BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

3rd Semester, End-Sem Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT 1301 **Time: 3 Hour**

Course Name: Automotive Power Train **Max. Marks: 100**

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section.

Section-A

Select the one correct option from the given options in the following questions : - **10x2=20 Marks**

Q1. (I) The condition that causes vapour locking in a brake system…

A) Overheating of the fluid due to frequent brake application
B) overcooling of the brakes during high speed driving
C) keeping the vehicle without use for an extended period
D) an excessively high engine speed on a downhill road.

(II) The portion of a crankshaft which rests on cylinder block is called main journal.

A) Yes
B) No

Q2. (I) A baffle plate is fitted inside the oil pan to prevent the oil from splashing when it is subjected to vibration and other movement during vehicle operation…

A) True
B) False

(II) The motion of the cam is transferred to the valves through…

A) Piston
B) Camshaft pulley
C) Rocker arm
D) Valve stems

Q3. (I) If the engine coolant leaks into the engine oil, then engine oil…

A) Appears milky
B) Turns black
C) Becomes foamy
D) None of these

(II) The function of an alternator in an automobile is to…

A) Supply electric power
B) Continuously recharge the battery
C) Convert Electrical Energy to Mechanical Energy
D) Partially Convert Engine power into electrical power

Q4. (I) What type of bearing is used for main bearings and connecting rod bearings?

A) Ball bearing
B) Needle roller bearing
C) Plain bearing
D) Taper roller bearing

(II) The torque available at the contact between driving wheels and road is known as...

A) Brake effort
B) Clutch effort
C) Tractive effort
D) None of these

Q5. (I) The main function of intake manifold is that it...

A) Promotes the mixture of air and fuel
B) Cools the intake air to suitable temperature
C) Reduces intake noise
D) Distributes intake air equally to the cylinders

(II) The firing order for an in-line four cylinder I.C. engine is...

A) 1-2-3-4
B) 1-2-4-3
C) 1-3-4-2
D) 1-3-2-4

Q6. (I) If the air-fuel mixture in a spark ignition engine is too rich, then air-fuel ratio is about...

A) 17:1
B) 15:1
C) 13:1
D) 10:1

(II) If the air-fuel mixture ignites before the spark takes place at spark plug, the condition is called...

A) Detonation
B) Ignition
C) Pre-ignition
D) Rumble

Q7. (I) The difference between DOT 3 and DOT 4 brake fluids is...

A) DOT 4 fluid has higher boiling point than DOT 3
B) DOT 4 has lower boiling point than DOT 3
C) Both of them
D) None of these

(II) The operation of removing trapped air from the hydraulic braking system is known as...

A) Trapping
B) Tapping
C) Bleeding
D) Cleaning

Q8. (I) The aluminium alloy is used in cylinder blocks because...

A) lighter and have good heat dissipation characteristics
B) Material cost is low
C) Easily available
D) None of these

(II) The most commonly used supplementary restraint system (SRS) component is...

A) Seat belt
B) Brake
C) Air bag
D) Steering

Q9. (I) The valve overlap in four stroke petrol engines is approximately...

A) 30 Degree
B) 60 Degree
C) 90 Degree
D) 120 Degree

(II) The petrol engines are also known as...

A) SI engine
B) CI engine
C) Pump
D) Steam engine

Q10. (I)The component that connects the steering rack to the knuckles is…

A) Tie-rod
B) Sector-gear
C) Pivot
D) Spline

(II) The connecting rods are generally made of _____ shaped cross-section.

A) I
B) C
C) L
D) H

Section-B

(6x5) = 30 Marks

Q11. What are the differences between wet cylinder liner and dry cylinder liner?

Q12. Explain advantages and disadvantages of dry cylinder liner and wet cylinder liner.

Q13. What do you understand by an overhead-valve engine?

Q14. How does the exhaust gas turbocharger work? Also draw a neat sketch.

Q15. What are the functions of exhaust system? Draw a neat sketch of exhaust system.

Q16. What are the sensors used in CRDi engines? Explain any four of them.

Q17. Explain engine cooling system. Draw a Sankey Diagrams for SI and CI engine.

Q18. Write are the SOP for brake bleeding.

Section – C

(10X5) = 50 Marks

Q19. What are the functions of crankshaft? From which materials are crankshafts made?

Q20. What is the purpose of a flywheel? How can the crankshaft bearing clearance be checked?

Q21. Explain types of engine lubrication systems. What are the functions of engine lubrication system?

Q22. Explain the functions of EGR? What are the main components of an exhaust gas turbocharger?

Q23. Explain the functions of fuel supply system in MPFI system.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Answer Sheet

School of Automotive Skills

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(II) The connecting rods are generally made of _____ shaped cross-section.

A) **I**
B) C
C) L
D) H

Section-B

(6x5) = 30 Marks

Q11. What are the differences between wet cylinder liner and dry cylinder liner?

Ans. **Wet Cylinders liners:**

- Coolant flows directly around liners of this type, thereby providing a good cooling effect. Wet liners can be replaced individually. However, the cylinders' block is not as rigid and is distorted more easily.
- Liners of this type feature a flange at their top end. They must be sealed against the crankcase by sealing rings, since otherwise coolant will get into the crankcase.

Dry cylinder liners:

- These are the slip fit or press fit as thin-walled liners into the cylinder block. Since they do not come into contact with the coolant, the transfer of heat to the coolant is not good as good with wet liners.
- Cylinder liners with a slip fit are finish machined prior to installation.
- Liners with press fit installation are pressed when a predrilled cylinder bore into the cylinder block.

Q12. Explain advantages and disadvantages of dry cylinder liner and wet cylinder liner.

Ans. **Advantages of wet cylinder liner: -**

- Easy to manufacture.
- Cooling is more effective.
- Relieved longitudinal stresses due to thermal expansion of the liners.

Disadvantages of wet cylinder liner: -

- The replacement of liner is difficult.
- Danger of water jacket leakage problem.

Advantage of Dry liner: -

- Replacement of dry liner is easy.
- No danger of water jacket problem.

Disadvantage of Dry liner: -

- The cylinder block is complicated and difficult to manufacture.
- Heat dissipation is not very effective.

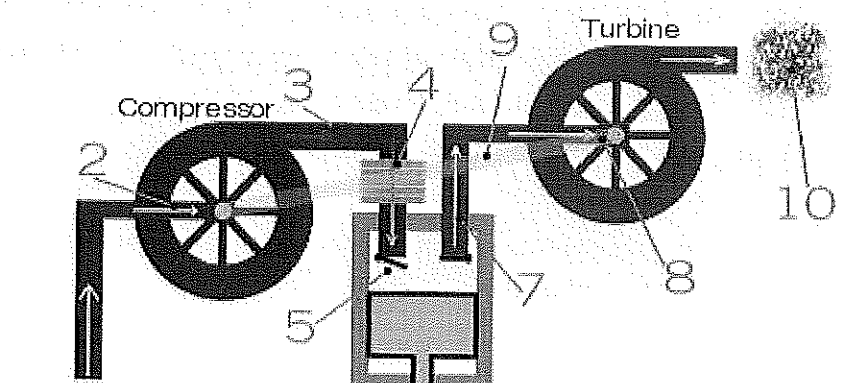
Q13. What do you understand by an overhead-valve engine?

