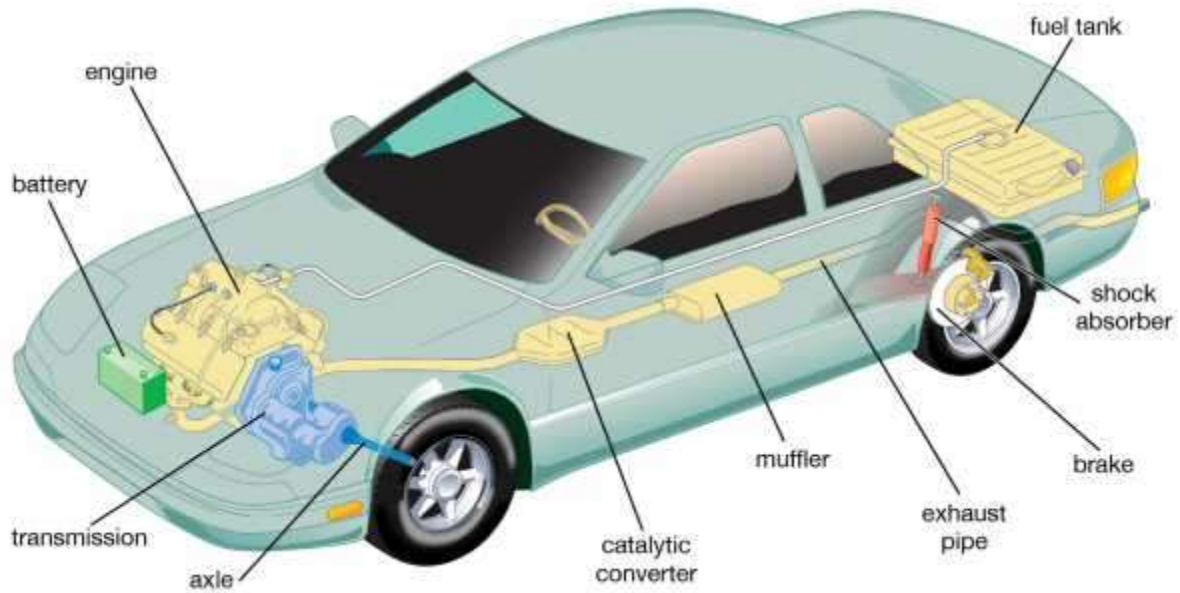


## Question bank

### BTMEC801A Fundamentals of Automotive Systems



	QUESTION	
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1	What is meant by self-propeller vehicle?
2	State the major types of automobiles according to the fuel used.
3	What are the functions of a frame?
4	What loads are coming to axle?
5	List any four components of a chassis.
6	What is meant by the term Chassis?
7	List any four characteristics of a good chassis.
8	Express the type of loads coming to axle.
9	Describe the various types of frames.
10	Describe the purpose of IC Engines.
11	Describe about cross wind force.
12	Name few components of engine.
13	What are the functions of piston rings? Types?
14	What are the functions of Turbo chargers?
15	What is super charging?
16	Define lift force.
17	Express about Vehicle Aerodynamics?
18	What is the use of air filters?
19	How does the oil filter work?
20	What are the signs that your fuel filter is bad?

1	Draw the layout of an automobile and indicate the various components.
2	Describe the various chassis components of automobiles and discuss the advantages and disadvantages.
3	Explain the construction of various frames used in automobiles with neat sketch
4	Explain the various types of engine drives of automobiles and mention the merits and demerits of each drive
5	explain the various forces acting on the body and its aerodynamics affects
6	Classification of a vehicle chassis is based on the position of the engine on the chassis
7	Explain in detail about the various components of engine with neat sketches.
8	Explain the working principle of turbo charger with neat sketch.
9	Explain the working principle of super charger with neat sketch.

