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April: 2024

BLUE PRINT

Mark Distribution

Module	Hr / Module	(hi / ∑Hi) * 123	TYPE OF QUESTIONS							
			PART A		PART B		PART C		TOTAL	
			No of Questions	Marks	No of Questions	Marks	No of Questions	Marks	No of Questions	Marks
I	18	37	2	2	3	9	4	28	9	39
II	17	35	3	3	2	6	4	28	9	37
III	15	31	2	2	4	12	2	14	8	28
IV	10	21	2	2	1	3	2	14	5	19
Total	60	123	9	9	10	30	12	84	31	123

Cognitive Level Wise Question Analysis

Mark Distribution

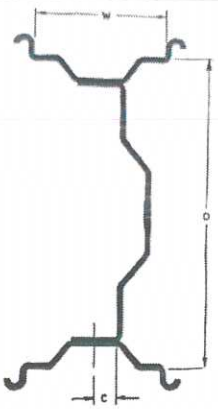
Cognitive Level	% Marks	Marks	TYPE OF QUESTIONS							
			PART A		PART B		PART C		TOTAL	
			No of Questions	Marks	No of Questions	Marks	No of Questions	Marks	No of Questions	Marks
R	34	42	9	9	4	12	3	21	16	42
U	66	81	0	0	6	18	9	63	15	81
A										
Total	100	123	9	9	10	30	12	84	31	123

Scoring Indicators

COURSE NAME : AUTOMOBILE ENGINEERING

COURSE CODE : 4023 **QID : 2103230221**

Q No	Scoring Indicators	Split score	Sub Tota l	Total score
	PART A			**9**
I. 1	Chassis	1	1	
I. 2	Petroil	1	1	
I. 3	Transmission system	1	1	
I. 4	Sun gear	1	1	
I. 5	Engine	1	1	
I. 6	Suspension system	1	1	
I. 7	Worm and nut/ wheel, rack and pinion, recirculating ball etc.	Any one	1	
I. 8	Mechanical energy	1	1	
I. 9	Bharath stage emission standards 4	1	1	
	PART B			24
II. 1	Cylinder blocks, cylinder, piston, connecting rod, crank case, Engine valves, cylinder manifolds	Any Three	3	
II. 2	Cooling of engine is necessary for the following reasons: 1. The even expansion of piston in the cylinder may result in seizure of the piston. 2. High temperatures reduce strength of piston and cylinder liner. 3. Overheated cylinder may lead to preignition of the charge, in case of spark ignition engines. 4. Physical and chemical changes may occur in lubricating oil which may cause sticking of piston rings and excessive wear of cylinder. 5. If the cylinder head temperature is high the volumetric efficiency and hence the power output of the engine is reduced.	Any Three	3	
II. 3	1. Hit and miss Governing 2. Quantitative Governing 3. Qualitative Governing	1 x 3	3	

II. 4	1. Clutch 2. Gearbox 3. Propeller shaft 4. Universal joints 5. Differential 6. Rear axle	Any three 1 x 3	3	
II. 5	Functions of a Clutch The functions performed by a clutch are as follows: 1. To permit engagement or disengagement of a gear when the vehicle is stationary and the engine is running. 2. To transmit the engine power to the road wheels smoothly without jolt/shock to the trans- mission system while setting the wheel in motion. 3. To permit the engaging of gears when the vehicle is in motion without damaging the gear wheels.	1 x 3	3	
II. 6	1.Leaf spring 2. Coil spring 3. Torsion bar	1x 3	3	
II. 7	**Camber** Camber is the tilt of the car wheels from the vertical. Camber is positive if the tilt is outward at the top. **Castor** The angle between the king pin centre line (or steering axis) and the vertical, in the plane of the wheel is called the castor angle. **King Pin Inclination** Inclination of the king pin from vertical is called the king pin inclination or king pin rake.	1x 3	3	
II. 8	 Fig. 8.14. Wheel dimensions W = Width D = Diameter C = Offset	Fig 2 Marking 1	3	
II.9	1. Mechanical brakes 2. Hydraulic brakes 3. Power brakes	1x 3	3	

