SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur– 603203.

DEPARTMENT OF MECHANICAL ENGINEERING

QUESTIONBANK

VI SEMESTER

ME-8091 AUTOMOBILE ENGINEERING

Regulation–2017

Academic Year 2019-2020 (Even Semester)

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UNIT-I VEHICLE STRUCTURE AND ENGINES

Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –components-functions and materials, variable valve timing (VVT).

PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	Define an automobile.	BT-3	Applying
2.	How automobile is classified on the basis of type of wheel drive?	BT-3	Applying
3.	What are the main components of automobiles?	BT-2	Understanding
4.	Difference between Diesel engine and Petrol engine.	BT-2	Understanding
5.	How crankshafts usually made?	BT-2	Understanding
6.	What do you mean by a chassis?	BT-1	Remembering
7.	What are the functions of a frame?	BT-6	Creating
8.	What are the types of sections used to make the frames?	BT-1	Remembering
9.	What are the requirements of automobile body?	BT-1	Remembering
10.	Define aerodynamics?	BT-2	Understanding
11.	What are the factors the aerodynamics resistance composed of?	BT-3	Applying
12.	What is Yawing moment?	BT-3	Applying
13.	Define lift force?	BT-4	Analyzing
14.	Why are rings provided on piston?	BT-5	Evaluating
15.	What are the methods of cooling in IC engines?	BT- 4	Analyze
16.	What is meant by lubrication?	BT-4	Analyzing
17.	What is EGR?	BT-1	Remembering
18.	What are the functions of piston rings? Types?	BT-1	Remembering
19.	What is referred as variable valve timing?	BT-5	Evaluating
20.	What are the different methods of variable valve timing?	BT-1	Remembering

PART-B (13 Marks)				
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	State briefly, the history of automobile.	13	BT-1	Remembering
2	What are the main components of an automobile? Describe all of them briefly.	13	BT-5	Evaluating
3	How do you classify automobiles? Explain in detail.	13	BT-3	Applying
4	Draw the layout of four-wheel drive and list its advantages and disadvantages.	13	BT-6	Creating
5	Explain briefly the various types of chassis construction with the help of suitable diagram.	13	BT-3	Applying
6	Explain briefly about vehicle aerodynamics.	13	BT-5	Evaluating
7	Explain with suitable sketches: valve timing diagrams for Otto and Diesel engines.	13	BT-2	Understanding
8	a) Write short notes about sub frames and defect in frames.	6	BT-3	Applying
	b) Draw and explain about frameless construction?	7	BT-2	Understanding
9	Draw schematic diagrams showing the layout of the transmission system of a rear wheel driven car and also of a four wheel drive vehicle.	13	BT-5	Evaluating
10	a) What are the normal frame defects?	7	BT-2	Understanding
	b) List the various requirements of automobile body.	6	BT-4	Analyzing
11	What is meant by variable valve timing? Discuss on the technologies in use.	13	BT-1	Remembering
12	Compare Spark Ignition engine and Compression Ignition engine.	13	BT-5	Evaluating
13	Classification of IC engine.	13	BT-2	Understanding
14	Draw a neat diagram of an IC engine and explain some important parts?	13	BT-2	Understanding

PART-C (15 Marks)				
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	How do you check the alignment of chassis frame? Explain clearly.	15	BT-4	Analyzing
2	With neat diagram explain components and drive system in an automobile chassis.	15	BT-4	Analyzing
3	Explain about the various aerodynamics forces and its influenced moments acting on a fast-moving passenger car.	15	BT-4	Analyzing
4	List at least six IC engine components and mention their functioning, material they are made up of and a schematic of the same.	15	BT-4	Analyzing

UNIT-II ENGINE AUXILIARY SYSTEMS

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	What is Gasoline direct injection?	BT-3	Applying
2.	Define common rail direct injection system?	BT-3	Applying
3.	What is the function of fuel supply system?	BT-2	Understanding
4.	What is an electronic ignition system?	BT-2	Understanding
5.	What are the functions of Turbo chargers?	BT-2	Understanding
6.	What are the advantages of petrol injection?	BT-1	Remembering
7.	What is super charging?	BT-6	Creating
8.	What is meant by carburetion in IC engine?	BT-1	Remembering
9.	What are the components of Multi point fuel injection system?	BT-1	Remembering
10.	State the advantages of electronic ignition system using contact breaker?	BT-2	Understanding
11.	What are the main pollutants from diesel engine?	BT-3	Applying
12.	Why the engine emissions to be controlled?	BT-3	Applying
13.	Name four major parts that forms as exhaust system in an automobile system.	BT-4	Analyzing
14.	Mention the methods controlling smoke from diesel engine?	BT-5	Evaluating
15.	What is known as smog in an automobile?	BT-4	Analyze
16.	What are the methods to clean the exhaust gas?	BT-4	Analyzing
17.	Write the purpose of catalytic converter?	BT-1	Remembering
18.	What are the basic requirements of a catalytic converter?	BT-1	Remembering
19.	What happens in a catalytic converter?	BT-5	Evaluating
20.	What is known as ‘EURO NORMS’?	BT-1	Remembering