Ans. An overhead valve engine (OHV engine) is an engine in which the valves are placed in the cylinder head. This was an improvement over the older flathead engine, where the valves were placed in the block next to the piston. Overhead camshaft(OHC) engines, while still overhead valve by definition, are usually categorized apart from other OHV engines.

In a piston engine configuration where the valves are overhead but the camshaft is not, informally called pushrod engine or I-head engine, the camshaft is placed within the cylinder block (usually beside and slightly above the crankshaft in a straight engine or directly above the crankshaft in the V of a V engine), and uses pushrods or rods to actuate rocker arms above the cylinder head to actuate the valves. Lifters or tappets are located in the engine block between the camshaft and pushrods.[1] By contrast, overhead camshaft design avoids the use of pushrods by putting the camshaft directly above the valves in the cylinder head, thus simplifying the valvetrain.

Q14. How does the exhaust gas turbocharger work? Also draw a neat sketch.

Ans. The basic idea is that the exhaust drives the turbine (the red fan), which is directly connected to (and powers) the compressor (the blue fan), which rams air into the engine. For simplicity, we're showing only one cylinder. Here then, in summary, is how the whole thing works:



- Cool air enters the engine's air intake and heads toward the compressor.
- The compressor fan helps to suck air in.
- The compressor squeezes and heats up the incoming air and blows it out again.
- Hot, compressed air from the compressor passes through the heat exchanger, which cools it down.
- Cooled, compressed air enters the cylinder's air intake. The extra oxygen helps to burn fuel in the cylinder at a faster rate.
- Since the cylinder burns more fuel, it produces energy more quickly and can send more power to the wheels via the piston, shafts, and gears.
- Waste gas from the cylinder exits through the exhaust outlet.

- The hot exhaust gases blowing past the turbine fan make it rotate at high speed.
- The spinning turbine is mounted on the same shaft as the compressor (shown here as a pale orange line). So, as the turbine spins, the compressor spins too.
- The exhaust gas leaves the car, wasting less energy than it would otherwise.

Q15. What are the functions of exhaust system? Draw a neat sketch of exhaust system.

Ans. For the internal combustion engine that drives trucks, cars and motorcycles, the exhaust system carries waste gases away from the engine and through a system of manifolds and pipes. The exhaust system is an essential part of a vehicle engine and must be kept in good working order, otherwise engine performance and mileage will suffer.

Exhaust Manifold: The exhaust manifold is the first component of the exhaust system. It comprises a stainless steel, aluminum or cast-iron unit that adjoins the engine's combustion cylinders and collects exhaust gases from the combustion process. Car enthusiasts have the option of detailing their engine with exhaust headers or extractors, which are a series of pipes that are individually linked to the cylinders.

Mufflers: A system of exhaust pipes carries the exhaust gases through a muffler, which contains a series of baffles that damp the noise of the engine combustion and escaping gases. Without a muffler, the noise of combustion would escape directly from the exhaust pipe, creating a tremendous distraction for drivers and pedestrians. By law in all states, automobile mufflers must be in good working condition.

Catalytic Converter: A catalytic converter completes the ignition of gases that have been incompletely burned within the engine's combustion chamber. The catalytic converter prevents pollutants such as carbon monoxide and nitrogen oxides from escaping into the atmosphere. By law, the catalytic converter must be in good working condition, and many states require annual testing of this component to assure that the vehicle is emitting minimal pollutants into the atmosphere.

Tailpipe: The engine exhaust finally reaches the tailpipe, which is made of stainless steel or steel tubing. The exhaust pipe vents the gases behind or above the vehicle. Modern exhaust systems have reduced automobile pollutants by a considerable amount in the past few decades and have helped to reduce smog and other pollution in largest cities.

Q16. What are the sensors used in CRDi engines? Explain any four of them.

Ans. Sensor:

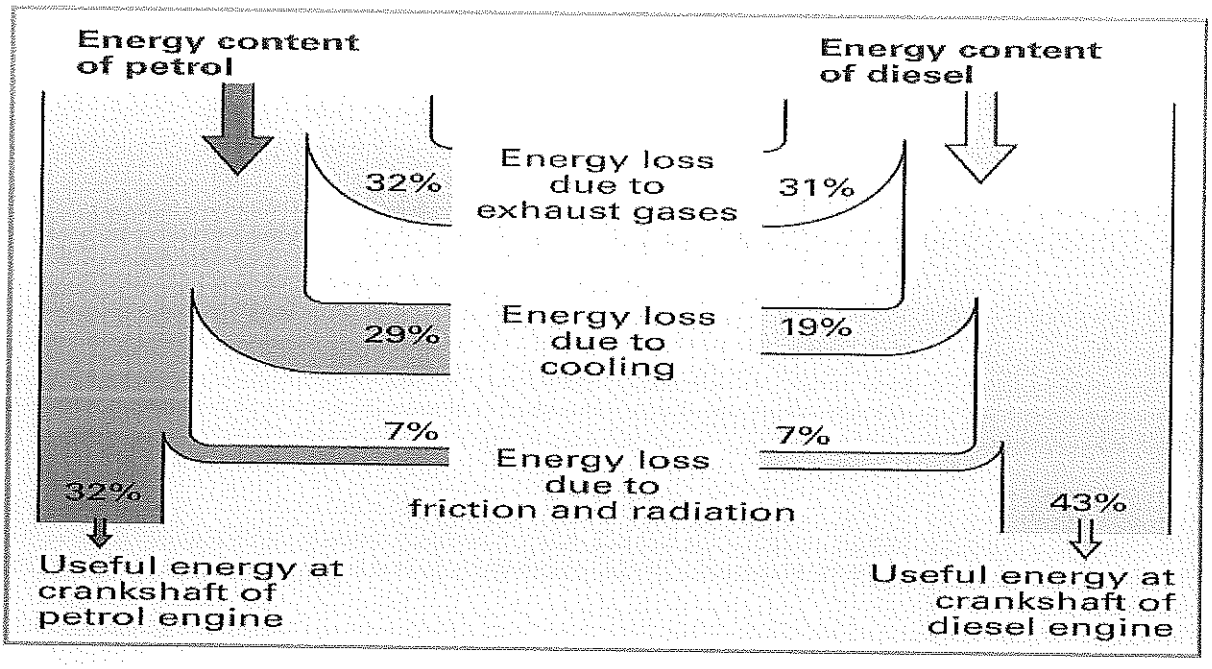
a. Injection pump speed sensor - monitors pump rotational speed.
b. Fuel rack position sensor - monitors pump fuel rack position.
c. Charge air pressure sensor - measures pressure side of the turbocharger.
d. Fuel pressure sensor.
e. Air cleaner vacuum pressure sensor.
f. Engine position sensor.

