SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur– 603203.

DEPARTMENT OF MECHANICAL ENGINEERING

QUESTIONBANK

VII SEMESTER

1909707 AUTOMOBILE ENGINEERING

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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 and mention its typical specifications.	BT-1	Remembering
2.	How is an automobile classified based on the type of wheel drive?	BT-2	Understanding
3.	List out the main components of automobiles.	BT-2	Understanding
4.	Difference between a Diesel engine and a Petrol engine.	BT-2	Understanding
5.	How are crankshafts usually made?	BT-2	Understanding
6.	Define chassis, frame, body and suspension.	BT-1	Remembering
7.	List out the functions of a frame.	BT-1	Remembering
8.	Identify the types of sections used to make the frames.	BT-1	Remembering
9.	List of the forces acting on a chassis frame.	BT-1	Remembering
10.	What are the advantages of diesel engines in cars?	BT-1	Remembering
11.	What is a chassis? How is design related to vehicle aerodynamics?	BT-2	Understanding
12.	Why are petrol engines preferred for two wheelers?	BT-2	Understanding
13.	Describe the materials used in the IC engine component.	BT-2	Understanding
14.	Why are rings provided on the piston?	BT-1	Remembering
15.	Summarize the methods of cooling in IC engines.	BT- 1	Remembering
16.	What is meant by lubrication?	BT-1	Remembering
17.	State the requirements of bodies for various types of vehicles.	BT-2	Understanding

18.	What materials are used for the construction of the piston and piston rings?	BT-1	Remembering
19.	What is referred to as variable valve timing?	BT-1	Remembering
20.	Point out the different methods of variable valve timing.	BT-1	Remembering
21.	State the difference between a carburetor and a fuel injector.	BT-2	Understanding
22.	What is the need for a gearbox in an automobile?	BT-1	Remembering
23.	State the factors that affect the rolling resistance of a vehicle.	BT-1	Remembering
24.	Name the different kinds of resistance to vehicle motion.	BT-2	Understanding
25.	Differentiate between Coupe and Sedan car body types.	BT-2	Understanding

	PART-B (13 Marks)			
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Discuss the factors that affect the resistance to vehicles motion.	13	BT-3	Apply
2	What are the main components of an automobile? Describe all of them briefly.	13	BT-3	Apply
3	Explain integral and semi-integral type vehicle body construction.	13	BT-4	Analyze
4	Draw the layout of a four-wheel drive and list its advantages and disadvantages.	13	BT-3	Apply
5	Explain briefly the various types of chassis construction with the help of a suitable diagram.	13	BT-4	Analyze
6	Explain briefly about the concept of vehicle aerodynamics.	13	BT-4	Analyze
7	Explain with suitable sketches about valve timing diagrams for Otto and Diesel engines.	13	BT-4	Analyze
8	a) Write short notes about sub frames and defects in frames.	6	BT-3	Apply
	b) Illustrate and explain frameless construction.	7	BT-3	Apply
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-3	Apply
10	a) What are the normal frame defects?	6	BT-2	Understanding
	b) List the various requirements of the automobile body.	7	BT-2	Understanding

11	What is meant by variable valve timing? Discuss the technologies in use.	13	BT-3	Apply
12	Compare the Spark Ignition engine and the Compression Ignition engine.	13	BT-3	Apply
13	Explain about all wheel drive with a suitable sketch.	13	BT-4	Analyze
14	Draw a neat diagram of an IC engine and explain some important parts.	13	BT-3	Apply
15	Explain the construction of various frames used in automobiles with a neat sketch.	13	BT-4	Analyze
16	Explain vehicle experiences different resistance in its motion.	13	BT-4	Analyze
17	List the engine parts with their functions, materials and method of their manufacture with a neat sketch.	13	BT-3	Apply
18	Draw a simple sketch of a solid frame with a front engine and rear drive. Locate major components of the engine on the frame.	13	BT-3	Apply

PART-C (15 Marks)

S.No	Questions	Marks	BT Level	Competence
1	Explain in detail how you check the alignment of a chassis frame.	15	BT-4	Analyze
2	Illustrate and explain the components and drive system of an automobile chassis.	15	BT-3	Apply
3	Explain the various aerodynamic forces and their corresponding moment effects acting on a fast-moving passenger car	15	BT-4	Analyze
4	List at least six IC engine components and describe their functions, the materials they are made of, and include a schematic diagram.	15	BT-3	Apply
5	Give reasons (i) For using single cylinder two stroke petrol engines on two wheelers. (ii) For using multi cylinder diesel engines in commercial vehicles.	15	BT-3	Apply