PART-B (13 Marks)				
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	List the various parts of the fuel feed system of a car. Draw a line diagram showing these parts in respective position.	13	BT-1	Remembering
2	Sketch and explain the construction and operation of a simple carburettor?	13	BT-5	Evaluating
3	Illustrate with a sketch the working of a Unit injector system.	13	BT-3	Applying
4	Explain in detail the working of rotary distribution type fuel injection system.	13	BT-6	Creating
5	What is Common Rail Direct Ignition (CRDI) system? Explain with a suitable sketch. What are the advantages and disadvantages of CRDI?	13	BT-3	Applying
6	Explain with a suitable sketch the working of a Transistorized Coil Ignition (TCI) system. What are the advantages and disadvantages of the TCI system?	13	BT-5	Evaluating
7	Explain with a suitable sketch the working of a Capacitor Discharge Ignition (CDI) system. What are the advantages and disadvantages of the CDI system?	13	BT-2	Understanding
8	Explain the working of variable geometry turbocharger (VGT), with a neat sketch.	13	BT-2	Understanding
9	Explain the working of Waste gate turbocharger (WGT), with a neat sketch.	13	BT-2	Understanding
10	a) Write short notes on air pollution and its pollutants.	8	BT-2	Understanding
	b) How air pollution can be controlled?	5	BT-4	Analyzing
11	Explain about the Engine emission control by three way catalytic converter system.	13	BT-1	Remembering
12	Discuss on exhaust emission control from automobiles.	13	BT-4	Analyzing
13	What is EGR? Explain the system with suitable sketch?	13	BT-2	Understanding

14	What are the major pollutants in exhaust gases from automobile? Discuss in EURO III and EURO IV.	13	BT-2	Understanding

PART-C (15 Marks)				
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Enlist the common troubles experienced in the fuel supply of an engine. Locate their possible causes and suggest measures to remedy theses.	15	BT-4	Analyzing
2	What is the reason that use of super chargers for automotive use is not common although when supercharged, the engine gives more H.P.?	15	BT-4	Analyzing
3	Describe clearly any method of remote sensing emission level of a moving vehicle and write the operation of exhaust gas analyser with a suitable sketch.	15	BT-4	Analyzing
4	Discuss on 'EURO NORMS' and emission norms for • Passenger cars • Two / Three Wheelers	9 6	BT-4	Analyzing

UNIT-III TRANSMISSION SYSTEMS

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Over drive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	What are the various components in transmission system?	BT-3	Applying
2.	What are the functions of transmission system?	BT-3	Applying
3.	Define clutch?	BT-2	Understanding
4.	What are the types of clutch?	BT-2	Understanding
5.	State the requirements of an automotive clutch?	BT-2	Understanding
6.	What is the need of gear box in automobile?	BT-1	Remembering
7.	What is tractive effort?	BT-6	Creating
8.	What is an over drive?	BT-1	Remembering
9.	What is a universal joint? What are its types?	BT-1	Remembering
10.	What is clutch slippage?	BT-2	Understanding
11.	What is cone clutch?	BT-3	Applying
12.	What are the advantages of diaphragm clutch?	BT-3	Applying
13.	How is reverse gear obtained in the normal type of gear box?	BT-4	Analyzing
14.	What is the principle of a “synchromesh” gear box?	BT-5	Evaluating
15.	What is the function of the free wheel in over drive?	BT- 4	Analyze
16.	What are the various universal joints in use?	BT-4	Analyzing
17.	What is trunion?	BT-1	Remembering
18.	What is specific purpose of Hotchkiss and torque tube drive?	BT-1	Remembering
19.	What will happen if differential is not used?	BT-5	Evaluating
20.	What are the functions of front axle?	BT-1	Remembering