Q17. Explain engine cooling system. Draw a Sankey Diagrams for SI and CI engine.

- Ans. The primary functions of the cooling system in internal combustion engines are to heat the engine quickly to optimal operating temperature and to dissipate excess heat during engine operation.
- Roughly one third of the thermal energy generated during combustion is absorbed by the components.

  e.g. Piston, valves, cylinder, cylinder head, exhaust gas turbocharger and the engine oil, and must be dissipated because of the limited heat resistance of the materials of the lubricating oil.
- Economical direct injection diesel and spark-ignition engines can only utilize at most 43% of the energy stored in the fuel. The remainder of the energy is lost in the form of heat.

Sankey Diagrams:



The thermal energy is generated in the process not just by the combustion of the fuel inside the cylinder. The friction of the moving components in the engine and the drivetrain also converts parts of the mechanical energy yielded back into thermal energy which can no longer be utilized as motive power.

Q18. Write are the SOP for brake bleeding?

Ans. Lift the vehicle on two post lift at position level.

Demount the wheel from the wheel hub with the help of ratchet and required tool. Remove the rubber cap from the bleeding port with the help of screw driver. Dip the one end of the transparent pipe into the oil container and tune in the other end on the bleeding port. Make sure that transparent pipe should be clean.

To Remove the air from brake fluid hose pipe and bleeding port. Loose the bleeding port's bolt with the help of spanner. Fill the brake oil into the reservoir, according to requirement. Applied the brake up and down, which circulate the fluid. The fluid will flow into the transparent pipe, here u can see the air bubble. Remove the pipe

and tight the nut with the help of spanner and close the bleeding port from the rubber cap. Check the air leakage and fluid level. 3.00 14 Conclusion:

Section – C

(10X5) = 50 Marks

Q19. What are the functions of crankshaft? From which materials are crankshafts made?

- Ans. he functions of the crankshaft is to translate the linear reciprocating motion of a pistons into the rotational motion required by the automobile.
- This is accomplished by connecting the pistons to the crank throws, which are offset from the central axis of the crankshaft to create a rotation about that axis.
- Crankshafts are made of forged steel.
- The forged crankshaft is machined to produce the crankshaft bearing and connecting rod bearing surfaces.
- The rod bearings are eccentric, or offset, from the center of the crankshaft as illustrated in Figure above.
- This offset converts the reciprocating (up and down) motion of the piston into the rotary motion of the crankshaft.

Materials: The alloying elements typically used in these carbon steels are manganese, chromium, molybdenum, nickel, silicon, cobalt, vanadium, and sometimes aluminium and titanium.

Q20. What is the purpose of a flywheel? How can the crankshaft bearing clearance be checked?

Ans. A flywheel is basically nothing but a storehouse of energy. It has very high moment of inertia, which is why once it gets into motion, it is almost as though it is in perpetual motion. If you've lived in India, you might have seen the machine a local sugarcane juice vendor uses. He will mechanically rotate a large wheel which has a weight attached to it in a manner that when the wheel is in motion, it becomes practically unstoppable. After that, as he passes the sugarcane through the gears, they literally just pull the tough canes through, wringing out the juice from them. That's nothing but a flywheel in action.
Now, a typical automotive engine will have four strokes, only one of which generates power. All the other three strokes take power away from the crankshaft. So, while in theory, the engine will run because of compression and de-compression, the energy to keep it going is generated only during one cycle, that's the power stroke. What a flywheel does is, it stores this energy, and keeps the engine going through the other strokes by providing the energy back. Diesel engines require more energy through the other strokes owing to higher compression ratios. That's why they have larger flywheels.

Q21. Explain types of engine lubrication systems. What are the functions of engine lubrication system?

Ans. **Lubricating Systems:**

Two different types of system may be used in four-stroke engines:

Forced-feed lubrication

. Dry Sump lubrication.

Functions:

Lubricate in order to reduce energy losses and wear-inducing friction between those parts that slides on or against each other.

- Cool in order to protect the engine components against overheating because these components cannot give off heat directly to the coolant or to the cooling air.
- Seal in order to guarantee the precision seal between parts that slides on or against each other.
- Clean in order to remove abrasion, deposits and combustion residues or to bind them in the oil so as to render them harmless to the engine.
- Protect against corrosion.
- Damp engine noises because the lubricant layer has a noise and vibration damping effect.

Q22. Explain the functions of EGR? What are the main components of an exhaust gas turbocharger?

Ans. The Exhaust Gas Recirculation (EGR) system's purpose is to reduce NOx emissions that contribute to air pollution. It is mainly used in Diesel engines in which the NOx formation is the main problem because of the high temperature and as well as the lean mixture.

EGR recirculates the exhaust gas in a particular percentage of about 6–10 again into the intake manifold due to which the temperature of overall mixture goes down and hence prevent the formation of NOx which generally needs temperature condition of about ~1500°C.

In diesel engine, lean mixture is used which means that the oxygen is more than the fuel due to which there remains enough oxygen at the combustion chamber which remains unburnt and can be chemically reacted into NOx although that's not the case in Petrol engine in which the mixture is in proper stoichiometric ratio.

Apart from the NOx reduction in diesel engine, EGR also helps in petrol engine by reducing the knocking tendency as it reduces the temperature in the chamber and hence reducing the possibility of self-ignition of the end mixture in the opposite side of the flame travel area.

EGR even aids in the vaporization of the liquid fuel in SI engines. Follow the below link and will get to know about this point in case of any doubt:

Q23. Explain the functions of fuel supply system in MPFI system.

Ans. The MPFI is a system or method of injecting fuel into internal combustion engine through multi ports situated on intake valve of each cylinder. It delivers an exact quantity of fuel in each cylinder at the right time. There are three types of MPFI systems – Batched, Simultaneous and Sequential.

In the batched MPFI system fuel is injected to the groups or batches of the cylinders without bringing their intake stroke together. In the simultaneous system, fuel is inserted to all cylinders at the same time, while the sequential system injection is timed to overlap with intake stroke of each cylinder.

MPFI includes a fuel pressure regulator, fuel injectors, cylinders, pressure spring and a control diaphragm. It uses multiple individual injectors to insert fuel in each cylinder through intake port situated upstream of cylinder's intake value. The fuel pressure regulator, connected to the fuel rail by means of an inlet and outlet, directs the flow of the fuel. While the control diaphragm and pressure spring controls the outlet valve opening and the amount of fuel that can return. The pressure in the intake manifold significantly changes with the engine speed and load.

Advantages of multi point fuel injection system.

The multi-point fuel injection technology improves fuel efficiency of the vehicles. MPFI uses individual fuel injector for each cylinder, thus there is no gas wastage over time. It reduces the fuel consumption and makes the vehicle more efficient and economical.

