

Code : 102705

(2)

B.Tech 7th Semester Exam., 2021

(New Course)

AUTOMOBILE ENGINEERING

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : $2 \times 7 = 14$

(a) Ford EcoSport 2021 model has

- (i) manual transmission
- (ii) semi-automatic transmission
- (iii) fully-automatic transmission
- (iv) Both (i) and (iii)

- (b) In a square type engine
 - (i) geometrical shape is square
 - (ii) diameter and length of piston are same
 - (iii) two cylinders are placed horizontal and two vertical
 - (iv) stroke length and cylinder bore are same

(c) The connecting rods are generally made of _____ shaped cross-section.

- (i) I
- (ii) C
- (iii) L
- (iv) H

(d) The vehicle ride will be comfortable if

- (i) unsprung mass is kept minimum
- (ii) sprung mass is kept minimum
- (iii) vehicle mass is kept minimum
- (iv) All of the above

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(Turn Over)

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(Continued)

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(e) The tilting of the front wheels away from the vertical, when viewed from the front of car is called

- (i) toe in
- (ii) caster
- (iii) camber
- (iv) toe out

(f) The torque converter uses _____ to transfer torque.

- (i) air
- (ii) automatic transmission fluid (ATF)
- (iii) gears
- (iv) steel belt

(g) The starter motor is driven by

- (i) chain drive
- (ii) gear drive
- (iii) flat belt drive
- (iv) V-belt drive

(h) The aspect ratio (expressed in percentage) of the tyre is defined as the ratio of

- (i) section height to section width
- (ii) wheel diameter to section height
- (iii) wheel diameter to section width
- (iv) section width to section height

(i) In radial tyres

- (i) one-ply layer runs diagonally one way and another layer runs diagonally the other way
- (ii) all plies run parallel to one another and vertical to tyre bead
- (iii) inner tubes are always used
- (iv) None of the above

(j) The caster is called positive when the top of the pin is inclined to the

- (i) rear of the vehicle
- (ii) front of the vehicle
- (iii) left of the vehicle
- (iv) right of the vehicle

2. (a) With the help of neat sketch, mark different components of a 4-wheeler, 2 rear wheel-driven car. 7
- (b) Distinguish between an articulated vehicle and a rigid vehicle. How do their construction and design differ from each other? 7
3. (a) What is common rail direct injection (CRDI) system? How is it different from conventional injection system? 7
- (b) Differentiate between transistor-based coil ignition system and capacitive discharge ignition system. 7
4. (a) Classify different types of clutches. Describe the working of multiplate friction clutch. 7
- (b) A cone clutch with a cone semi angle of 12° is to transmit 11.19 kW at 750 r.p.m. The width of the face is $1/4$ th of the mean diameter and the normal pressure between the contact faces is not to exceed 0.67 kgf/cm^2 . Allowing the coefficient of friction of 0.2, determine the main dimensions of the clutch and the axial force required. 7
5. (a) What is gearbox? Why do we need a gearbox in an automobile? State various functions of a gearbox. 8

- (b) Sketch the layout of a synchromesh gearbox used on any Indian automobile. 6
6. (a) What is a torque converter? Sketch and explain the construction and working of a torque converter. In what respect is it different from a fluid flywheel? 8
- (b) Explain the principle of working of an overdrive with suitable diagram. 6
7. (a) Sketch the assembly of a front wheel and a stub axle showing inclined king-pin and cambered wheel to provide center-point steering. 7
- (b) With the help of a neat sketch, differentiate between king-pin inclination and steering-axis inclination. 7
8. (a) Differentiate between : 8
- (i) Two leading shoe brake and two trailing shoe brake
- (ii) Self-energizing and servo brakes
- (b) What is tandem master cylinder? What are its advantages over an ordinary master cylinder? 6

9. (a) What is biodiesel? Explain various processes involved in transesterification process to convert vegetable oil into biodiesel. 8
- (b) What are hybrid vehicles? With the help of a schematic diagram, explain the working of any hybrid electric auto-vehicle. 6

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