PART-B (13 Marks)				
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Explain clearly the necessity of a transmission in a vehicle.	13	BT-1	Remembering
2	Describe the working of a "single plate clutch" with a neat sketch and write its advantages and disadvantages.	13	BT-5	Evaluating
3	Describe the construction and working of the following: • Cone clutch • Multi plate clutch • Centrifugal clutch	 5 4 4	BT-3	Applying
4	Describe the following clutch operation with a neat sketch • Mechanical operation clutches • Vacuum operated clutch • Hydraulic operated clutch • Electromagnetic operated clutch	 4 3 3 3	BT-6	Creating
5	With the help of a neat sketch, explain the construction and operation of a sliding mesh gearbox.	13	BT-3	Applying
6	With the help of a neat sketch, explain the construction and operation of a constant mesh gearbox.	13	BT-3	Applying
7	Briefly describe the construction and working of a fluid coupling.	13	BT-2	Understanding
8	a) Write overdrive troubles and their causes.	6	BT-3	Applying
	b) Comparison between the fluid fly wheel and torque converter.	7	BT-2	Understanding
9	Explain the construction and working principle of propeller shaft.	13	BT-5	Evaluating
10	Explain the construction and working of a differential with a neat sketch	13	BT-2	Understanding
11	What is universal joint? And explain the different types of universal joints with a neat sketch.	13	BT-1	Remembering

12	What is a CVT? Describe? Describe its principle of working in detail with the help of simple diagrams; discuss also its main advantages and limitations.	13	BT-1	Remembering
13	Explain briefly, with neat sketches of the following: • Torque tube drive • Hotchkiss drive	 7 6	BT-2	Understanding
14	Explain briefly, with neat sketches of the following: • Half floating rear axle • Fully floating rear axle • Three-quarter floating rear axle	 5 4 4	BT-2	Understanding

PART-C(15 Marks)				
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	What is the necessity of a gear box at all in the automobile when the engine speed can be varied by means of accelerator?	15	BT-4	Analyzing
2	A sliding mesh type of gear box with forward speeds only is to be designed. The gear box should have the following gear ratios available approximately: 1.0, 1.5, 2.5 and 3.9. the centre distance between the layshaft and the main shaft is 78 mm and the smallest gear is to have at least 16 teeth with a diametral pitch of 3.25 mm. calculate the number of teeth of the various gears and the exact gear ratios thus available.	15	BT-4	Analyzing
3	Explain the common troubles encountered in gear boxes and suggest suitable remedies.	15	BT-4	Analyzing
4	a) Write a comprehensive note on 'zero shift' transmission technology.	6	BT-4	Analyzing
	b) Make a detailed comparison of various types of automotive transmissions.	9	BT-4	Analyzing

UNIT-IV STEERING, BRAKES AND SUSPENSION SYSTEMS

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

PART-A (2 Marks)

Q.No.	Questions	BT Level	Competence
1.	What is meant by centre point steering?	BT-3	Applying
2.	Why is camber angle provided?	BT-3	Applying
3.	What is the purpose of steering linkage?	BT-2	Understanding
4.	What is known as power steering?	BT-2	Understanding
5.	What is the function of a braking system?	BT-2	Understanding
6.	What are functions of brake lining?	BT-1	Remembering
7.	What is the advantage of disc brake?	BT-6	Creating
8.	What is pitching in the suspension system?	BT-1	Remembering
9.	What is wishbone?	BT-1	Remembering
10.	What are the causes of poor brakes?	BT-2	Understanding
11.	What are the functions of break shoe?	BT-3	Applying
12.	What do you mean by “Independent suspension”?	BT-3	Applying
13.	What is bouncing in the suspension system?	BT-4	Analyzing
14.	How are leaf spring lubricated?	BT-5	Evaluating
15.	How is shock absorber fitted in the vehicle?	BT- 4	Analyze
16.	What are the functions of the shock absorber?	BT-4	Analyzing
17.	What is a slave cylinder?	BT-1	Remembering
18.	What are the main parts of the air braking system?	BT-1	Remembering
19.	What is anti-lock system in brakes?	BT-5	Evaluating
20.	Mention the benefits of anti-lock brake system.	BT-1	Remembering

PART-B (13 Marks)				
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Sketch and explain the layout of steering system	13	BT-1	Remembering
2	Explain the Ackermann steering mechanism and Davis steering mechanism with a neat sketch.	13	BT-5	Evaluating
3	Define and explain the following front wheel alignment factors: • Camber • Caster • King-pin inclination • Toe-in • Toe-out	 3 3 3 2 2	BT-3	Applying
4	Describe the construction and operation of power steering.	13	BT-6	Creating
5	What is front axle? Write its functions and explain the types of front axles.	13	BT-3	Applying
6	Explain the construction and working of mechanical brakes with a neat sketch.	13	BT-5	Evaluating
7	What is anti-lock braking system? Explain the need and functioning of ABS with a sketch.	13	BT-2	Understanding
8	Write the principle of Braking and co efficient of friction.	6	BT-3	Applying
	Describe the following: • Stopping distance • Braking performance • Braking efficiency.	 3 2 2	BT-2	Understanding
9	Explain hydraulic brake with a neat sketch and write its advantages.	13	BT-5	Evaluating
10	a) What is the necessity of a braking system?	5	BT-2	Understanding
	b) Explain the function of master cylinder in hydraulic brakes?	8	BT-4	Analyzing
11	Sketch and explain the working of telescopic hydraulic shock absorber. What effect does their action have on the working of springs?	13	BT-1	Remembering

