339 Register No.:

October 2018

Time – Three hours
(Maximum Marks: 75)

[N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. Answer any FOUR questions from the remaining in each PART - A and PART - B

(2) Answer division (a) or division (b) of each question in PART - C.

(3) Each question carries 2 marks in PART – A, 3 marks in Part – B and 10 marks in PART – C.]

PART – A

1. What are the characteristics of force?
2. State Hooke's law.
3. What is meant by temperature stress?
4. List out the stresses, induced in thin cylindrical shells.
5. What is beam?
6. Define polar modulus.
7. List the various types of springs.
8. Define moment of inertia.

PART – B

9. Distinguish between force of friction and limiting force of friction.
10. Define co-efficient of friction.
11. Differentiate between repeated loading and cyclic loading.
12. What is centroidal axis and axis of reference?
13. What is cantilever beam and simply supported beam?
14. Write down the assumptions made in theory of pure torsion.
15. Compare closely coiled and open coiled helical spring.
16. What is UDL and UVL?

[Turn over.....

PART – C

17. (a) (i) What are the essential conditions for equilibrium of rigid body?

(ii) State the law of static friction.

(Or)

(b) The magnitude of the resultant of two concurrent forces with an included angle of 90° between them is $\sqrt{3}$ kN. When the included angle between the forces is 60°, the magnitude of their resultant is $\sqrt{19}$ kN. Find the magnitude of the two forces.

18. (a) List and explain the various mechanical properties of materials.

(Or)

(b) A mild steel specimen 25mm rod diameter was subjected to an axial pull of 100 kN. An extension of 0.25 mm was noted on a gauge length of 300 mm and a decrease in diameter of 0.00595 mm was observed. Find the values of Poisson's ratio and Young's modulus of the material.

19. (a) Find the centroid of an *I* section having top flange 150mm X 25mm, web 160mm X 25mm and bottom flange 200mm X 25mm.

(Or)

(b) Determine the change in diameter and change in volume of spherical shell 2m in diameter and 12 mm thick subjected to an internal pressure of 2 N/mm^2. Assume E=2x10^5 N/mm^2 and Poisson's ratio = 0.25.

20. (a) Draw the SFD and BMD for a simply supported beam subjected to a point load 'W' at its mid point.

(Or)

(b) A wooden beam of rectangular section 100mm X 200mm is simply supported over a span of 6 m. Determine the UDL it may carry, if the bending stress is not to ‹ceed 7.5 N/mm^2. Estimate the concentrated load it may carry at the centre of the beam with the same permissible stress.

21. (a) With neat sketches, explain the various types of springs.

(Or)

(b) A solid shaft 20 mm diameter transmits 10 kW at 1200 rpm. Calculate the maximum intensity of shear stress induced and the angle of twist in degrees in a length of 1m. If modulus of rigidity for the material of the shaft is 8x10^4 N/mm^2.