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-1	Remembering
2.	Define the common rail direct injection system.	BT-1	Remembering
3.	Summarize the function of the fuel supply system.	BT-2	Understanding
4.	Define an electronic ignition system.	BT-1	Remembering
5.	Write the functions of turbochargers.	BT-1	Remembering
6.	List out the advantages of petrol injection.	BT-1	Remembering
7.	Define supercharging.	BT-1	Remembering
8.	What is meant by carburetion in IC engine?	BT-1	Remembering
9.	List out the components of Multi point fuel injection system.	BT-1	Remembering
10.	State the advantages of an electronic ignition system using contact breaker.	BT-2	Understanding
11.	Summarize the main pollutants from a diesel engine.	BT-2	Understanding
12.	Why the engine emissions to be controlled?	BT-2	Understanding
13.	Name four major parts that forms as exhaust system in an automobile system.	BT-1	Remembering
14.	Mention the methods controlling smoke from diesel engine.	BT-1	Remembering
15.	What is known as smog in an automobile?	BT-1	Remembering
16.	Describe the methods to clean the exhaust gas.	BT-2	Understanding
17.	Write the purpose of the catalytic converter.	BT-1	Remembering
18.	Point out the basic requirements of a catalytic converter.	BT-1	Remembering
19.	What happens in a catalytic converter?	BT-1	Remembering
20.	What is known as ‘EURO NORMS’?	BT-1	Remembering
21.	Why do we need to use superchargers in engines?	BT-2	Understanding

22.	State the difference between turbocharger and supercharger.	BT-2	Understanding
23.	Differentiate between battery and magneto ignition system.	BT-2	Understanding
24.	What is the sequence of operation in unit injector?	BT-1	Remembering
25.	What is main purpose of fuel injection system in CI engine?	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 and draw a line diagram showing these parts in respective position.	13	BT-3	Apply
2	Sketch and explain the construction and operation of a simple carburettor.	13	BT-3	Apply
3	Illustrate with a sketch the working of a Unit injector system.	13	BT-3	Apply
4	Explain in detail the working of rotary distribution type fuel injection system.	13		
5	What is Common Rail Direct Ignition (CRDI) system and explain with a suitable sketch and write its advantages and disadvantages of CRDI?	13	BT-3	Apply
6	Explain with a suitable sketch the working of a Transistorized Coil Ignition (TCI) system and write its 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 and write its 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.	6	BT-3	Apply
	b) How can air pollution be controlled?	7	BT-3	Apply
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-3	Apply
13	What is EGR? Explain the system with a suitable sketch.	13	BT-3	Apply

14	What are the major pollutants in exhaust gases from an automobile? Discuss in EURO III and EURO IV.	13	BT-3	Apply
15	With a neat sketch explain the electronically controlled gasoline injection system for SI engine.	13	BT-3	Apply
16	How electronically controlled unit diesel injector system function?	13	BT-3	Apply
17	Explain engine emission control by three-way catalytic converter system.	13	BT-4	Analyze
18	Explain the construction and working of a turbocharger with a neat sketch.	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 the use of superchargers for automotive useis not common, although when supercharged, the engine gives more H.P.?	15	BT-3	Apply
3	Describe clearly any method of remote sensing the emission level of a moving vehicle and write the operation of exhaust gas analyzer with a suitable sketch.	15	BT-3	Apply
4	Discuss on 'EURO NORMS' and emission norms for Passenger cars	15	BT-3	Apply
5	Discuss on 'EURO NORMS' and emission norms for two wheelers.	15	BT-3	Apply

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.	List out the various components in the transmission system.	BT-1	Remembering
2.	Summarize the functions of the transmission system.	BT-2	Understanding
3.	Define clutch.	BT-1	Remembering
4.	What are the types of clutch?	BT-1	Remembering
5.	State the requirements of an automotive clutch.	BT-1	Remembering
6.	Identify the need of gear gearbox in an automobile.	BT-1	Remembering
7.	Define tractive effort.	BT-1	Remembering
8.	What is an overdrive?	BT-1	Remembering
9.	What is a universal joint and write its types?	BT-1	Remembering
10.	Describe the clutch slippage.	BT-2	Understanding
11.	Define cone clutch.	BT-1	Remembering
12.	List out the advantages of the diaphragm clutch.	BT-1	Remembering
13.	How is reverse gear obtained in the normal type of gearbox?	BT-2	Understanding
14.	What is the principle of a “synchromesh” gearbox?	BT-1	Remembering
15.	Summarize the function of the free wheel in over drive.	BT-2	Understanding
16.	List out the various universal joints in use.	BT-2	Understanding
17.	What is trunion?	BT-1	Remembering
18.	Identify the specific purpose of hotchkiss and torque tube drive.	BT-2	Understanding
19.	What will happen if differential is not used in the transmission system?	BT-1	Remembering
20.	List out the functions of front axle.	BT-1	Remembering

