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ME—703

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4022 Roll No.

B.Tech.

SEVENTH SEMESTER EXAMINATION, 2005-2006

AUTOMOBILE ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note : *(i) Answer **ALL** questions.*

(ii) All questions carry equal marks.

(iii) Each question is of 20 marks.

(iv) Be precise in your answer.

1. Attempt ***any two*** parts : **(10x2=20)**

(a) Draw layout of a valve operating mechanism for an overhead valve engine. Label various parts and explain their functions

(b) The coefficient of rolling resistance for a truck weighing 62300 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R=KW+K_a.AV^2$, N, where A is m^2 of frontal area and V is the speed in km/h. The transmission efficiency in top gear of 6.2 : 1 is 90% and that in the second gear of 15 : 1 is 80% The frontal area is $5.75m^2$. If the truck has to have maximum speed of 88km/h in top gear, calculate :

(i) The engine b.p required,

(ii) The engine speed if the driving wheels have an effective diameter of 0.8125m,

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(iii) The maximum grade the truck can negotiate at the above engine speed in second gear.

(iv) The maximum drawbar pull available on level at the above engine speed in second gear.

(c) A four speed gear box is to be constructed for providing the ratios of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly as possible. The diametral pitch of each gear is 3.25mm and the smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of the different gears. What is then the distance between the main and layout shaft ?

2. Attempt *any four* parts : **(5x4=20)**

(a) With a suitable sketch describe the working of a multiplate clutch.

(b) Sketch and explain the construction and working of a torque converter.

(c) Describe the working of a hydramatic drive automatic transmission.

(d) What do you mean by a universal joint ? What is its function ?

(e) What is the need of using a differential assembly ? Discuss different types of differentials.

(f) Explain the principle of Ackerman steering mechanism.

3. Attempt *any four* parts : **(5x4=20)**

(a) What is a tandem master cylinder ? What are its advantages over an ordinary master cylinder ?

(b) Draw layout of a booster hydraulic brake system and briefly explain the functions of each component.

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(c) Explain the working of a vacuum brake by means of a diagram.

(d) Sketch and explain the construction and working on a torsion bar.

(e) Differentiate between independent suspension system and rigid axle suspension system.

(f) What are the functions of a shock absorber ? Describe the telescopic shock absorber with a sketch.

4. Attempt *any two* parts : **(10x2=20)**

(a) Sketch and explain the construction and working of a starter motor commonly used on modern vehicles.

(b) Describe the working principle of a multipoint port electronic fuel-injection system. What are the advantage of SI engine fuel injection system ?

(c) Describe the working principle of a Jerk type of injection pump. Show the variation of plunger helix indicating the beginning and ending of diesel injection.

5. Attempt *any two* parts : **(10x2=20)**

(a) Describe with the help of a diagram air-cooled system of an automobile engine. What are its advantages and disadvantages ?

(b) Describe with the help of a diagram a combination of splash and pressure lubrication system.

(c) Write short notes on Major overhaul of an engine.

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