The vehicles with MPFI automobile technology have lower carbon emissions than a few decades old vehicles. It reduces the emission of the hazardous chemicals or smoke, released when fuel is burned. The more precise fuel delivery cleans the exhaust and produces less toxic byproducts. Therefore, the engine and the air remain cleaner.

MPFI system improves the engine performance. It atomizes the air in small tube instead additional air intake, and enhances the cylinder-to-cylinder fuel distribution that aid to the engine performance.

It encourages distribution of more uniform air-fuel mixture to each cylinder that reduces the power difference developed in individual cylinder.

BSDU

Registration No.....

SCHOOL OF AUTOMOTIVE SKILLS

3rd SEMESTER END-SEMESTER EXAMINATION – 2018-2109

SUMMER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1302 Time: 3 Hour

Course Name: AUTOMOTIVE BRAKING, SUSPENSION AND STEERING Max. Marks: 100

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section B.

Section-A

Select the one correct option from the given options in the following questions : - (10x2) = 20 Marks

Q1. (I) Which one of the following steering system works on turning mechanism?

a) Ackermann b) a & b

c) Davis d) None of them

(II) The range of steering ratio for normal steering system in cars:

a) 12-17 b) 19-25

c) 22-33 d) 15-21

Q2. (I) The maximum traction between a tire and the road occurs when the tire is___.

a) Locked and skidding b) Slipping 10% to 20%

c) Rotating freely d) Slipping 80% to 90%

(II) Which type of antilock braking system (ABS) requires the use of four-wheel speed sensors?

a) one channel b) three channel

c) two channel d) four channel

Q3. (I) A defective vacuum brake booster will cause a _____.

a) Hard brake pedal b) Soft (spongy) brake pedal

c) Low brake pedal d) None of the above

(II) The major reason for brake pedal pulsation during braking is due to ..... of rotor.

a) Uneven surface b) Even surface

c) Crack d) Heat

Q4. (I) Rotor thickness measured in _____.

a) Millimeters
b) Micro inches
c) Inches
d) Centimeters

(II) In a typical integral rear disc brake caliper, the parking brake cable operates _____.

a) Caliper
b) Auxiliary piston
c) Mechanical drum
d) Rotor

Q5. (I) Which component(s) is considered to be unsprung weight?

a) Frame
b) Wheels and tires
c) Body
d) Both a and b

(II) Proper tire inflation pressure information is found _____.

a) On the driver's door or post
b) On the sidewall of the tire
c) In the owner's manual
d) Both a and b

Q6. A tire with lower than specified inflation pressure could lead to what condition?

a) Reduced fuel economy
b) Increases maintenance
c) Reduced tire life
d) All of the above

(II) What is the full form of ABS system?

a) Anti-lock braking system
b) Anti-lock blocking system
c) Auto-lock braking system
d) None of above

Q7. (I) Which two of the following types of suspension system generally we use in vehicles?

a) Dependent suspension
b) Independent suspension
c) Air suspension
d) Dry suspension

(II) What is the function of damper in suspension system?

a) Reduce vibration
b) Reduce Noise
c) Reduce shock
d) None of these

Q8. (I) What component is considered to be sprung weight?

a) Frame
b) Wheels and tires
c) Body
d) Both a and b

(II) What is minimum speed where ABS is disabled?

a) Below 10km/h
b) Below 9 km/h
c) Below 8 km/h
d) Below 20km/h

Q9. (I) Which one of following is not a steering gear box?

a) Rack and pinion
b) Warm and warm wheel
c) Recirculating ball type
d) Sliding mesh

(II) Which type of sensor is use in ABS?

a) Speed sensor
b) Torque Sensor
c) Temperature
d) Pressure Sensor

Q10. (I) In a coil spring suspension system, as the wheel passes over a bump, the spring is…

a) Expanded
b) Extended
c) Compressed
d) None

(II) Spring rate in suspension can be expressed as.....

a) K = Gd4/8ND3
b) K = Gd4+8ND3
c) K = Gd4-8ND3
d) K = Gd48ND3

Section-B

(6x5) = 30 Marks

Q11. Write briefly about four-wheel steering system.

Q12. What is HPS also write its components (at list 10)?

Q13. Write a short note on steering pull & tyre conicity.

Q14. What is the function of metering valve?

Q15. Write briefly about all tyre repairing processes.

Q16. Write differences between front and rear suspension systems.

Q17. Describe briefly about master cylinder and wheel cylinder.

Q18. Describe what is shock absorber.

Section-C

(5x10) = 50 Marks

Q19. Explain caliper and its types.

Q20. Explain Anti-lock braking system.

Q21. Explain suspension system and its components with the help of a diagram.

Q22. Explain the standard process of wheel alignment process. Write its advantages.

Q23. Make a suspension problem symptom chart.

BSDU

Registration No:.....

SCHOOL OF AUTOMOTIVE SKILLS

3rd SEMESTER END-SEMESTER EXAMINATION – 2018-2019

SUMMER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1302 Time: 3 Hour

Course Name: AUTOMOTIVE WHEEL CARE & STEERING SYSTEM Max. Marks: 100

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section B.

Section-A

Select the one correct option from the given options in the following questions :- (10x2) = 20 Marks

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Ans:- a

(II) The range of steering ratio for normal steering system in cars.

a) 12-17 b) 19-25

c) 22-33 d) 15-21

Ans: b

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Ans: c

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a) one channel b) three channel

c) two channel d) four channel

Ans: d

Q3. (I) A defective vacuum brake booster will cause a _____ .

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c) Low brake pedal d) None of the above

Ans: a

(II) The major reason for brake pedal pulsation during braking is due to ..... of rotor.

a) Uneven surface
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d) Heat

Ans: a

Q4. (I) Rotor thickness measured in _____ .

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c) Inches
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Ans: a

(II) In a typical integral rear disc brake caliper, the parking brake cable operates _____.

a) Caliper
b) Auxiliary piston
c) Mechanical drum
d) Rotor

Ans: c

Q5. (I) What component(s) is considered to be unsprung weight?

a) Frame
b) Wheels and tires
c) Body
d) Both a and b

Ans: b

(II) Proper tire inflation pressure information is found _____ .

a) On the driver's door or post
b) On the sidewall of the tire
c) In the owner's manual
d) Both a and b

Ans: a

Q6. A tire with lower than specified inflation pressure could lead to what condition?

a) Reduced fuel economy
b) Increases maintenance
c) Reduced tire life
d) All of the above

Ans: d

(II) What is the full form of ABS system?

a) Anti-lock braking system
b) Anti-lock blocking system
c) Auto-lock braking system
d) None of above

Ans: a

Q7. (I) Which two of the following types of suspension system generally we are used in vehicles?

a) Dependent suspension
b) Independent suspension
c) Air suspension
d) Dry suspension

Ans: A & B

(II) What is the function of damper in suspension system?

