.4 **(a)** Sketch and briefly explain the different types of machining symbols.   **07**

(b) A square prism, edge of base 30 mm and height 60 mm, resting on its base in HP, is completely penetrated by another square prism of 20 mm base edge such that the axis of the penetrating prism is perpendicular to and 5 mm in front of the axis of the vertical prism. The rectangular faces of the two prisms are equally inclined to the VP. Draw the projection of the solids showing lines of intersection.   **07**

OR

Q.4 **(a)** With the help of sketches, show how the geometrical tolerances are indicated , as prevalent in industry , for the following cases:
1. Parallelism   2. Perpendicularity   3. Symmetry   4.   Radial Run out   **07**

(b) A right circular cylinder of 60 mm diameter and 90 mm height, resting on its base in HP. It is completely penetrated by another cylinder of 45 mm diameter and 90 mm long such that their axes bisect each other at right angles and are parallel to VP. Draw their projections showing curves of intersection.   **07**

Q.5 Fig 1 shows details of Universal coupling. Draw Assembly drawing showing (i) Sectional Elevation (ii) Left Hand Side View (iii) Plan. Use the Projection Method as shown with symbol (a)   **14**

OR

Q.5 Fig 1 shows details of Universal coupling. Draw Assembly drawing showing (i) Elevation (ii) Right Hand Side View (iii) Section Plan. Use the Projection Method as shown with symbol (b)   **14**

FIG 1

Details of universal coupling

Parts List

Part No.	Qty.	Name	Matl.
1	2	Collar	MS
2	2	Fork	CI
3	1	Centre block	CI
4	2	Pin	MS

KEYWAY
8 H7 × 4
φ 30 H7
56 H7
16
16
10
18
48
6.3
0.08
∥ 0.08
◎ φ.1 A
A

2

φ 16 H8
56 g6
6.3
18
∥ 0.08
⊥ φ.1 B
B
φ 16 H8
3

φ 25
φ 16
12
6
1
HOLE FOR DIA 3
TAPER PIN

φ 30
φ 30
56 g6
6.3
∥ .08
6.3
4

φ 16 f8
φ.08
⊥
6.3
6
100
φ 25
10

56
φ 55
φ 16 H8
R15

(a)

(b)

****