SECTION II
(Mechanical)

7. (a) What do you understand by characteristic curves of centrifugal pump ? Draw the figure. 10

(b) What do you mean by specific speed of a turbine ? Explain. 5

(c) What will be the force exerted by

(i) direct impact of a jet on a stationary flat plate ?

(ii) oblique impact of a jet on a stationary flat plate ?

Explain with neat sketches. 15

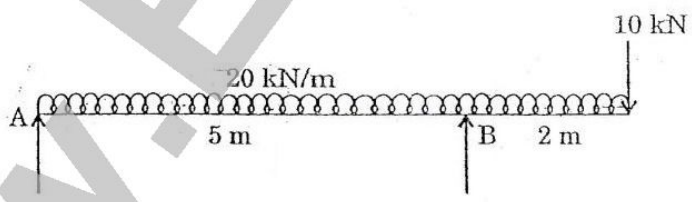
8. (a) Show that the air standard efficiency of Otto cycle depends on compression ratio only. 15

(b) Describe working of a simple plain tube carburettor with the help of a neat sketch. 15

9. (a) A load of 270 kN is applied on a short concrete column 250 mm × 250 mm. The column is reinforced with 8 bars of 16 mm diameter. If the modulus of elasticity for steel is 18 times that of concrete, find the stresses in concrete and steel.
If the stress in concrete shall not exceed 4 N/mm^2, find the area of steel required so that the column may support a load of 400 kN. 10.

(b) Draw the B.M. and S.F. diagrams for the overhanging beam carrying loads as shown in figure given below.

Mark the values of principal ordinates and locate the point of contraflexure. 20



10. (a) Define inversion. Write its properties and importance. 15

(b) A capstan and a rope are used in a railway goods yard for moving trucks. The capstan runs at 50 r.p.m. The rope from the line of trucks makes 2·75 turns around the capstan at a radius of 20 cm and the free end of the rope is pulled with a force of 147·15 N. Determine the pull on the trucks, the power taken by the trucks, and the power supplied by the capstan. Take $\mu = 0{\cdot}25$. 15

11. (a) Define and explain with proper sketches, the following lathe operations : 15

(i) Grooving

(ii) Chamfering

(b) Explain Taper turning on lathe in detail. 10

(c) Determine the angle at which the compound rest would be swivelled for cutting a taper on a workpiece having a length of 150 mm and outside diameter 80 mm. The smallest diameter on the tapered end of the rod should be 50 mm and the required length of the tapered portion is 80 mm. 5

12. (a) Explain centreless grinders. Give sketches for external centreless grinding and write about (i) through feed (ii) infeed and (iii) end feed. 20

(b) Calculate the time required to drill a 25 mm diameter hole in a workpiece having thickness of 60 mm to the complete depth. The cutting speed is 14 m/min and feed is 0·3 mm/rev. Assume length of approach and overtravel as 5 mm. 10