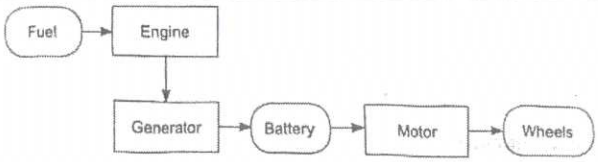
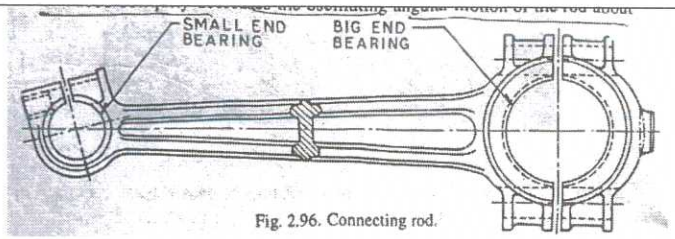
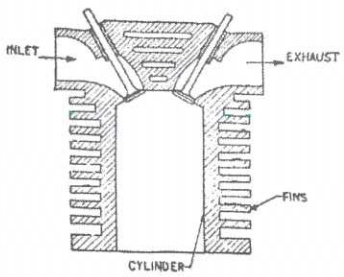
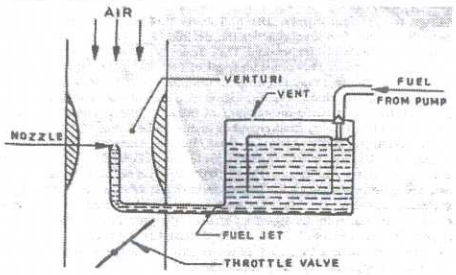
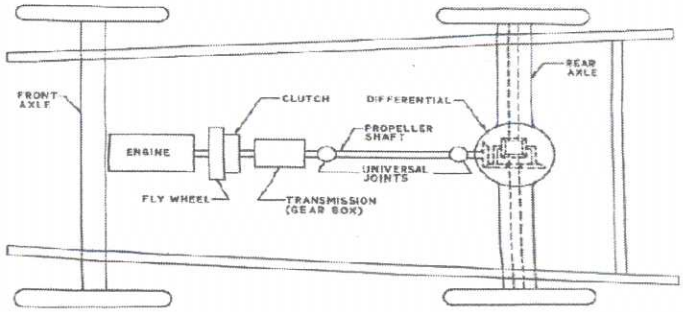
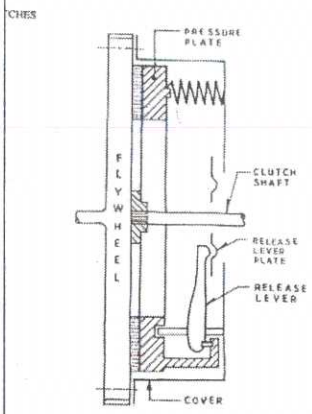
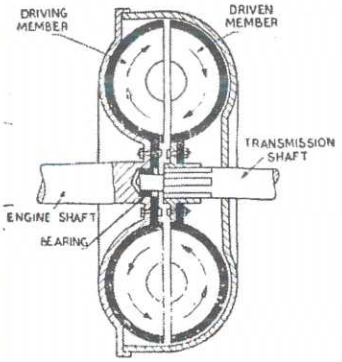
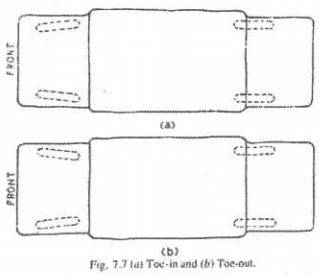
<table>
<tr><td>II.10</td><td> 
</td><td></td><td>3</td><td></td></tr>
<tr><td></td><td>PART C</td><td></td><td></td><td>42</td></tr>
<tr><td>III. 1</td><td> 

