No. of Printed Pages : **3 + Drawing Sheet** **BIME-025**

DIPLOMA VIEP MECHANICAL ENGINEERING

00260

Term-End Examination

June, 2013

BIME-025 : DESIGN OF MACHINE ELEMENTS

Time : 2 Hours *Maximum Marks : 70*

Note : *Attempt **any four** questions between 2 to 8 and first question is compulsory. Design data book is allowed. All questions carry **equal** marks.*

1. (a) The difference between maximum size and minimum size of the shaft is known as : **2x7=14**

(i) Allowance (ii) Deviation

(iii) Tolerance (iv) Clearance

(b) Which of the following key is screwed to the shaft :

(i) Tangent Key (ii) Taper Key

(iii) Prismatic Key (iv) Feather Key

(c) Equivalent bending moment for the shaft subjected to torque and bending will be :

(i) $\frac{1}{2}(T^2 + M^2)$

(ii) $\frac{1}{2}(T^2 - M^2)$

(iii) $M + \sqrt{T^2 + M^2}$

(iv) $\frac{1}{2}(M + \sqrt{T^2 + M^2}$

(d) Energy stored in a body due to change in shape is called :

(i) Potential Energy
(ii) Kinetic Energy
(iii) Mechanical Energy
(iv) Resilience

(e) Universal Coupling is used to connect two shafts which are :

(i) Perfectly aligned
(ii) Not perfectly aligned
(iii) Axes intersect at a small angle
(iv) Having lateral misalignment.

(f) Most suitable section for connecting rod is :

(i) Z - section (ii) T - section
(iii) O - section (iv) I - section

(g) When a helical compression spring is subjected to an axial compression load, the stress induced in the wire is :

(i) Tensile (ii) Compressive
(iii) Shear (iv) Bending

2. What is the general procedure in designing a machine component. Discuss in brief and also draw its block diagram. **14**

3. Calculate the force required to punch a circular blank of 60 mm diameter in a plate of 5 mm thickness. The ultimate shear stress of the plate is $350N/mm^2$. Also calculate the stress induced in the punch. **14**

4. Derive expression for equivalent twisting moment and equivalent bending moment for a shaft subjected to combined twisting and bending moment. 14

5. Write short notes with neat diagrams. 14

   (a) Different types of keys.

   (b) Design of square key and its effect on strength of the shaft.

6. Design a cotter joint to connect two steel rods for a pull of 30 kN. The maximum permissible stresses are 55 MPa in tension, 40 MPa in shear and 70 MPa in crushing. Draw a neat sketch of the joint designed. 14

7. Compare the ratio of strength of a solid steel column to that of a hollow column of internal diameter equal to $3/4^{th}$ of its external diameter. Both the columns have the same cross sectional area, length and end conditions. 14

8. Write short note on *any four* of the following : 3.5x4=14

   (a) Functions of springs

   (b) S N Curve

   (c) Modified Goodman diagram

   (d) Fatigue Failure.