a) Reduce vibration
b) Reduce Noise
c) Reduce shock
d) None of these

Ans: c

Q8. (I) What component is considered to be sprung weight?

a) Frame
b) Wheels and tires
c) Body
d) Both a and b

Ans: a

(II) What is minimum speed where ABS is disabled?

a) Below 10km/h
b) Below 9 km/h
c) Below 8 km/h
d) Below 20km/h

Ans: b

Q9. (I) Which one of following is not a steering gear box?

a) Rack and pinion
b) Warm and warm wheel
c) Recirculating ball type
d) Sliding mesh

Ans: d

(II) Which type of sensor is use in ABS.

a) Speed sensor
b) Torque Sensor
c) Temperature
d) Pressure Sensor

Ans: a

Q10. (I) In a coil spring suspension system, as the wheel passes over a bump, the spring is…

a) Expanded
b) Extended
c) Compressed
d) None

Ans: c

(II) Spring rate in suspension can be expressed as.....

a) K = Gd4/8ND3
b) K = Gd4-8ND3
c) K = Gd4+8ND3
d) K = Gd48ND3

Ans: a

Section-B

(6x5) = 30 Marks

Q11. Write briefly about four-wheel steering system.

Ans:

Four wheel steering system/all-wheel steering systems:

With all-wheel steering, all four wheels of the vehicle can be steered. It is mainly used in special vehicles, e.g. crane vehicles or buses and commercial vehicles. Mechanical, electric or electro-hydraulic systems are used to steer one or more rear axles.

❖ **Advantages of Four Wheel stearing system:**

- Easier to manoeuvre at low speeds
- Increased driving safety at higher driving speeds

Q12. What is HPS also write its components (at list 10)?

Ans:

1. working piston
2. radial grooves
3. torsion bar
4. control bushing
5. rotary valve
6. return slots
7. axial slot
8. housing
9. rotary slide
10. inlet
11. inlet slots
12. return flow
13. pin
14. oil tank
15. pump
16. torsion bar
17. pin
18. drive pinion
19. control sleeve
20. gear rack

Q13. Write short note on steering pull & tyre conicity.

Ans:

Steering Pull:

Steering is the tendency of the steering to gradually pull to the right or left when the vehicle is driven straight ahead on a reasonably smooth, straight road.
Tires of different types, sizes, designs, or inflation pressures on opposite sides of a vehicle cause steering pull.
Sometimes a tire manufacturing defect occurs in which the belts are wound off centre on the tire. This condition is referred to as tire conicity.

Tyre conicity:
Tire conicity is where a properly inflated tire causes a vehicle to pull to the right or left when driven. Tires do not get conicity. They manufacture them with the tendency. It is considered a defect and tire manufacturers cover tire conicity under their warranty, if we diagnose it properly and promptly.

Q14. What is the function of metering valve?

Ans:
Metering Valve:
The metering valve section of the combination valve is required on cars that have disc brakes on the front wheels and drum brakes on the rear wheels. If you have read How Disc Brakes Works and How Drum Brakes Work, you know that the disc brake pad is normally in contact with the disc, while the drum brake shoes are normally pulled away from the drum. Because of this, the disc brakes are in a position to engage before the drum brakes when you push the brake pedal down.
The metering valve compensates for this, making the drum brakes engage just before the disc brakes. The metering valve does not allow any pressure to the disc brakes until a threshold pressure has been reached. The threshold pressure is low compared to the maximum pressure in the braking system, so the drum brakes just barely engage before the disc brakes kick in. Having the rear brakes engage before the front brakes provides a lot more stability during braking. Applying the rear brakes first helps keep the car in a straight line, much like the rudder helps a plane fly in straight line.

Q15. Write briefly about all tyre repairing process?

Ans: Plug Installation Procedure
1. Buff the area around the puncture with a wire brush or wire buffing wheel.
2. Select a plug slightly larger than the puncture opening, and insert the plug in the eye of the insertion tool.
3. Wet the plug and the insertion tool with vulcanizing fluid.
4. While holding and stretching the plug, pull the plug into the puncture from the inside of the tire (Figure 4-15). The head of the plug should contact the inside of the tire. If the plug pulls through the tire, repeat the procedure.

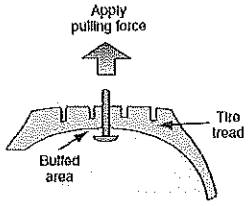


FIGURE 4-15 Plug installation procedure.

5. Cut the plug off 1/32 in. from the tread surface. Do not stretch the plug while cutting.

Cold Patch Installation Procedure:

1. Buff the area around the puncture with a wire brush or buffing wheel.
2. Apply vulcanizing fluid to the buffed area and allow it to dry until it is tacky.
3. Peel the backing from the patch, and apply the patch over the puncture. Center the patch over the puncture.
4. Run a stitching tool back and forth over the patch to improve bonding.

Hot Patch Installation Procedure:

1. Buff the area around the puncture with a wire brush or buffing wheel. 2. Apply vulcanizing fluid to the buffed area, if required.
3. Peel the backing from the patch and install the patch so it is centered over the puncture on the inside of the tire. Many hot patches are heated with an electric heating element clamped over the patch. Th is element should be clamped in place for the amount of time recommended by the equipment or patch manufacturer.
4. After the heating element is removed, allow the patch to cool for a few minutes and be sure the patch is properly bonded to the tire.

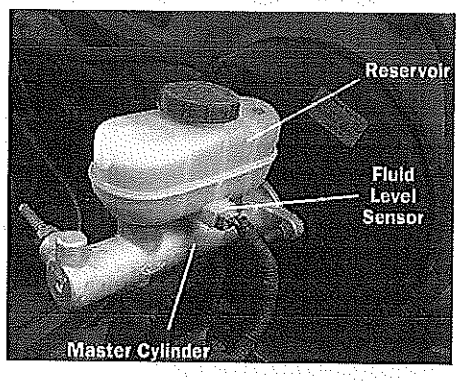
Q16. Write difference between front and rear suspension system.

Ans:

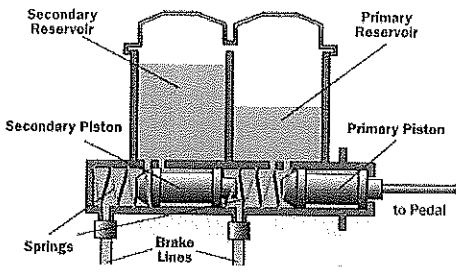
Q17. Describe briefly about master cylinder and wheel cylinder.

Ans: Master Cylinder:

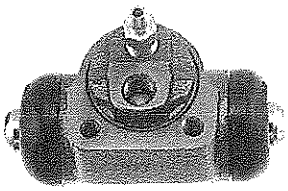
In the figure below, the plastic tank you see is the **brake-fluid reservoir**, the master cylinder's brake-fluid source. The electrical connection is a **sensor** that triggers a warning light when the brake fluid gets low.



