INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

QUESTION BANK

Course Name	:	**AUTOMOBILE ENGINEERING**
Course Code	:	**A62405**
Class	:	III B. Tech II Semester
Branch	:	Mechanical Engineering
Year	:	2017 – 2018
Course Faculty	:	Mr. G. Sarat Raju, Associate Professor Mr. A. Anudeep Kumar, Assistant Professor.

COURSE OVERVIEW:

This course is intended to introduce structural and operational details of automobile and its systems. Major systems are fuel supply, cooling, ignition, electrical, transmission, suspension, braking and steering. Transport of personnel and goods play an important role in the economy of country and standard of living. So the man power is required to manufacture and maintain all these vehicles. After completion of this course the students gains adequate knowledge either to work in manufacturing or maintenance sector of automobiles.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT – I		
	Part- A: Short Answers Questions		
1	What are the four basic components of the automobile structure?	Understand	1
2	How gear box is important in an automobile?	Remember	1
3	What is the reason for distortion of frame to parallelogram shape?	Remember	1
4	How the carbon from the cylinder head is removed?	Understand	1
5	When should the overhauling of the engine is to be done?	Remember	1
6	What is the friction that occurs between the layers of oil in an oil film?	Remember	1
7	Define the primary function of the lubrication?	Understand	2
8	List out the important characteristic of lubricating oil?	Understand	2
9	Name the most commonly used lubrication system in an automobile?	Understand	2
10	What is the most widely used fuel supply system for car engines?	Remember	2
11	What is the source of the drive for a mechanical fuel pump in an engine?	Understand	1
12	Write the function of venturi in the carburetor?	Understand	1
13	When will the engine choke is closed?	Remember	1
14	Which is the most accurate petrol injection system?	Understand	1
15	Why the compression ratio is high in an automotive diesel engine?	Understand	1
16	Where is the fuel feed pump in a diesel engine is mounted?	Understand	1
17	What is the approximate value of the cranking compression pressure in diesel engine?	Remember	2
18	What is the approximate value of the temperature after compression in a diesel engine?	Remember	2
19	What is the ignition temperature of diesel fuel?	Understand	2
20	How the fuel injection timing in a distributor type pump is controlled?	Understand	2

Part-B: Long Answers Questions			
1	Describe the working of crescent type gear pump and Rotor pump with neat sketches?	Understand	2
2	What are the requirements of lubricants?	Understand	2
3	Sketch and explain clearly Splash Lubrication system?	Remember	2
4	Explain piston rings function, materials, number of rings clearly.	Remember	1,2
5	Describe Four wheel drive.	Understand	1,2
6	Explain A.C mechanical fuel pump.	Understand	1,2
7	How Petrol can be injected according to location?	Understand	1,2
8	Discus functions of a carburetor?	Remember	1,2
9	Explain common rail fuel injection system.	Remember	1,2
10	Draw and explain the schematic diagram of electronic petrol injection system.	Remember	1,2
11	Sketch the layout of four wheels automobile and indicate major components.	Understand	1,2
12	Distinguish between gear pump and vane pump.	Understand	1,2
13	Discus the importance of lubrication.	Understand	1,2
14	Draw and Explain pressure lubrication system.	Remember	1,2
15	Explain the working principle of simple carburetor with a neat sketch.	Understand	1,2
16	Explain the working of nozzle and classify nozzles.	Understand	1,2
17	Explain fuel injection pump in CI engines.	Remember	1,2
18	How valves are serviced?	Remember	1,2
19	Explain the defects in simple carburetor?	Understand	1,2
20	How air is cleaned in engines?	Remember	1,2
Part-C: Analytical Questions			
1	Distinguish between front engine and rear engine.	Remember	1
2	Explain rear engine vehicles.	Understand	1
3	Distinguish between two wheel drive and four wheel drive vehicles.	Remember	1
4	Compare petrol and diesel engines for automobile applications	Remember	1
5	Compare single cylinder and 3-cylinder engine of same power for	Remember	1
6	Distinguish between electrical vehicles with petrol vehicle.	Remember	1
7	Compare series and parallel hybrid systems.	Remember	2
8	Describe clearly the requirements of air-fuel ratio mixtures for starting a petrol engine from cold.	Understand	2
9	Analyze the merits of pre lubrication system	Remember	2
10	Compare carburettor system with direct petrol injection.	Remember	2
UNIT – II			
Part- A: Short Answers Question			
1	What is the approximate percentage of utilization of the heat in the engine for the useful work?	Understand	1, 3
2	What is the approximate percentage of loss of fuel energy to the cylinder walls?	Understand	1, 3
3	Write the sequence of the coolant circulation	Remember	1, 3
4	How wax thermostat is better than Bellows type thermostat?	Remember	1, 3
5	Sketch coolant pump.	Remember	1, 3
6	How the cooling fans are driven?	Understand	1, 3
7	What are the three components of primary ignition circuit?	Remember	1, 3
8	What are the components of the secondary ignition circuit?	Remember	1, 3
9	What is the material generally used for the contact breaker points?	Understand	1, 3
10	What is ‘dwell’?	Understand	1, 3
11	What is the result of excessive contact breaker gap?	Remember	1, 3
12	How the contact breaker points are opened?	Remember	1, 3
13	How the contact breaker points are closed?	Remember	1, 3