1	State the functions of transmission system.
2	What is the function of clutch?
3	What are the types of clutch?

4	State the requirements of an automotive clutch.
5	List the various parts of a single plate clutch.
6	Why multi-plate clutches are used in automobiles?
7	What is the use of synchronizer in the automotive transmission system?
8	Why is gear box necessary in automobile?
9	Give the function of a flywheel?
10	What is an over drive?
11	What is a universal joint? What are its types?
12	State the functions of a slip joint.
13	Explain the transfer box and its function?
14	What is the function of differential unit?
15	What is meant by differential lock?
16	Why is double clutching technique used?
17	Discuss the function of Universal joint?
18	List out the various function of propeller shaft.
19	Compare Hotchkiss drive and Torque Tube drive?
20	List down the types of liver rear axles.
1	Explain the working principle of single plate clutch and multi plate with neat sketch.
2	Explain the working principle of cone clutch with neat sketch.
3	Explain the centrifugal clutch and semi-centrifugal clutch with neat sketch
4	Describe the working principle of fluid fly wheel with the help of a sketch
5	Illustrate the operation of a (i) sliding mesh gearbox (ii) constant mesh gearbox (iii) synchromesh gearbox
6	Explain the working of Epi-cyclic gear box with neat sketch
7	Explain the working of a Torque converter with suitable diagram.
8	Explain the working of Constant velocity universal joint.
9	Describe the construction and working of an over drive with a neat sketch and list out its advantages.
10	Explain the principle and working of a differential with a neat sketch.
11	Explain the types of rear axle drive with suitable sketch.
12	Explain in detail with neat sketches about Hotchkiss drive and torque tube drive
13	Explain in detail with neat sketches about final drive gears.
1	Define wheel track and wheel base
2	Give a brief note on damper.
3	Define steering gear.
4	What are the different types of tyres used in automobile?
5	Give the function of tyre?
6	Define tube vulcanization.
7	Classify wheels.
8	Write down the types of tread patterns in tyres.

9	What is meant by the term 'tread' ?
10	Distinguish between disc brake with drum brake.
11	What are the different types of springs used in suspension system?
12	State the function of the steering gear box.
13	Define toe-in and toe-out.
14	Define castor and camber.
15	Define king pin inclination.
17	List out the types of stub axle.
18	What is the Ackermann principle of steering?
19	What is center point steering?
20	What is slip angle in steering?

1	Discuss in detail about the different types of wheels and tires with respect to construction, advantages and disadvantages.
2	Explain the different types of stub axle with neat sketch.
3	Explain the wheel alignment, factors of wheel alignment and factors pertaining to wheels with neat sketch.
4	Sketch and explain various steering geometries.
5	Sketch and explain steering mechanism. Deduce an expression for true rolling of a steering wheel.
6	vehicle handling
7	Explain the steering linkage with suitable sketch.
8	What are the different types of steering gears? What is the purpose of steering gear? Explain with sketch of steering gears.
9	Explain the power steering system with neat sketch
10	Discuss the various troubles shooting in steering system.

1	What are Objectives of vehicle Suspension System?
2	What are the Difference between Pitch, Roll, and Yaw?
3	What is meant by unsprung weight?
4	What is the function of shackle with a leaf spring?
5	What is the material used for leaf spring?
6	What forces are supported by a leaf spring?
7	State the advantages of a tapered leaf spring.
8	What is rigid axle suspension system?
9	What are the advantages of an independent suspension system over a rigid axle suspension?
10	What is the purpose of a shock absorber?
11	How do shock absorbers work?
12	What are the symptoms of bad shock absorbers?
13	Write its advantages and disadvantages of disc brake.
14	What is a common cause of premature ABS brake application?
15	What is the function of torsion bar?
16	What is independent suspension system?
17	What are the different types of suspension systems?
18	Why are hydraulic brakes better than mechanical?