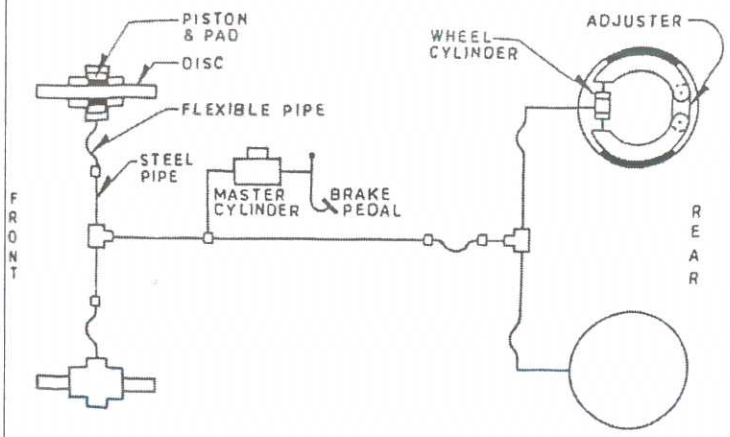
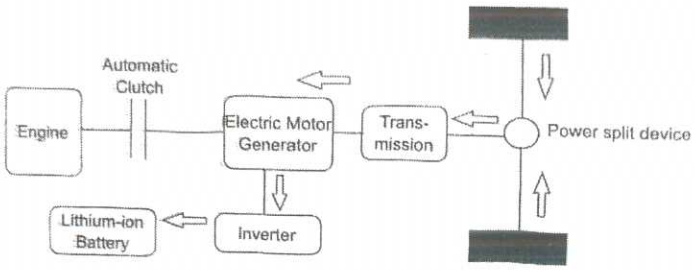
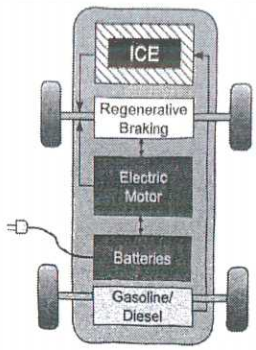
Fig. 2.96. Connecting rod.
The connecting rod transmits the piston load to the crank, causing the latter to turn, thus converting the reciprocating motion of the piston into a rotary motion of the crankshaft. The lower or "big end" of the connecting rod turns on "crank pins".The connecting rods are made of nickle, chrome and chrome vandium steels. For small engines the material may be aluminium.</td><td>Fig 3
Explanation 4</td><td>7</td><td>7</td></tr>
<tr><td>III. 2</td><td> 

Air-Cooling System
In this system, heat is carried away by the air flowing over and around the cylinder. Here fins are cast on the cylinder head and cylinder barrel which provide additional conductive and radiating surface .The fins are arranged at right angles to cylinder axis. The number and dimensions should be adequate to take care of the surplus heat dissipation.</td><td>Fig 3
Explanation 4</td><td>7</td><td>7</td></tr>
<tr><td>III. 3</td><td><table>
<tr><th>S. No.</th><th>Aspects</th><th>Battery ignition system</th><th>Magneto ignition system</th></tr>
<tr><td>1.</td><td>Current for primary circuit</td><td>Obtained from battery.</td><td>Generated by the magneto.</td></tr>
<tr><td>2.</td><td>Starting</td><td>Difficult to start when battery is in discharged condition</td><td>No problem of battery discharge</td></tr>
<tr><td>3.</td><td>Maintenance problems</td><td>More, due to battery.</td><td>Less, due to absence of battery</td></tr>
<tr><td>4.</td><td>Intensity of spark at low speed</td><td>Good</td><td>Poor</td></tr>
<tr><td>5.</td><td>Efficiency</td><td>Efficiency of the system decreases with the reduction in spark intensity as the engine speed increases.</td><td>Efficiency of the system improves as the engine speed increases due to high intensity spark.</td></tr>
<tr><td>6.</td><td>Cost</td><td>Less</td><td>More</td></tr>
<tr><td>7.</td><td>Space occupied</td><td>More</td><td>Less</td></tr>
<tr><td>8.</td><td>Applications</td><td>In cars and light commercial vehicles.</td><td>In racing cars and two wheelers, aircrafts etc.</td></tr>
</table></td><td>Any 7

1 mark each</td><td>7</td><td>7</td></tr>
<tr><td>III. 4</td><td>Working:</td><td>Fig 3
Explanation 4</td><td>7</td><td>7</td></tr>
</table>