14	Which device is used to set the accurate contact breaker gap?	Understand	1, 3
15	When will the vacuum advance mechanism is operated?	Understand	1, 3
16	How the life of a spark plug of two stroke engine and four stroke engines is related with each other?	Understand	1, 3
17	What is the significance of spark plug having white insulator?	Understand	1, 3
18	What is the significance of spark plug with a black centre?	Understand	1, 3
19	What are the three units contained in a regulator for automobile D.C. generator?	Understand	1, 3
20	What is the use of thermistor in an alternator regulator?	Remember	1, 3
	Part-B: Long Answers Questions		
1	Draw the charging Circuit and explain the principle of a D.C Generator.	Understand	4
2	Draw and explain standard Bendix drive (or) Folo-thru drive.	Remember	4
3	What are the requirements of Ignition System?	Understand	4
4	Explain current and voltage regulator with a neat sketch.	Understand	1
5	Explain pulse generator with a neat sketch.	Understand	1
6	Compare different contact breakers.	Remember	1
7	Explain spark advance and its advantages.	Remember	4
8	What are the main requirements of a charging system?	Understand	4
9	Describe the working of a fuel gauge.	Understand	2
10	Explain the construction of D.C Generator.	Remember	2
11	Explain the principle of electrically operated oil pressure gauge.	Understand	2
12	Explain the working of a Horn.	Understand	1
13	Sketch and explain the different types of thermostats used in automobile.	Understand	1
14	Explain in detail the type of cooling pump used in water cooling system.	Remember	1
15	Compare battery ignition system with magneto ignition system.	Understand	2
16	Draw and explain wind screen wiper.	Understand	2
17	How overrunning clutch is used as starting device?	Understand	2
18	Describe magneto ignition system with a neat sketch.	Remember	2
19	How we can control generator output by the third brush.	Understand	1
20	Explain centrifugal advance method in automatic ignition advance	Remember	1
21	Explain battery ignition system with neat sketch.	Understand	1
22	Explain starting motor wiring circuit using a solenoid shift with relay.	Understand	1
	Part-C: Analytical Questions		
1	Compare intelligent cooling with conventional cooling. How intelligent cooling systems improve engine performance?	Understand	1,2
2	How electronic ignition systems improve the performance of engine?	Remember	1,2
3	How automatic ignition advance result in higher efficiency?	Understand	1,2
4	Compare battery and magneto ignition systems	Understand	1,2
5	Analyze the performance of D-C generator and alternator for automobile application	Understand	1,2
6	Why alternator do not require cut-out relay and current regulator?	Remember	1,2
7	Compare Folo-thru and Bendix drive starting mechanism	Understand	1,2
8	Compare centrifugal and vacuum spark advance and retard mechanisms.	Remember	1,2
9	Explain the advantage of a solenoid switch compared to the manual type.	Understand	1,2
10	What are the considerations on which the sizes of starting motor depend?	Understand	1,2
	UNIT-III		
	Part- A: Short Answers Question		
1	What is the purpose of transmission in an automobile?	Remember	3
2	How to increase the torque in a vehicle?	Understand	3