21.	State the forces that act on the rear axle.	BT-1	Remembering
22.	What is the use of a torque converter?	BT-1	Remembering
23.	Summarize the function of a propeller shaft.	BT-2	Understanding
24.	State the functions of a slip joint.	BT-1	Remembering
25.	Describe fluid coupling.	BT-2	Understanding

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

12	What is a CVT? Describe its working principle in detail with the help of simple diagrams and discuss also its main advantages and limitations.	13	BT-3	Apply
13	Explain briefly, with neat sketches of the following: • Torque tube drive • Hotchkiss drive	6 7	BT-4	Analyze
14	Explain the Half floating rear axle with neat sketches.	13	BT-4	Analyze
15	Explain the semi centrifugal clutch with neat sketch.	13	BT-4	Analyze
16	Explain the Fully floating rear axle with neat sketches.	13	BT-4	Analyze
17	Explain the Three-quarter floating rear axle with neat sketches.	13	BT-4	Analyze
18	Explain the working principle of hotchkiss drive with neat sketch.	13	BT-4	Analyze

	PART-C (15 Marks)			
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	What is the necessity of a gearbox at all in the automobile when the engine speed can be varied through the accelerator?	15	BT-3	Apply
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-5	Evaluate
3	Explain the common troubles encountered in gearboxes and suggest suitable remedies.	15	BT-4	Analyzing
4	Write a comprehensive note on ‘zero shift’ transmission technology.	15	BT-3	Apply
5	Make a detailed comparison of various types of automotive transmissions.	15	BT-3	Apply

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-1	Remembering
2.	Why is the camber angle provided?	BT-2	Understanding
3.	Describe the purpose of the steering linkage.	BT-2	Understanding
4.	Define power steering.	BT-2	Understanding
5.	List out the function of a braking system.	BT-1	Remembering
6.	Identify the functions of the brake lining.	BT-1	Remembering
7.	List out the advantages of disc brakes.	BT-1	Remembering
8.	What is pitching in the suspension system?	BT-1	Remembering
9.	Define wishbone.	BT-1	Remembering
10.	Describe the causes of poor brakes.	BT-2	Understanding
11.	Point out the functions of the brake shoe.	BT-1	Remembering
12.	What do you mean by “Independent suspension”?	BT-1	Remembering
13.	What is bouncing in the suspension system?	BT-1	Remembering
14.	How are leaf spring lubricated?	BT-2	Understanding
15.	How is shock absorber fitted in the vehicle?	BT-2	Understanding
16.	List out the functions of the shock absorber.	BT-1	Remembering
17.	What is a slave cylinder?	BT-1	Remembering
18.	Point out the main parts of the air braking system.	BT-1	Remembering
19.	Summarize about anti-lock system in brakes.	BT-2	Understanding
20.	Mention the benefits of anti-lock brake system.	BT-1	Remembering

21.	Define caster and camber.	BT-1	Remembering
22.	Define king pin inclination.	BT-1	Remembering
23.	What is the purpose of Toe -in and Toe-out?	BT-1	Remembering
24.	What is meant by bleeding of brakes?	BT-1	Remembering
25.	What do you understand by Traction control?	BT-1	Remembering

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

11	Sketch and explain the working of a telescopic hydraulic shockabsorber and point out the effect their action has on the working of springs.	13	BT-3	Apply
12	Explain the functions of rear wheel suspension system.	13	BT-4	Analyze
13	State the advantages and disadvantages of independent suspension over rigid axle type suspension.	13	BT-3	Apply
14	Describe the Macpherson strut assembly of an independent suspension system with a neat sketch.	13	BT-3	Apply
15	Explain the working of the rear independent suspension system with a neat sketch.	13	BT-4	Analyze
16	Explain with the help of a simple diagram the different types of stub axles.	13	BT-4	Analyze
17	Explain in detail about the objectives and components of the suspension system.	13	BT-4	Analyze
18	Explain about steering geometry with a neat sketch.	13	BT-4	Analyze

	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	Analyze
2	Discuss thoroughly the procedure for bleeding of hydraulic brakes.	15	BT-3	Apply
3	Discuss how various defects are caused in the braking system of automobiles. Suggest also suitable remedies.	15	BT-3	Apply
4	Why are springs provided in an automobile transmission? Explain briefly the following springs: • Leaf springs • Coil springs • Rubber springs	15	BT-4	Analyze
5	Explain the Ackerman principle of steering with a neat sketch.	15	BT-4	Analyze