19	What are the main differences between hydraulic and pneumatic brakes?
20	What is traction control?
21	What is the function of EBD system?
22	What is the difference between ABS and EBD?
<b>1</b>	Explain in detail about suspension system with neat sketches.
<b>2</b>	Sketch and explain the working of torsion bar.
<b>3</b>	Explain the operation of a telescopic type shock absorber with a sketch.
<b>4</b>	Describe the working of front independent suspension system with neat sketch.
<b>5</b>	Explain the working air suspension system with neat sketch.
<b>6</b>	Describe the mechanical brake system with neat sketch.
<b>7</b>	Explain the working principles of hydraulic brake system with neat sketch
<b>8</b>	Explain the pneumatic or air brakes with neat sketch.
<b>9</b>	Sketch and explain the vacuum brake system.
<b>10</b>	Explain the anti-lock braking system with suitable sketch.
<b>11</b>	What is EBD (electronic brake force distribution) and how does it work?
<b>12</b>	Explain the traction control with suitable sketch.

	Explain in detail about of engine emissions and emission standards.	

<b>2</b>	Classify the different types of emission control device with suitable sketch.(Any two)
<b>3</b>	Explain the working of multi point fuel injection system for SI engines.
<b>4</b>	Explain the working of common rail fuel injection system for SI engines.

<b>6</b>	Explain about Charging circuit ,Starting system in an automobile
<b>7</b>	Describe the mechanism of solenoid switch with neat sketch
<b>8</b>	Describe the working of a standard bendix drive used in starter motors.
<b>9</b>	Explain in detail about Lighting system

<b>11</b>	Explain the working of engine management system.
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1. Define a heat engine. How are heat engines classified?
2. What do you understand by an external combustion engine? Give some examples of this type of the engine.
3. What do you understand by an internal combustion engine? Give some examples of this type of engine.
4. Distinguish between internal combustion and external combustion engines. What are the relative merits and demerits of internal combustion engines over the external combustion engines?
5. Distinguish between intermittent and continuous IC engines. Give some examples of these types of engines.
6. Give an account of historical development of IC engines.
7. Give an account of the modern development of IC engines.
8. How are the reciprocating IC engines classified? Briefly describe the each type.
9. How are the reciprocating IC engines classified according to their applications? Mention the predominant type of engines used in each case.
10. How are the reciprocating IC engines classified according to cylinder arrangement? Briefly describe the each type with the help of suitable diagrams.
11. Describe the functions of important engine components in a four-stroke IC engine. Also mention the materials used for these engine components.
12. Define swept volume, clearance volume, compression ratio and mean piston speed.
13. Describe with the help of diagrams, the working principle of the four-stroke SI engine.
14. Describe the valve timing of a four-stroke SI engine. Draw the  $p$ - $V$  diagram and valve timing diagram for an SI engine.
15. Describe the working principle of the four-stroke CI engine. Mention the typical values of valve timings for a four-stroke CI engine.
16. Distinguish between spark-ignition and compression-ignition engines.
17. Describe a two-stroke SI engine with the help of a diagram. What modifications are required for the two-stroke CI engine?
18. Distinguish between four-stroke and two-stroke IC engines. Mention their relative merits and demerits.
19. Draw the  $p$ - $V$  diagram and the typical valve-timing diagram for a two-stroke IC engine.
20. What are the major pollutants from the exhaust of SI and CI engines?

- 5.1 Why the actual cycle efficiency is much lower than the air-standard cycle efficiency? List the major losses and differences in actual engine and air-standard cycles.
- 5.2 List three principal factors that influence engine performance?
- 5.3 Briefly explain the following: (i) time loss factor (ii) heat loss factor (iii) exhaust blowdown factor.
- 5.4 Compare the actual and fuel-air cycles of a gasoline engine.
- 5.5 How does the composition of exhaust gases vary for various fuel-air ratios in a gasoline engine?
- 5.6 Discuss the effect of spark advance on the performance of an Otto cycle engine. What is meant by the optimum spark advance?
- 5.7 Discuss the optimum opening position of exhaust valve to reduce the exhaust blowdown loss.

