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RN-7475

B. E. - IV (Sem. VII) (Mechanical) Examination

May / June – 2010

Automobile Engineering (Elective-I)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 4 (Sem. 7) (Mech.)**

Name of the Subject :

☛ **Automobile Engineering (Elective-I)**

☛ Subject Code No. : **7 4 7 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Answers to the **two** section must be written in **separate** answer books.

(4) Use of calculator is permitted.

(5) Figures to the right indicate full marks.

(5) Assume suitable data if require.

SECTION - I

1 (a) Answer the following questions : **10**

(i) How much net heat energy available to propel the vehicle? Why?

(ii) The rolling resistance Rr. can be expressed by _____ (Following relations)

(iii) Why parking brake is required?

(iv) What is Dipping in suspension system?

(v) Why two piece propeller shaft is better than single long propeller shaft?

(b) Discuss air resistance. Calculate the power required in an engine fitted on a truck whose weight is 30 kN, the frontal cross-section area is 3 square meter, and which can run on level road at a highest speed of 75 kmph. The mechanical efficiency of the engine is 75% and the transmission efficiency of vehicle is 85%. **10**

2 (a) Explain anti-lock brake system on vehicle. **8**

OR

(a) Explain with neat sketch tandem master cylinder. **8**

(b) Discuss gas-filled shock absorber system. **7**

OR

(b) Discuss independent front suspension system. **7**

3 Answer any **two** : **15**

(i) Explain differential assembly with neat sketch.

(ii) Write importance of universal coupling with neat sketch.

(iii) State and discuss troubleshooting of driveline.

(iv) Discuss troubleshooting of brake with possible remedy.

SECTION - II

4 (a) Write one line answers of the following : **10**

(i) What is transfer case?

(ii) Why is oil of high viscosity used in gear box?

(iii) What is preselector gear box?

(iv) What is meant by double cardon joint?

(v) What is a swing axle?

(vi) What is Transaxle?

(vii) What is zero caster?

(viii) What is meant by 'reach' sparkplug?

(ix) What is a cold plug?

(x) What is a collapsible steering column?

(b) (i) A rack and pinion steering system has 5 teeth of 10 mm pitch and a steering wheel of 320 mm diameter. Calculate: **10**

(a) the movement ratio

(b) the mechanical efficiency of the steering gear if a tangential force of 30 N at the rim of the steering wheel produces a force of 560 N on the rack.

(ii) A 75 mm crankshaft main bearing journal rotates at 3000 rev/min while carrying a normal load W = 20 kN. If the coefficient of friction in the bearing = 0.02, calculate :

(a) the friction torque on the crankshaft;

(b) the power lost in friction at this engine speed; and

(c) state what happens to the energy absorbed in friction.

5 Attempt any **two** : **15**

(i) Hydraulic torque converter.

(ii) Troubleshooting of gearbox.

(iii) A worm and sector steering gear of the type shown in figure 1 has a 4-start worm and a sector that is a sector of a 48- tooth worm wheel. The steering wheel has a diameter of 400 mm and the drop arm has a length of 150 mm. Two tangential forces each of 15 N applied at the rim of the steering wheel produce a force in the drag link of 450 N, which acts at right angles to the drop arm. Calculate :

(a) the movement ratio, MR of the steering system

(b) the mechanical advantage MA, of the system

(c) the mechanical efficiency of the system.

6 Attempt any **two** : **15**

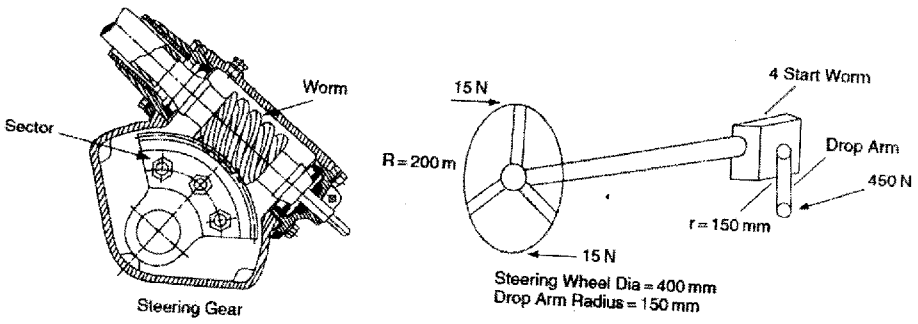

Fig. 1

(i) Transistorized coil ignition system.

(ii) Overdrive troubles and their causes.

(iii) (a) A connecting rod has a cross-sectional area of 200 mm^2 and it carries a compressive force of 2.4 tonnes. Calcualte the compressive stress in the connecting rod.

(b) In the handbrake lever mechanism shown in figures 2, a brake cable force of 420 N is required to apply the brakes. Calculate the hand force applied at right angles to the long part of the lever, that is required to produce this force in the cable.

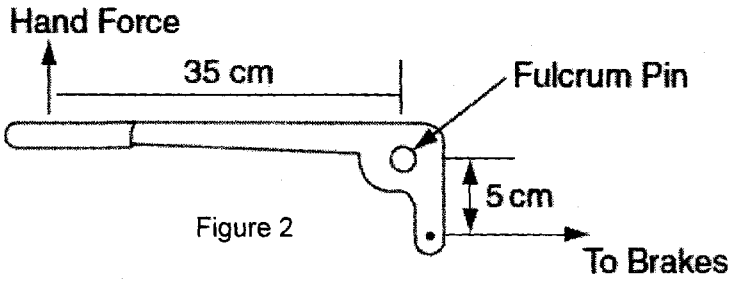

Figure 2