As you'll see here, there are two pistons and two springs inside the cylinder.



- **Wheel cylinder:** A wheel cylinder is a component of a hydraulic drum brake system. It is located in each wheel and is usually positioned at the top of the wheel, above the shoes. Its function is to exert force onto the shoes so as to bring them into contact with the drum and stop the vehicle with friction.



Q18. Describe what is shock absorber.

- **Ans: SHOCK ABSORBERS:**
- **PURPOSE AND FUNCTION:** The major purpose of any shock or strut is to control ride and handling. Standard shock absorbers do not support the weight of a vehicle. The springs support the weight of the vehicle; the shock absorbers control the actions and reactions of the springs. Shock absorbers are also called dampers.
- **SHOCK ABSORBER OPERATION:** The hydraulic shock absorber operates on the principle of fluid being forced through a small opening (orifice). Besides small openings, pressure relief valves are built into most shock absorbers to control vehicle ride under all operating conditions. The greater the pressure drop of the fluid inside the shock and the greater the amount of fluid moved through the orifice, the greater the amount of dampening; therefore, larger shock absorbers can usually provide better dampening than smaller units.

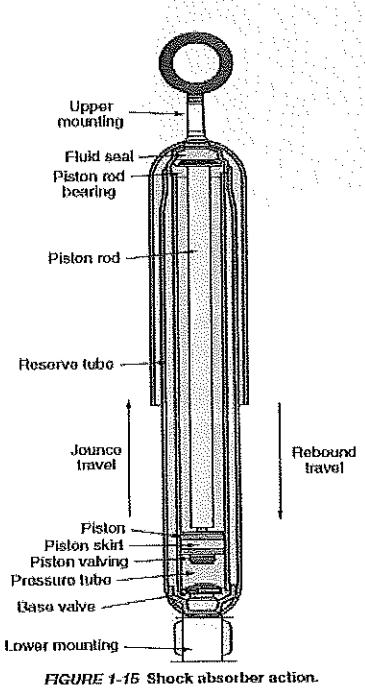


FIGURE 1-15 **Shock absorber action.**

Section-C

(5x10) = 50 Marks

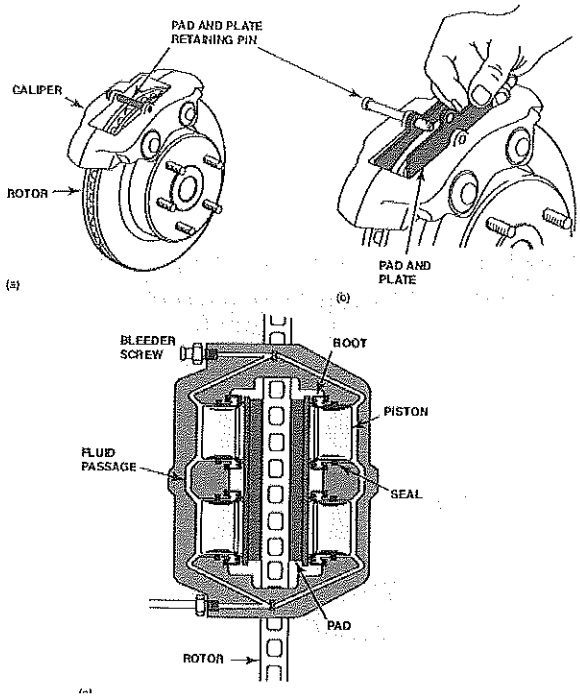
Q19. Explain caliper and its types.

Ans:

CALIPER: With the exception of the rotor, the caliper is the largest part of a disc brake friction assembly. The brake caliper uses hydraulic pressure to create the mechanical force required to move the brake pads into contact with the brake rotor. At the front axle, the caliper mounts to the spindle, caliper support bracket or steering knuckle.

Caliper is basically two types:

FIXED CALIPER DESIGN The **fixed brake caliper** is the earliest design. The fixed caliper has a body manufactured in two halves, and uses two, four, or six pistons to apply the brake pads. The fixed caliper gets its name from the fact that the caliper is rigidly mounted to the suspension. When the brakes are applied, the pistons extend from the caliper bores and apply the brake pads with equal force from both sides of the rotor. No part of the caliper body moves when the brakes are applied.



FLOATING AND SLIDING CALIPER DESIGN The front brakes of most vehicles are fitted with either floating or sliding calipers, which are *not* rigidly mounted. The caliper is free to move within a limited range on an **anchor plate** that *is* solidly mounted to the vehicle suspension. The anchor plate may be cast into a suspension member (often the front spindle) or it can be a separate piece that bolts to the suspension.

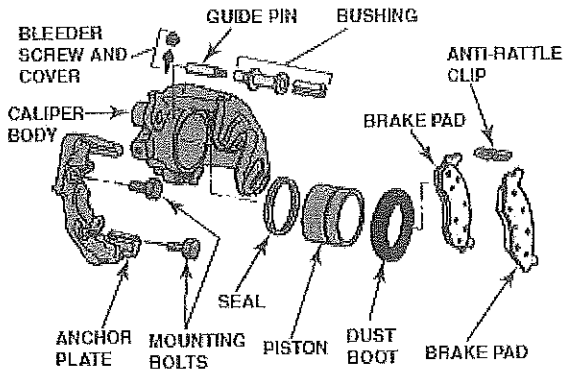


FIGURE 101-20 This floating caliper mounts on a separate anchor plate that bolts to the vehicle suspension.

When the brakes are applied, the caliper piston moves out of its bore and applies the inner brake pad. At the same time, the
caliper body moves in the opposite direction on the anchor plate and applies the outer brake pad. With a floating or sliding caliper, the caliper body moves every time the brakes are applied.

Q20. Explain Anti-lock braking system?

Ans:

Antilock braking systems (ABS) help prevent the wheels from locking during sudden braking, especially on slippery surfaces. This helps the driver maintain control. Antilock brakes increase safety because they eliminate lockup and minimize the danger of skidding, allowing the vehicle to stop in a straight line. ABS also allows the driver to maintain steering control during heavy braking so the vehicle can be steered to avoid an obstacle or another vehicle.

- On dry or wet pavement, maximum braking traction occurs when tire slip is held between approximately 15% and 30%.
- **ABS AND BASE BRAKES** An antilock braking system is only an "add-on" to the existing base brake system. ABS only comes into play when traction conditions are marginal or during sudden panic stops when the tires lose traction and begin to slip excessively. The rest of the time ABS has no effect on normal driving, handling, or braking.
- ABS also makes no difference in the maintenance, inspection, service, or repair of conventional brake system components. A vehicle with ABS brakes uses the same brake linings, calipers, wheel cylinders and other system components as a vehicle without ABS brakes. The only exception being the master cylinder on certain applications. All ABS systems are also designed to be as "fail-safe" as possible. Should a failure occur that affects the operation of the ABS system, the system will deactivate itself and the vehicle will revert to normal braking. Therefore, an ABS failure will not prevent the vehicle from stopping.