	 During suction stroke, vacuum is created inside the cylinder. It causes the pressure difference between cylinder and outside the carburetor. Due to this, the atmospheric air enters the carburetor. The air flows through venturi. The venturi increases the velocity of air and reduces the pressure. It produces the partial vacuum at the tip of the nozzle. Because of this vacuum, the fuel comes out from the nozzle in the form of fine spray. These fine fuel particles mix with the incoming air to form air-fuel mixture. Thus, it gives a homogeneous mixture of air-fuel to the engine			
III. 5	 Fig. 1.4. Layout of complete transmission system of an automobile	Fig 4 Marking 3	7	7
III. 6	***Single Plate Clutch***  Fig. 3.5. Simplified diagram showing the working of a single plate clutch. A simplified sketch of a single plate clutch is given in Fig Friction plate is held between the flywheel and the pressure plate. There are springs (the number may vary, depending upon design) arranged circumferentially. which provide axial force to keep the clutch in engaged position. The friction plate is mounted on a hub which is splined from inside and is thus free to slide over the gear box shaft. Friction facing is attached to the friction plate on both sides to provide two annular friction surfaces for the transmission of power. A pedal is provided to pull the pressure plate against the spring force whenever it is required to be disengaged. Ordinarily it remains in engaged position as is When the clutch pedal is pressed, the pressure plate is moved to the right against the force of the springs. This is achieved by means of a suitable linkage and a thrust bearing. With this movement of the pressure plate, the friction plate is released and the clutch is disengaged.	Fig 3 Explanation 4	7	7

III. 7	 Fig. 3.48. Fluid flywheel. ***FLUID FLYWHEEL (Fluid Coupling)*** The fluid flywheel or the hydraulic coupling as it is frequently called, has been used in cars employing automatic transmissions. It consists of two members. the driving and the driven as shown in Fig. 3.48. The driving member is attached to the engine flywheel and the driven member, to the transmission shaft. The two members do not have any direct contact with each other. The driven member is free to slide on splines on the transmission shaft. The two rotors are always filled.	Fig 3 Explanation 4	7	7
III. 8	1. **Semi floating rear axle:** The bearings are inside the axle casing. The axle of the wheel is at the centre of the de casing. The wheels are fitted at the two ends of the axle by means of a key, bolt and nut The whole weight of the vehicle is first transmitted to the suspension spring then to the axle case, rear axle, wheel and finally to the ground. **2. Three-quarter floating rear axle:** The axle is fitted inside the axle casing. The bearings are on the outer side between the wheel and the axle casing. The wheel is fitted with the axle by means of a key, bolt and nut The weight of the vehicle is supported partly by the axle case and partly by the axle. The axle only takes care of the rotation and transmission of power. Power is transmitted from the engine to the wheel. **3. Fully-floating rear axle:** The bearings are between the wheel and axle case. The axle is introduced inside the axle case. The axle end is fitted with the wheel by means of a flange, bolt and nut. The entire weight of the vehicle is supported by the wheel and axle case. The axle is not supported by bearings at either end, and its position is maintained by the way that it is supported at both ends.	3 -types 4 - Explanation	7	7
III. 9	 Fig. 7.7 (a) Toe-in and (b) Toe-out. **Toe-in and Toe-out** **Toe-in** is the amount by which the front wheels are set closer together at the front than at the rear when the veliicle is stationary On the other hand, the wheel may be set closer at the rear than at the	Fig 3 Explanation 4	7	7

	front in which case the difference of the distances between the front wheels at the front and at the rear is called **toe-out.**			
III. 10	 Fig. 9.25. Hydraulic brake system.	Fig 4 Marking 3	7	7
III. 11	 Fig. 24.7: Regenerative braking	Fig 4 Marking 3	7	7
III. 12	 Fig. 6.3: Plug-in hybrid electric vehicle These are types of HEVS which can recharge the bateries through regenerative battery or through the external source of power. Plug-in hybrid vehicles (PHEVs) use an electric motor and battery that can be plugged into the power grid to charge the battery, but also have the support of an internal combustion engine that may be used to recharge the vehicle's battery and/or to replace the electric motor when the battery is low.	Fig 3 Explanation 4	7	7