3	List out the advantages of using helical gears rather than spur gears in a transmission?	Remember	3
4	What is the use of synchronizing device?	Understand	1, 3
5	In a simple planetary gear set what is the output member and why it is used?	Remember	1, 3
6	In simple epicyclic gear set what is the output member and why it is used?	Remember	1, 3
7	What is the name of the central gear of an epicyclic gear set?	Understand	1, 3
8	Which component in the torque converter allows multiplication of the torque?	Understand	1, 3
9	Which component in the torque converter drives the oil?	Remember	1, 3
10	When will the maximum torque multiplication occurs in a torque converter?	Remember	1, 3
11	What is taper lite leaf spring?	Understand	1, 3
12	With respect to suspension system when will the vehicle ride will be comfortable?	Understand	1, 3
13	What is the function of a stabilizer in an automobile?	Remember	1, 3
14	What is the use of Panhard rod?	Understand	1, 3
15	What is the function of a shackle with a leaf spring?	Understand	1, 3
16	What is used for lining of spring eyes in case of cars?	Understand	1, 3
17	What is the use of zinc liners between the leaves of spring?	Remember	1, 3
18	What is the other name of torsion bar?	Remember	1, 3
19	What is the use of shock absorber in an automobile?	Understand	1, 3
20	Where the coil spring is placed in the wishbone suspension?	Understand	1, 3
	Part- B: Long Answers Questions		
1	What are the requirements of a clutch?	Understand	1, 3
2	How clutch can be operated electromagnetically?	Remember	1, 3
3	Explain with a neat sketch how Multi plate clutch can be constructed?	Understand	1, 3
4	Explain with a neat sketch the principle of differential?	Understand	1, 3
5	What are the Desirable properties of tyres?	Understand	1, 3
6	Explain vertical guide suspension with sketch?	Remember	1, 3
7	How stabilizer bar works? Explain with a neat sketch.	Remember	1, 3
8	Explain taper lite spring with a neat sketch.	Understand	1, 3
9	Sketch and explain different types of leaf springs.	Remember	1, 3
10	What are the types of Rubber springs? Explain with a neat sketch.	Understand	1, 3
11	Explain the principle of centrifugal clutch with a neat sketch.	Understand	1, 3
12	Explain working of a synchro mesh gear box with a neat sketch.	Understand	1, 3
13	What are the various problems encountered on wheels and tyres? How they can be eliminated?	Remember	1, 3
14	Differentiate between the torque tube and Hotch kiss drive.	Remember	1, 3
15	Explain the construction of fluid fly wheel and write the advantages and disadvantages.	Understand	1, 3
16	Explain the construction and working of a telescopic type of shock absorber.	Remember	1, 3
17	Explain the purpose of shackle in leaf spring mounting with a neat sketch?	Understand	1, 3
18	What are the objectives of employing suspension on an automobile?	Understand	1, 3
19	Sketch and explain the construction and working of wishbone type independent front suspension.	Understand	1, 3