ABS COMPONENTS: Basic components that are common to all antilock brake systems include the following.

- Wheel speed sensors
- Electronic control unit
- ABS warning lamp
- Hydraulic modulator assembly with electrically operated solenoid valves (or motor-driven valves in the case of Delphi ABS-VI

Q21. Explain suspension system and its components with help of diagram.

Ans: The suspension system must provide proper steering control and ride quality. Performing these functions is extremely important to maintain vehicle safety and customer satisfaction.

The suspension system and frame must also position the wheels and tires properly to provide normal tire life and proper steering control. If the suspension system does not position each wheel and tire properly, wheel alignment angles are incorrect and usually cause excessive tire tread wear.

When the suspension system positions the wheels and tires properly, the steering should remain in the straight-ahead position if the car is driven straight ahead on a reasonably straight, smooth road surface.

Coil springs are made of special round spring steel wrapped in a helix shape.

- **LEAF SPRINGS: Leaf springs** are constructed of one or more strips of long, narrow spring steel. These metal strips, called leaves, are assembled with plastic or synthetic rubber insulators between the leaves, allowing for freedom of movement during spring operation.
- The ends of the longest spring leaf are rolled or looped to form eyes. Rubber bushings are installed in the eyes of the spring and act as noise and vibration insulators. The leaves are held together by a **centre bolt,** also called a *centring pin.*

SHOCK ABSORBERS:

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the orifice, the greater the amount of dampening; therefore, larger shock absorbers can usually provide better dampening than smaller units.

Q22. Explain the standard process of wheel alignment process write its advantages.

Ans: Wheel alignment:

- Depending on your alignment equipment, enter the vehicle year, make, model and design into the system's computer to determine the OEM (Original equipment manufacturer) alignment specifications. That data will be compared to the vehicle's actual alignment status to determine necessary corrections. Some systems allow you to simply scan the VIN to recall specs.
- Next, drive the vehicle onto your alignment rack. Chock wheels and raise lift to a comfortable and safe work height.
- Next, check and adjust tire pressures to OEM (Original equipment manufacturer) specification; some systems have an automatic inflation feature. Remove hubcaps if present.
- Mount targets to wheel ends as required by the rack manufacturer. Most alignment racks require the alignment heads be attached to all four wheels, even if no adjustments are made to the rear wheels. With many FWD vehicles, adjustments can be made to the rear and should be performed before the front wheel alignment adjustments are made.
- Depending on your alignment equipment and system, there are unique procedures that will measure the current camber, caster and toe angles of the vehicle and report that information either on a print-out or on a diagnostic screen. Some systems even print a "symptom report" that you can show the customer, which explains the potential damage to tire health if alignment issues are not corrected.
- As previously mentioned, if the rear alignment needs to be adjusted, this has to be performed before working on front-end adjustments, analyses each job and presents the optimal action sequence with the minimum steps required.`
- With front-end alignments, correct caster and camber adjustments first. Certain FWD vehicles do not offer caster adjustments, but correcting the camber may bring the caster within specs. Refer to the alignment machine instructions (or a repair manual) for the specific vehicle to perform the correct caster and camber adjustments.
- With caster and camber adjusted, then adjust toe angles.
- Restart the car, remove the steering wheel lock, turn the steering wheel back and forth a couple times, then re-centre and replace the steering wheel lock. Recheck alignment specifications, and then readjust angles as necessary.
- Remove the alignment heads and lower the vehicle.
- Complete the alignment by taking a test drive to ensure any previously noted symptoms are gone or can be attributed to other vehicle issues (such as vibrations caused by worn suspension parts).

Q23. Make a suspension problem symptom chart.

Ans:

SUSPENSION PROBLEM SYMPTOM CHART

	CONCERN/PROBLEM					
Item or System to Check	**Noise**	**Instability/ Wander**	**Pull to One Side**	**Excessive Steering Play**	**Hard Steering**	**Shimmy**
Tires/Wheels	Road/tire noise	Low/uneven air pressure	Low/uneven air pressure, mismatched tire sizes	Low/uneven air pressure	Low/uneven air pressure	Wheel out of balance/uneven tire wear/ overworn tires
Shock Absorbers (Struts)	Loose/worn mounts/ bushings	Loose/worn mounts/ bushings, worn/ damaged struts/shock absorbers			Loose/worn mounts/ bushings on strut assemblies	Worn/damaged struts/shock absorbers
Strut Rods (If Equipped)	Loose/worn mounts/ bushings	Loose/worn mounts/ bushings	Loose/worn mounts/ bushings			Loose/worn mounts/ bushings
Springs	Broken/ unseated	Broken/ unseated	Broken/ unseated especially rear			
Control Arms	Steering knuckle contacting control arm stop, worn/damaged mounts/bushings	Worn/damaged mounts/ bushings	Worn/damaged mounts/ bushings		Worn/damaged mounts/ bushings	Worn/damaged mounts/ bushings
Steering System	Component wear/damage	Component wear/damage	Component wear/damage	Component wear/damage	Component wear/damage	Component wear/damage
Wheel Alignment		Front and rear, especially caster	Front, camber and caster	Front alignment	Front, especially caster	Front, especially caster
Wheel Bearings	Front-wheel bearings	Loose/worn (front and rear)	Loose/worn (front and rear)	Loose/worn (front and rear)		Loose/worn (front and rear)
Brake System			Stuck caliper/slide			
Other					Ball joint lubrication	Loose/worn friction ball joints

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

3rd Semester, End-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1303 **Time: 3 Hours**

Course Name: Automotive Body Works **Max. Marks: 100**

Instruction:

1. Answer all questions from **"Section-A"**, each question carries 01 mark.
2. Answer any **six** questions from **"Section-B"**, each question carries 05 marks.
3. Answer all questions from "**Section-C"**, each question carries 10 marks.

