1731

Code : 15AT61T

Register Number

AUTOMOTIVE MECHANICS

Time : 3 Hours]

[Max. Marks : 100

Note :
   (i) Answer any **six** questions from Part – **A** and each question carries **five** marks.

   (ii) Answer any **seven** questions from Part – **B** and each question carries **ten** marks.

   (iii) Any missed data may be assumed.

PART – A

1. Explain the construction and working of an electric dynamometer.   5

2. An Engine consumes 4.08 litres of gasoline per hour develops 11.75 KWip. The specific gravity of fuel is 0.78 and heating value is 43900 kJ/kg. Determine indicated thermal efficiency.   5

3. List the requirements of friction clutch.   5

4. With respect to Gear pinion terminology define :
   (a) Adendum
   (b) Dendum
   (c) Pitch circle
   (d) Diametrical pitch and
   (e) Module   5

5. Explain brake fade.   5

6. Define instantaneous centre in steering geometry.   5

7. Explain the different types resistance offered against the movement of the vehicle.   5

8. Explain the brake balance of internal expanding shoe brake.   5

9. Deduce the equation power for propulsion of a vehicle.   5

     [Turn over

PART – B

10. When Morse test was carried out on four cylinder petrol engine, the engine output power was 38.62 kW at 2000 rpm, the Brake torque readings were 132.5, 127.13, 127.12 and 130.2 N-m respectively. In the normal running at this speed the specific fuel consumption is 14.24 kg/hr and heating value of fuel is 43900 kJ/kg. Calculate indicated power, mechanical efficiency and brake thermal efficiency.   10

11. During the test on single cylinder oil engine, working on four stroke cycle, fitted with mechanical dynamometer, the effective diameter of the brake drum 475 mm; Dead load on brake drum 150 N; spring balance reading 22.5 N; Speed 450 rpm; Area of indicator diagram 315 mm^2; Length of indicator 70 mm, spring scale 1.1 bar/min; Diameter of the cylinder is 100 mm; Stroke 150 mm; Quantity of fuel consumption 0.62 kg/hr; heating value of fuel 42000 kj/kg, calculate (a) Brake power; (b) Indicated power, (c) Mechanical efficiency, (d) Brake thermal efficiency.   10

12. Derive an equation for torque transmitted through multiplate clutch considering when there is a uniform pressure.   10

13. A single plate clutch effective on both the sides is required to transmit 25 kW at 3000 rpm. Determine the outer diameter and inner diameter of friction surface, if co-efficient of friction is 0.225, ratio of diameters is 1.25 and maximum pressure not to exceed 0.1 N/mm^2. Also determine axial thrust to be provided by springs, assume the condition of uniform wear.   10

14. A four speed gear box is to be constructed for providing ratios of 1.0, 1.46, 2.28 and 3.93 to 1 as nearly as possible. The diametrical pitch of each gear is 3.25 mm and smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of different gears and distance between the shafts.   10

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5. A motor car has a wheel base of 2.743 m and pivot centre of 1.065 m. The front and rear wheel track is 1.217 m, calculate the correct angle of outside lock and turning circle, radius of the outer front and inner rear wheels when the angle of inside lock is 40°.   10

6. A motor car weighs 13341.5 N and has wheel base 2.65 m. The c.g is 1.27 m behind the front wheel axle and 0.76 m above the ground level, the co-efficient adhesion between tyre and road surface is 0.6. The car is travelling on level road, calculate stopping distance and load distribution on front and rear wheels when (a) All the wheels are braked, (b) rear wheels are braked and (c) front wheels are braked.   10

7. An internal expanding type of brake of drum diameter 0.4 m, the brake shoes are pinned together at the bottom 0.15 m away from the brake drum centre. An actuating force on both the shoes at wheel cylinder is 311.5 N. The distance between the pin to wheel cylinder axis is 0.3 m. The point of application of the resultant frictional force to act at a distance of 0.22 m from the centre of brake drum. The co-efficient of friction is 0.4 between shoe and drum. Determine total torque developed when

   (a) Normal pressure on brake shoe to act at right angle to the line joining the pin centre with brake drum.

   (b) Normal pressure on brake shoe to act at 60° to the line joining the pin centre with brake drum.   10

18. In a certain application, the jeep weighing 12459 N is required to pull a trailer of gross weight 10673 N at speed of 57.75 km/hr. in top gear on level road. The rolling resistance co-efficient is 0.016 and air resistance co-efficient is 0.055. Find the resistance on the jeep and decide the jeep is adequate for job if the engine is developed 40.5 b kW and transmission efficiency is 90%. What will be the pull at couplings ? If the available power is just utilized in top gear by suitably loading the trailer, determine the pull at coupling at 57.75 kmph.   10

19. A motor car with wheel base 2.75 m with cg 0.85 m above the ground at 1.15 m behind the front axle has co-efficient of adhesion 0.6 between tyre and road, calculate maximum possible acceleration when vehicle driven on

(a)   Four wheel

(b)   Front wheel

(c)   All the four wheel

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