8.1 Define carburetion.

8.2 Explain the factors that affect the process of carburetion.

8.3 What are different air-fuel mixture on which an engine can be operated?

8.4 Explain the following: (i) rich mixture, (ii) stoichiometric mixture, and (iii) lean mixture.

8.5 How the power and efficiency of the SI engine vary with air-fuel ratio for different load and speed conditions?

8.6 By means of a suitable graph explain the necessary carburetor performance to fulfill engine requirements.

8.7 Briefly discuss the air-fuel ratio requirements of a petrol engine from no load to full load.

8.8 Explain why a rich mixture is required for the following: (i) idling, (ii) maximum power, and sudden acceleration.

8.9 Explain the principle of carburetion.

8.10 With a neat sketch explain the working principle of a simple carburetor.

8.11 Derive an expression for air-fuel ratio of a simple carburetor.

8.12 Develop an expression for air-fuel ratio neglecting compressibility for a simple carburetor.

8.13 Explain why a simple carburetor cannot meet the various engine requirements.

8.14 Describe the essential parts of a modern carburetor.

8.15 Describe with suitable sketches the following system of a modern carburetor:

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- (i) main metering system
- (ii) idling system
- (iii) economizer system
- (iv) acceleration pump system
- (v) choke

8.16 What are the three basic types of carburetors? Explain.

8.17 With suitable sketches explain the various modern automobile carburetors.

8.18 With a suitable sketch explain the starting circuit of a Solex carburetor.

8.19 Draw the sketch of a Carter downdraught carburetor. How do the idle and low speed circuit work in this carburetor?

8.20 What are the special requirements of an air craft carburetor? What do you understand by altitude compensation? Explain.

- 15.1 What are the problems created by exhaust emissions?
  - 15.2 What causes the engine emissions?
  - 15.3 Give a brief account of air pollution due to engines.
  - 15.4 What are the major emissions that come out of engine exhaust?
  - 15.5 Describe the causes of hydrocarbon emissions from SI engines.
  - 15.6 How knock emissions are caused and what are their effects on environment?
  - 15.7 What are particulates? Describe in detail how particulate emissions are caused.
  - 15.8 Give a brief account of other emissions from engines.
  - 15.9 What is a thermal converter? How does it help to reduce emissions from engines?
  - 15.10 What are catalytic converters? How are they helpful in reducing HC, CO and  $\text{NO}_x$  emissions?
  - 15.11 Give a brief account of emissions from CI engines.
  - 15.12 How can emissions be reduced using chemical methods?
  - 15.13 What do you understand by the term EGR? Explain how EGR reduces  $\text{NO}_x$  emission.
  - 15.14 Explain with a sketch the non-exhaust emission from a vehicle.
  - 15.15 Explain with sketches how non-exhaust emission are controlled.
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- 19.1 What are the factors that affect the power output of an engine? Explain how supercharging helps to improve the power output.
- 19.2 What is meant by supercharging? What is its effect on engine performance?
- 19.3 Briefly explain the working of the following:
- (i) Centrifugal supercharger
  - (ii) Roots supercharger
  - (iii) Vane type supercharger
- Compare all the above superchargers.
- 19.4 Briefly explain the various methods of supercharging an engine.
- 19.5 Mention the effect of supercharging on engine performance.
- 19.6 What are the limitations of supercharging in an IC engine?
- 19.7 Make the thermodynamic analysis of a supercharged engine cycle.
- 19.8 With a neat sketch explain gear driven and exhaust driven supercharging methods.
- 19.9 What do you understand by the term turbocharging?
- 19.10 Explain with a neat sketch the principle of exhaust turbocharging of a single-cylinder engine.



- 20.1 What is a two-stroke engine and how does it differ from a four-stroke engine?
- 20.2 Explain with neat sketches the two different types of two-stroke engines.
- 20.3 What is an opposed piston engine? Explain.
- 20.4 Define the following :
- (i) delivery ratio
  - (ii) trapping efficiency
  - (iii) relative cylinder charge
  - (iv) scavenging efficiency
  - (v) charging efficiency
  - (vi) pressure loss coefficients
  - (vii) excess air factor
  - (viii) index of compression
- 20.5 Explain with a graph the three possible theoretical scavenging processes.
- 20.6 How does the actual scavenging process differ from the theoretical one? Explain by means of suitable graphs.
- 20.7 Briefly explain the classification of two-stroke engines based on scavenging process.

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