UNIT-V ELECTRICAL AND ELECTRONIC SYSTEMS			
Introduction to Battery, Alternator, and Starter Motor systems, working principle, and circuitry, Safety systems - seat belts, air-bag, ABS, Modern electronic features in vehicles like tyre pressure monitoring, ESP, EBD, Automatic headlamp ON, Rain sensing wipers, speed sensing auto locking, OBD. HVAC system.			
PART-A (2 Marks)			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	Define Battery.	BT-1	Remembering
2.	Write the few purposes of a battery.	BT-1	Remembering
3.	List a few types of batteries.	BT-1	Remembering
4.	Define battery efficiency	BT-1	Remembering
5.	Define battery Voltage.	BT-1	Remembering
6.	Name the diseases of lead acid battery.	BT-1	Remembering
7.	Name the two methods of charging the battery	BT-1	Remembering
8.	Define Electrolite.	BT-1	Remembering
9.	Describe the use of the hydro meter test.	BT-2	Understanding
10.	List out the functions of the dynamo and alternator.	BT-1	Remembering
11.	What is the main function of Vehicle generator?	BT-1	Remembering
12.	Mention the application of a series motor.	BT-1	Remembering
13.	Summarize the functions of the solenoid switch.	BT-2	Understanding
14.	What is the main purpose of lighting in an automobile?	BT-1	Remembering
15.	What are the components of a lighting system?	BT-1	Remembering
16.	What is a halogen headlight bulb?	BT-1	Remembering
17.	What is the main purpose of a dip switch?	BT-1	Remembering
18.	List out the use of the oil pressure guage.	BT-1	Remembering
19.	Summarize the properties of electrical cable.	BT-2	Understanding
20.	What is the use of FUSES?	BT-1	Remembering
21.	Define Electric voltage.	BT-1	Remembering

22.	Define Electric resistance.	BT-1	Remembering
23.	Define magnetic flux.	BT-1	Remembering
24.	Describe motor.	BT-1	Remembering
25.	Why electricity is needed in an automobile?	BT-2	Understanding

	PART-B (13 Marks)			
Q.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	With a neat sketch, explain the construction of a lead acid battery.	13	BT-3	Apply
2	Discuss briefly about how batteries are rated.	13	BT-3	Apply
3	Explain in detail the various tests done on a lead acid battery.	13	BT-4	Analyze
4	Explain the constant current method of charging a lead acid battery.	13	BT-4	Analyze
5	Explain the constant voltage method of charging a lead acid battery.	13	BT-3	Applying
6	With a neat sketch, explain any two types of headlamps.	13	BT-3	Apply
7	What do you mean by headlight dazzling? How can it be prevented?	13	BT-3	Apply
8	With a neat sketch, explain the working of any two types of horns.	13	BT-3	Applying
9	With a neat sketch, explain the working of the wiper system of an automobile.	13	BT-3	Apply
10	With a neat sketch, explain the working of the trafficators of an automobile.	13	BT-3	Apply
11	Explain the construction and working of a phase induction motor.	13	BT-4	Analyze
12	Describe the constant current and voltage regulator with a sketch.	13	BT-3	Apply
13	Describe the constructional details of the starter motor with a neat sketch.	13	BT-3	Apply
14	Describe the construction and working of a head lamp with a neat sketch.	13	BT-3	Apply
15	Describe the head lamp beam setting and adjustments.	13	BT-3	Apply
16	Describe the working principle of D.C generator with a neat sketch.	13	BT-3	Apply

17	Explain the Axial starter motor, showing the first and secondcontact points with a neat sketch.	13	BT-4	Analyze
18	Explain the principle of operations, constructions, and working of the starting Motor.	13	BT-4	Analyze
	PART-C (15 Marks)			
S.No	**Questions**	**Marks**	**BT Level**	**Competence**
1	Draw a simplified circuit of a lighting system showing the side- and headlight bulbs, light switch, dip switch and main beam warning light.	15	BT-4	Analyzing
2	Explain why EMC is such an important issue for automotive electronic system designers.	15	BT-4	Analyzing
3	Describe the following with an example (i) Resistance (ii) Magneticflux & Magnetic flux density (iii) Reluctance (iv) Frequency (v) Power factor.	15	BT-3	Apply
4	Describe the construction and working of the oil pressure gaugeand fuel gauge.	15	BT-3	Apply
5	Explain the reason why headlights are fused independently.	15	BT-4	Analye

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