1485

Code : 15AT61T

Register Number | | | | | | | | | | |

VI Semester Diploma Examination, April/May-2019

AUTOMOTIVE MECHANICS

Time : 3 Hours] **[Max. Marks : 100**

Instruction : (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) Missing data may be suitably assumed.

PART – A

1. Explain prony brake dynamometer. **5**

2. Explain Morse test. **5**

3. List the requirements of clutch. **5**

4. List the different terms involved in spur gear terminology. **5**

5. Derive an equation for correct steering. **5**

6. List the requirements of braking. **5**

7. Explain the brake fade. **5**

8. Deduce the equation between engine speed and vehicle speed. **5**

9. List resistances offered against the movement of vehicle. **5**

[Turn over

PART – B

10. A four-cylinder petrol engine has an output of 51.5 kW bp at 2000 rpm. A Morse test was carried out and the brake torque readings were : 176.3, 169.5, 166.8 and 173.6 N-m respectively. For normal running at this speed specific fuel consumption is 0.37 kg/kW-Hr. The LCV of the fuel is 43900 kJ/kg. Calculate the mechanical efficiency and the brake thermal efficiency of the engine. 10

11. While testing a four-cylinder automobile petrol engine of bore 85 mm and stroke 92.2 mm at 3000 rpm on a test stand. The following data were obtained :

Indicated mean effective pressure = 96.14×10^4 N/m^2

Fuel Consumption = 1.36 kg.

Engine torque developed = 135.6 N/m

Duration of test = 5 min.

If the heating value of fuel used 44270 kJ/kg

Calculate :

(a) Indicated power of the engine

(b) Brake power

(c) Mechanical efficiency

(d) Overall thermal efficiency 10

12. Single plate dry disc clutch having both the faces effective is required to transmit 36.8 kW at crank shaft speed of 3000 rpm. The total axial load is 3561 N and the coefficient of friction between disc and metal is 0.3. Find the size of friction lining required, if the inner radius of lining is 0.75 of the outer radius. 10

13. In a passenger car the gear box clutch shaft pinion is having 14 teeth and lay shaft constant mesh gear has 20 teeth. The other gear wheels of lay shaft are having 10, 14 and 16 teeth for I, II and III gear respectively. The rear axle ratio is 4. The road wheel diameter is 600 mm. Calculate the various speeds of the vehicle when the engine is running at constant speed of 4000 rpm. 10

14. A motor vehicle with a wheel base = 2.14 m, wheel track = 1.22 m is provided with Ackerman steering system. The distance from the centre plane of each front wheel to the nearest king pin axis is 0.11 m while taking a turn, the inner wheel is deflected through a maximum angle of 42°. Calculate the corresponding deflection of the outer front wheel, assuming that all the wheels are in true rolling motion. Also find the turning circle radius of outer front wheel. **10**

15. A motor car has a wheel base of 2.64 m the height of its e.g. above the ground is 0.61 m and is 1.12 m infront of the rear axle. If the car is travelling at 40 km/hr. on a level track, determine the minimum distance in which the car may be stopped, when

(a) The rear wheels are braked

(b) The front wheels are braked

(c) All the wheels are braked.

Assume coefficient of friction between tyre and ground as 0.6. **10**

16. A truck weighing 78480 N has its eg 1.2 m infront of the rear axle, 1.8 m behind the front axle and 1.35 m above the ground level. The front wheel brakes are having only leading shoes whereas the rear wheel brakes have conventional leading and trailing shoes. Final actuating forces are applied to all shoes which are symmetrically placed :

Having brake drum dia = 0.25 m

Distance of shoe pivots from drum centre = 0.1 m

Distance of actuating force from pivot centre = 0.2 m

Effective radius for the resultant frictional force = 0.16 m

Coefficient of friction between shoe and drum = 0.4

Coefficient of friction between tyre and ground = 0.5

Diameter of road wheel = 0.92 m

Calculate :

(a) The magnitude of actuating force on each shoe

(b) The maximum deceleration possible without any skidding of the wheels. **10**

17. Calculate the power of a car of gross weight 11920 N, the engine is running at a speed of 5000 rpm in top gear. The size of the wheel is 0.508 m dia. Final gear reduction is 4.3 : 1. Frontal area of the body of the vehicle is 2.2 m^2.

Coefficient of rolling resistance = 0.012

Coefficient of air resistance = 0.007 10

18. A motor vehicle of total weight 13341.6 N has road wheels of effective diameter 0.635 m. The engine can develop a maximum torque of 189.82 N/m and the transmission efficiency is 80%. The moment of inertia of road wheels and axles is 66.22 N/m^2 and that the engine fly wheel is 5.89 N/m^2. Calculate the gear ratio required to give a maximum acceleration of 0.455 m/sec^2 up a slope of 1 in 10 with a road resistance of 311.46 N under maximum torque condition. 10

19. (a) Define gradiability and draw bar pull. 5

(b) Find the rpm of the engine when the vehicle is moving at a speed of 60 km/hr. in top gear. Take rear axle reduction to be 4.2 : 1 and the dia. of the wheel as 500 mm. 5
