Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PEME 5301

Fifth Semester Regular Examination – 2014

AUTOMOBILE ENGINEERING

BRANCH : MECH

QUESTION CODE : H 197

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

(a) What is brake fade ?

(b) What are the different types of joints in the propeller shaft and how they help during power transmission ?

(c) What is the condition for perfect rolling in case of steering ?

(d) Explain the working of a disc brake system in brief.

(e) What is the purpose of having an efficient cooling system for an engine and what are the different types of cooling systems ?

(f) What is the job of an engine lubricant and what are different types of engine lubrication system ?

(g) What is Caster angle and Camber angle ?

(h) What is Toe-in and Toe-out ?

(i) What is the disadvantage of a sliding mesh gearbox as compared to a constant mesh gearbox ?

(j) What is the job of a bendix drive ?

P.T.O.

2. What is the basic principle that is behind the working of the Hydraulic braking system ? Explain the Hydraulic braking system in details with the help of neat sketches wherever necessary. 10

3. Why a differential is required in an Automobile ? What are the different components of a differential ? Explain the working of a differential with the help of neat sketches where ever necessary. 10

4. (a) Differentiate between Tractive effort and Traction. Explain the road performance curves for **road speed vs Power available at wheels** and **road speed Vs Tractive effort** for different gears at different speeds. 5

(b) A car engine has to be designed to pull the car on an inclined surface of inclination 5 degrees at a speed of 40 km/hr in the 3rd gear. The transmission efficiency of the car in 3rd gear is 85%. The front projected area of the car is 5.3 m^2. If the car has a self-weight of 650 kg and it has to carry 5 persons in it, each of them weighing 70 kg on an average, how much power should be developed by the car ? Assume that the coefficient of rolling resistance = 0.0059 and the coefficient of air resistance = 0.023. 5

5. (a) Explain the working of a 4-speed constant mesh gearbox in details with the help of a neat sketch. 5

(b) In a gearbox the clutch shaft pinion has 14 teeth and the low gear main shaft pinion has 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axle ratio is 3.7 : 1 and the effective radius of the rear tyre is 0.355 m. Calculate the car speed in the above arrangement at an engine speed of 2500 rpm. 5

6. (a) What is a fluid coupling and where is it used ? Explain the working of a fluid coupling with the help of a neat sketch. 5

(b) Explain the working of an automatic transmission in details with the help of a neat sketch. 5

7. (a) Explain the basic electrical system of an automobile with the help of a circuit diagram. 5

(b) Explain, in details, the different types of rear axles used in the Automobile industry. 5

8. Answer any **two** of the following questions : 5×2

(a) How bleeding is done in hydraulic brakes ?

(b) Briefly explain the Hotchkiss drive.

(c) Give a brief description on fuel cells.

(d) Explain the working of a cone clutch in synchronizer.