12	Explain the functions of rear wheel suspension system.	13	BT-1	Remembering
13	State the advantages and disadvantages of independent suspension over rigid axle type suspension.	13	BT-2	Understanding
14	Describe the Macpherson strut assembly of independent suspension system with a neat sketch.	13	BT-2	Understanding

PART-C (15 Marks)				
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Explain the probable causes of various steering troubles and suggest suitable remedies.	15	BT-4	Analyzing
2	Discuss thoroughly the procedure for bleeding of hydraulic brakes.	15	BT-4	Analyzing
3	Discuss how various defects are caused in the braking system of automobiles. Suggest also suitable remedies.	15	BT-4	Analyzing
4	Why springs are provided in automobile transmission? And explain briefly the following springs: • Leaf springs • Coil springs • Rubber springs	6 3 3 3	BT-4	Analyzing

UNIT-V ALTERNATIVE ENERGY SOURCES			
Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.			
PART-A (2 Marks)			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	What are the alternative fuels?	BT-3	Applying
2.	Write the needs of alternate fuel.	BT-3	Applying
3.	List out the various forms of natural gas.	BT-2	Understanding
4.	What is the composition of Natural gas?	BT-2	Understanding
5.	Define octane number.	BT-2	Understanding
6.	State the advantages of alcohol as fuels in automobiles.	BT-1	Remembering
7.	State the advantage of CNG.	BT-6	Creating
8.	Write the properties of CNG?	BT-1	Remembering
9.	Write down the components of LPG fuel flow.	BT-1	Remembering
10.	What is Bio-Diesel? State its advantages?	BT-2	Understanding
11.	How ethanol can be produced?	BT-3	Applying
12.	What is biogas?	BT-3	Applying
13.	What is meant by trans esterification?	BT-4	Analyzing
14.	What is meant by gasohol?	BT-5	Evaluating
15.	List down the properties of alternate fuel.	BT- 4	Analyze
16.	What are the different methods of production of hydrogen?	BT-4	Analyzing
17.	What are the main components of electric-hybrid vehicles?	BT-1	Remembering
18.	What is fuel cell?	BT-1	Remembering
19.	Mention the types of fuel cell.	BT-5	Evaluating
20.	State the advantages of fuel cell.	BT-1	Remembering

PART-B (13 Marks)				
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	What are the needs of alternate fuels and describe the various types of alternate fuels for auto engines	13	BT-1	Remembering
2	Write the advantages and disadvantages of alternate fuel?	13	BT-5	Evaluating
3	Explain the various properties of alternate fuels.	13	BT-3	Applying
4	What are the sources of natural gas?	13	BT-6	Creating
5	Compare the characteristics between Natural gas and LPG.	13	BT-3	Applying
6	Explain the construction of LPG system in petrol engine and describe the salient features of using LPG as alternate fuel.	13	BT-5	Evaluating
7	Draw a neat diagram and explain the working principle of electric vehicle?	13	BT-2	Understanding
8	Discuss the properties of Bio-diesel	5	BT-3	Applying
	Mention the advantages and disadvantages of Bio-diesel.	8	BT-2	Understanding
9	Write short notes about Hybrid vehicle and write its principle and mention the main components of a hybrid transmission?	13	BT-5	Evaluating
10	a) What is bio-gas? Write its properties and composition in detail?	7	BT-2	Understanding
	b) Mention the advantages and disadvantages of alcohols	6	BT-4	Analyzing
11	What is gasohol? What are the modifications needed in engine and fuel supply system? And write its advantages and disadvantages?	13	BT-1	Remembering
12	Explain the process of Bio-Ethanol production in detail with a neat diagram	13	BT-1	Remembering
13	What is fuel cell? Explain the components and working principle of a Fuel Cell?	13	BT-2	Understanding
14	Draw a neat diagram and explain the working of Hydrogen-Oxygen Fuel Cell?	13	BT-2	Understanding

PART-C (15 Marks)				
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Discuss how the crude petroleum oil is refined?	15	BT-4	Analyzing
2	Compare electric vehicle to a conventional vehicle powered by a petrol engine. State salient features of an electric vehicle?	15	BT-4	Analyzing
3	What is an HCCI engine? How does it compare with S.I. and C.I. engines? Discuss in detail its merits and demerits, describing also the current scenario regarding its application in automobile engines.	15	BT-4	Analyzing
4	List out the components of a Hydrogen Fuel Cell electric vehicle and Give typical examples of vehicles based on Fuel Cell?	15	BT-4	Analyzing

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