20	Explain Air suspension with a neat sketch.	Remember	1, 3
	Part-C: Analytical Questions		
1	Compare friction clutch and fluid flywheel.	Understand	1, 3
2	Compare sliding mesh and synchro mesh gear boxes.	Remember	1, 3
3	How epicyclic gears are used for automatic transmission.	Understand	1, 3
4	Compare tubeless tyre with conventional tyre.	Understand	1, 3
5	Compare torque tube and conventional propeller shaft.	Understand	1, 3
6	Compare rigid axle and independent suspension.	Remember	1, 3
7	Compare air suspension with spring suspension.	Understand	1, 3
8	What are advantages and disadvantages of auto transmission?	Remember	1, 3
9	What is clutch free pedal play? Explain with neat sketch mentioning how much it is kept at the clutch pedal?	Understand	1, 3
10	Discuss about what happens if clutch free pedal play is excessive.	Understand	1, 3
	Unit IV		
	Part- A: Short Answers Questions		
1	What is the general break efficiency of a new vehicle?	Remember	1,4
2	Define the brake fade?	Understand	1,4
3	Why fading of brakes occur?	Remember	1,4
4	What is the ratio of braking effect at the front and at the rear wheels due to weight transfer?	Understand	1,4
5	How usually the brakes employed in cars are operated?	Remember	1,4
6	Which component of the wheel cylinder seals the brake fluid?	Remember	1,4
7	What is the use of push rod during braking?	Understand	1,4
8	In drum type brakes why the fluid on releasing, returns to the master cylinder?	Remember	1,4
9	What is the use of intake port in the master cylinder?	Understand	1,4
10	When will the proportioning valve does not work?	Remember	1,4
11	Where are the most anti-skid devices employed?	Understand	1,4
12	In disc brakes, why pad-to-disc adjustment is provided?	Understand	1,4
13	What is the function of brake bleeding process?	Remember	1,4
14	What are the types of brakes generally used on front and on rear of Maruti car?	Understand	1,4
15	Where generally the electric brakes are used?	Remember	1,4
16	On suspended vacuum brakes, when will the vacuum present on both sides of the piston?	Understand	1,4
17	In which vehicles generally air brakes are used?	Remember	1,4
18	Hand brake is used on which wheels?	Remember	1,4
19	What is the main component of the material of the brake lining?	Understand	1,4
20	What is the maximum disc runout allowed on the vehicle?	Understand	1,4
	Part-B: Long Answers Questions		
1	What is meant by bleeding of brakes?	Understand	4
2	What is brake adjustment? When is it required?	Remember	1
3	Define camber, castor. Explain with a neat sketch.	Understand	1
4	Define king pin inclination. Explain with a neat sketch.	Understand	4
5	What is meant by Toe-in or Toe-out? Explain with a neat sketch.	Understand	1
6	Explain Rack and pinion steering gear with neat sketch.	Remember	4
7	Draw and explain worm and nut type steering gear.	Understand	4
8	Derive an equation for the condition for correct steering mechanism?	Remember	4
9	Explain different types of steering gears.	Understand	4
10	How worm and wheel steering gear mechanism works?	Understand	4
11	What are the advantages of power steering?	Understand	4

12	Sketch and explain the construction and working of Ackermann steering	Remember	4
13	Explain self-righting torque.	Remember	1
14	Explain special steering columns.	Understand	1
15	Describe the working of a power steering unit with a neat sketch.	Remember	1
16	How hydraulic brake works? Explain with a neat sketch.	Understand	1
17	Describe the steering linkage for vehicle with rigid axle front	Understand	4
18	Explain the construction and working of Davis steering gear	Understand	4
19	How recirculating ball type steering gear is working. Explain with a neat sketch.	Remember	4
20	Describe steering linkage for vehicle with independent front suspension.	Remember	4
	Part-C: Analytical Questions		
1	Explain why the master cylinder is not filled completely with the braking fluid.	Understand	1
2	Why drum type hydraulic brakes are so designed that there should be residual pressure in the brake lines even when the brakes are in the released position?	Remember	1
3	Out of the disc and the drum brakes, which have better anti-fade characteristics and explain them.	Understand	2
4	What are the advantages of using synthetic resin adhesives for attaching brake linings as compared to the conventional riveting?	Understand	4
5	If only the brake on one of the four brake drums is incorrectly adjusted, how does it affect braking performance?	Understand	4
6	Out of the camber and the castor, which is measured first and out of their angle which is adjusted first why?	Understand	1
7	What should be the approximate amount of the following in a car: camber, kingpin inclination, included angle, castor and toe-in?	Remember	1
8	What is the meaning of the terms wander and shimmy in steering and how are they caused?	Understand	1
9	If the kingpin and the wheel centre lines meet below the ground, will the wheels try to toe-in?	Understand	2
	UNIT – V		
	Part- A: Short Answers Questions		
1	What are the main pollutants in the engine exhaust?	Understand	5
2	What are the approximate maximum allowable hydrocarbons in the car emission?	Remember	5
3	Define ppm.	Remember	1
4	What is the limit of the percentage of the CO in the exhaust of a car engine?	Understand	1
5	Where is the PCV valve located?	Understand	1
6	Define a PCV valve.	Remember	5
7	List out the functions of PCV valve.	Remember	5
8	What is the position of the PCV valve plunger at idle speed?	Remember	5
9	List out the functions of the charcoal granules.	Understand	1
10	Where is the liquid-vapour separator located?	Remember	1
11	Why EGR system is employed?	Remember	1
12	Define EGR system.	Remember	1
13	Name the type of the pump for the air injection system.	Understand	5
14	What is the main purpose of the diverter valve in the air injection system?	Understand	5
15	Name the catalyst used in the reduction converter?	Understand	5
16	Name the catalyst used in the converter for oxidising HC and CO?	Remember	1
17	What is controlled by the first converter in a three way converter?	Remember	1
18	What is the air fuel ratio required for the efficient operation of a three way converter?	Remember	1
19	What does the amount of oxygen in the exhaust indicate?	Understand	1

