Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: 2020-21 B. Tech.	**School of Technology**	**Department:** Mechanical Engg.
Course Code: MET407.4	**Course Title: Automotive System Design**	**Semester : VII**
Day : Saturday **Date : 26/12/2020**	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All Questions are compulsory.
2) Figures to right indicate marks.

		Marks	Bloom's Level	CO
Q.1	**Answer the following (any Two)–**			
a)	Discuss the design of piston for internal combustion engine.	8	L3	407.4.1
b)	A plate clutch having a single driving plate with contact surfaces on each side is required to transmit 110 kW at 1250 RPM The outer diameter of the contact surfaces is to be 300 mm. The coefficient of friction is 0.4 Assuming a uniform pressure of 0.17 N/mm^2; determine the inner diameter of the friction surfaces. Assuming the same dimensions and the same total axial thrust, determine the maximum torque that can be transmitted and the maximum intensity of pressure when uniform wear conditions have been reached.	8	L3	407.4.1
c)	Explain the concept of Ray Diagram and step ratio.	8	L2	407.4.2
Q.2	**Answer the following (any two) –**			
a)	An automobile engine develops 28 kW power while turning at 1650 rev/min and having its BGR 3. The tubular propeller shaft of 40mm diameter and made of steel with safe shear stress of 0.5×10^5 KPa. Calculate the inside diameter of shaft tubing. Neglect bending moment on shaft.	8	L3	407.4.2
b)	Explain construction and working of telescopic shock absorber.	8	L2	407.4.3
c)	A railway wagon moving at a velocity of 1.5 m/s is brought to rest by a bumper consisting of two helical springs arranged in parallel. The mass of the wagon is 1500 kg. The springs are compressed by 150 mm in bringing the wagon to rest. The spring index can be taken as 6. The springs are made of oil-hardened and tempered	8	L3	407.4.3

steel wire with ultimate tensile strength of 1250 N/mm^2 and modulus of rigidity of 81 370 N/mm^2. The permissible shear stress for the spring wire can be taken as 50% of the ultimate tensile strength. Design the spring and calculate:

(i) wire diameter;

(ii) total number of coils;

(iii) Pitch of the coil.

Q.3 Answer the following (any two) –

a)	Explain construction and working of internal expanding shoe type brakes.	9	L2	407.4.4
b)	A four-wheeled automobile car has a total mass of 1200 kg. The moment of inertia of each wheel about a transverse axis through its centre of gravity is 0.5 kg-m^2. The rolling radius of the wheel is 0.35 m. The rotating and reciprocating parts of the engine and the transmission system are equivalent to a moment of inertia of 2.5 kg-m^2, which rotates at five times the road-wheel speed. The car is traveling at a speed of 100 km/h on a plane road. When the brakes are applied, the car decelerates at 0.5 g. There are brakes on all four wheels. Calculate: (i) the energy absorbed by each brake; and (ii) The torque capacity of each brake.	9	L3	407.4.4
c)	What is Johnson's method of optimum design? Explain the concept of adequate design and optimum design.	9	L3	407.4.5

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