Mech

COLLEGE OF ENGINEERING, PUNE
(AN AUTONOMOUS INSTITUTE OF GOVT. OF MAHARASHTRA)

END SEMESTER EXAMINATION
(ME-410) AUTOMOBILE ENGINEERING
Program: B. Tech (Mechanical)

[Time: 3 Hours] [Max.Mark:60]

Instructions to candidates:
1. Attempt any four questions out of six.
2. All sub-questions are compulsory.
3. Neat Diagrams must be drawn where ever necessary.
4. Assume suitable data if necessary.
5. Use of non programmable electronic calculators is allowed.

Q.1

a) Derive the expression for the total torque transmitted for the single plate clutch on the basis of (i) Uniform Pressure Intensity (ii) Uniform rate of wear (5)

b) Explain in detail four wheel drive system. (5)

c) Single plate friction clutch is to be designed for an Ashok Leyland bus developing 80.85 kw at 2400 r.p.m. The maximum torque developed however is 376 Nm at 1600 r.pm. A maximum wear of clutch facing of 3 mm is to be allowed when the clutch must transmit at least 25 % excess torque. A pressure intensity of 190 kPA can be safely allowed and ratio, inside dia/ outside dia = 0.6 ,is considered reasonable.(i) Calculate clutch plate dimensions (ii) If 9 springs are used and initial spring force is to be 1.2 times the spring force after allowable wear of 3 mm, find out the spring stiffness. Assume coefficient of friction as 0.35. (5)

Q.2

a) Discuss in detail: a) Plastic Suspension. b) Hydraulic Suspension. c) Daimler Benz Suspension d) Hydragas interconnected Suspension System (5)

b) Enlist various types of common faults occurring in steering system along with their remedies. (5)

c) A motor car has a wheel base of 2.743 m and pivot centers 1.065 m apart. The front and rear wheel track is 1.217 m Calculate the correct angle of outside lock and turning radius of the outer front and inner rear wheels when the angle of inside lock is 40^0 (5)

Q.3

a) Compare frameless and unitary construction of passenger car bodies. Why is the integral frame body construction preferred for them? (5)

b) Define the following terms and phenomena.
(a) Drag (b) streamlined body (c) coefficient of lift (d) wake (e) separation of flow (f) rear spoiler. (5)

c) The effective frontal area of car s 1.5 m^2. It is moving at speed of 75 km/hr in calm air surrounding. Profile of its body is such that Profile of its body is such that the coefficients of lift and drag are 0.7 and 0.1 respectively. Taking weight density of air as 1.15 kilogram per cubic meter, determine a) the drag force b) the lift force c) the resultant force d) power exerted by the air stream on the car and e) the expected pressure distributions on bonnet front and rear windscreens, roofs, rear hood, front and back faces of the car (5)

Q.4

a) Describe in detail constructional features of the tubed and the tubeless tyres for automotive use. Discuss also there relative merits and demerits. (5)

b) Describe the requirement of automobile wheel in automobile. Explain its all the types. (5)

c) The wheelbase of a vehicle of weight 20 kN is 5.0 m and its centre of gravity is 0.1 m above the ground. When the vehicle is standing the front axle shared 7 kN while the rest of the weight is carried by rear axle. Determine the load on each axle when brakes are applied just to the point of skidding the retardation achieved s 5.0 m/sec^2 (5)

Q.5

a) Explain in detail construction, operation & maintenance of lead acid batteries. (5)

b) Draw a simplified diagram of lightening circuit in car and explain the same. (5)

c) i) In a 12 volt battery ignition system, the number of turns in primary and secondary windings of ignition coil is 120 and 180000 respectively Estimate the high voltage produced in it.

ii)A condenser when charged to potential of 2000 V s found to store an energy of 24 joule. Calculate the capacitance of condenser.

(5)

Q.6

a) Explain the need of vehicle testing, its standards and types of vehicle tests. (5)

b) Make a detail list of equipments that a good automobile service station must have. (5)

c) Discuss in detail various precautions that must be observed for safety in an automobile service station (5)