20	Define ‘catalyst operating window’.	Remember	5
Part-B: Long Answers Questions			
1	How emissions reduced by positive crank case ventilation?	Understand	5
2	What is a multi-point fuel injection system for S.I engines?	Remember	5
3	Explain vacuum advance method in automatic ignition advanced method?	Understand	5
4	List out the advantages of C.N.G?	Understand	1
5	List out the advantages of L.P.G?	Understand	1
6	Explain the operation of exhaust gas analyser.	Remember	5
7	Explain the working of positive crank case ventilation (PCV) with PCV valve.	Remember	5
8	How hydrogen fuel is utilized as alternative fuel?	Understand	5
9	What is exhaust gas recirculation (EGR)? How EGR valve works?	Remember	5
10	How air injection systems reduce pollution?	Understand	1
11	How fuel tank carburetor ventilation reduces the pollutants?	Understand	1
12	Explain the working of catalytic converter?	Understand	1
13	Explain the two types of techniques for treating the exhaust gases to reduce the pollutants?	Remember	5
14	Explain the methods for reducing emissions from automobile.	Remember	1
15	How common rail fuel injection system in Diesel engines works.	Understand	1
16	What are the advantages and disadvantages of Bio-diesel?	Remember	1
17	Explain clearly how the proper design of combustion chamber help in reducing exhaust emission	Understand	1
18	What are the main pollutants from the engine exhaust and mention its effects on the living organisms.	Understand	5
19	How diesel catalytic converter-cum-particulate trap reduce pollutants?	Understand	5
20	Explain unheated lambda probe with neat sketch.	Remember	5
Part-C: Analytical Questions			
1	Why does the three – way converter not work in case of diesel engines?	Understand	5
2	At what air-fuel ratio does the three – way converter operate at maximum efficiency? How is this ratio achieved precisely?	Remember	5
3	Why should unleaded gasoline be used for engines employing catalytic converters?	Understand	1
4	Compare the catalytic converter method with blowing of air only into the exhaust manifold	Understand	1
5	How does PCV valve protect crankcase from engine backfiring?	Understand	1
6	If the opening temperature for the thermostat valve in the engine cooling system is raised, how does it affect the pollution?	Remember	5
7	How does an electric – assist type of choke help decrease the emission of pollutants?	Understand	5
8	How does the fuel-air ratio affect the exhaust emission idle?	Remember	5
9	How does the fuel injection help to reduce automobile pollution?	Understand	1
10	What happens when at higher speeds the crankcase emissions exceed the flow rating of the PCV valve?	Understand	1

Prepared by:

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