Section – A

Directions: Select any one correct answer from the given options: 20X01 = 20 Marks

1) (i) What is the first step in preparing a bare metal surface for corrosion protection?
   a) Clean with lacquer thinner
   b) Clean with soap and water
   c) Sand with coarse sand paper
   d) Clean with wax and grease removal

   (ii) The loads supported by an automobile frame are:
   a) Weight of the body, passengers and cargo loads
   b) Torque from engine and transmission
   c) Sudden impacts from collisions
   d) All of the mentioned

2) (i) An upraised part on the hood which directs the air flow into the engine compartment is called.....
   a) Spoiler
   b) Hood Scoop
   c) Hose pipe
   d) Wings

   (ii) Why 'Bumpers' are used in cars:
   a) To reduce the impact in case of low speed collisions
   b) To improve the aerodynamics of a car
   c) To increase the engine performance
   d) None of the mentioned

3) (i) ..... remover is essential for cleaning the surface prior to sanding or spraying undercoats or to coats.

a) Wax and grease
b) Putty
c) Body filler
d) Seam sealer

(ii)..... is a lightweight, extremely strong, and robust material.

a) Sheet metal
b) Diamond
c) Chassis
d) Fiberglass

4) (i)..... is an essential tool for the quick removal of paint, primer and old body filler from an area being repaired.

a) Sliding hammers
b) Sander
c) Shears
d) Nibblers

(ii) Premium Body Fillers are best used when:

a) Minor rust removal is required
b) Minors holes, tears and cracks repair
c) High quality and large area work is required
d) All of the above

5) (i)..... are generally a polyester resin based filler with creme hardener.

a) Grease and wax
b) Body fillers
c) Degreaser
d) Thinners

(ii) The first step of denting procedure is to:

a) Cut the surface
b) Apply body fillers
c) Apply sanding
d) Inspect the dented areas

6) (i) Where do we use plug weld?

a) Where spot welding is not reachable.
b) In a patch panels.
c) On the roof of vehicle
d) None of the above

(ii) A hole is drilled into the top piece and it is laid over the bottom one is preferred as.....

a) Butt weld
b) Spot weld
c) Plug weld
d) Chain weld

7) (i) .....removes old paint from steel parts and some other metals.

a) Paint stripper
b) Wax and grease
c) Nibbler
d) All of the above

(ii) .....help you to exert even pressure on the sandpaper, while minimizing waves in the panel being sanded.

a) Slid hammer
b) Sanding blocks
c) Panel flangers
d) None of the above

8) (i) The objective of car body repair is to put damaged vehicles back into a.....

a) Accidental condition
c) Damaged condition
b) Pre-accident condition
d) All of the above

(ii) The ionized state of gas is called .....

a) Fume
c) Helium gas
b) Toxic gas
d) Plasma

9) (i) .....are typically used for hammer-forming flat sheet metal into custom shapes.

a) Sliding hammers
c) Shears
b) Mallets
d) Nibblers

(ii) In which of the following welding processes heat and pressure are applied on the joint but no filler material of flux is added?

a) Arc welding
c) Resistance welding
b) Gas welding
d) MIG/MAG welding

10) (i) How long will the dent repair take?

a) It depends on the types of dent.
c) It depends on the number of dents.
b) It depends on the model of vehicle.
d) All of the above

(ii) A slide hammer is used for .....in sheet metal.

a) Restoring body line
c) Making holes
b) Pulling out dents
d) None of the above

Section – B

06X05 = 30 Marks

11) List five necessary precautions for safety in the workshop and describe each one briefly.

12) What are the advantages and disadvantages of chemical stripping?

13) Where do we use plug weld in a car body?

14) Some beating files and panel hammers have serrated faces. Explain the reason for this.

15) Write the techniques for using auto body filler.

16) What is dolly-on and dolly-off hammering.

17) Where do we use the different types of body hammers?

18) List the hand tools which you would expect to find in a body repairer's toolkit.

Section – C

05X10 = 50 Marks

19) Discuss the major and minor rust removal procedures.

20) Describe the door skins replacement procedures.

21) How to repair car windows?

22) Explain the different types of body fillers and their uses.

23) Describe the sandpaper and also the types of abrasive materials.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

3rd Semester, End-Sem. Examination

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Section – A

Directions: Select any one correct answer from the given options: 20X01 = 20 Marks

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a) Clean with lacquer thinner
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c) Sand with coarse sand paper
d) Clean with wax and grease removal

Ans: - d)

(ii) The loads supported by an automobile frame are

a) Weight of the body, passengers and cargo loads
b) Torque from engine and transmission
c) Sudden impacts from collisions
d) All of the mentioned

Ans: - d)

2) (i) An upraised part on the hood which directs the air flow into the engine compartment is called.....

a) Spoiler
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Ans: - b)

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a) To reduce the impact in case of low speed collisions
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Ans: - a)

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a) Wax and grease
b) Putty
c) Body filler
d) Seam sealer

Ans: - a)

(ii)..... is a lightweight, extremely strong, and robust material.

a) Sheet metal
b) Diamond
c) Chassis
d) Fiberglass

Ans: - d)

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a) Sliding hammers
b) Sander
c) Shears
d) Nibblers

Ans: - b)

(ii) Premium Body Fillers are best used when

a) Minor rust removal is required.
b) Minors holes, tears and cracks repair.
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Ans: - c)

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a) Butt weld
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9) (i) .....are typically used for hammer-forming flat sheet metal into custom shapes.

a) Sliding hammers
c) Shears
b) Mallets
d) Nibblers

Ans: - b)

(ii) In which of the following welding process heat and pressure is applied on the joint but no filler material of flux is added?

a) Arc welding
c) Resistance welding
b) Gas welding
d) MIG/MAG welding

Ans: - c)

10) (i) How long will the dent repair take?

a) It depends on the types of dent.
b) It depends on the model of vehicle.
c) It depends on the number of dents.
d) All of the above

Ans: - d)

(ii) A slide hammer is used for .....in sheet metal.

a) Restoring body line
c) Making holes
b) Pulling out dents
d) None of the above

Ans: b)

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Section – B

06X05 = 30 Marks

11) List five necessary precautions for safety in the workshop and describe each one briefly.

Ans: -

The Health and Safety at Work Act imposes on employers a statutory duty to ensure safe working conditions and an absence of risk in the use of equipment and the handling of materials, and to comply with Regulations regarding safe working practices in order to reduce to a minimum the hazards to health and safety associated with vehicle body repair work. To skilled and experienced operators this does not mean that any additional restrictions are imposed on their activities, but merely that they should carry out their tasks with constant regard for the health and safety of themselves and their fellow workers.

- Safety glasses and hearing protection - every person entering the workshop must collect these items from just inside the door. They must be worn at all times.
- Students that wear glasses should be aware these are not safety glasses, they are only impact resistant and may shatter, safety glasses must be worn.
- All loose clothing (e.g. shirts hanging out) must be tucked in.
- Safety boots or enclosed shoes must be worn in the workshop. Do not enter under any circumstances without this footwear, there are no exceptions to this rule.
- Long hair has to be tied up including fringes.
- Remove rings and loose jewelry before operating machinery they can be a hazard

12) What are the advantages and disadvantages of chemical stripping?

Ans: -

The chemical removal of paint and rust can be done at home or you can have it done commercially. The amount of stripping and the availability of a chemical stripper in your area will most likely be the key points to consider when considering this type of work. If you have several parts or a number of large pieces to be stripped, it will be more practical to strip them commercially. If you simply need to strip one or two pieces or just one salvage yard fender, for instance, you can do this yourself.

Chemical stripping doesn't work well on thick plastic body filler, so if you have a panel that you know conditions body filler, remove as much of it as you can before attempt to strip it chemically. This can be accomplished simply using a 36-grit disc on an orbital sander. If thick body filler is not removed before the panel is chemically stripped, the filler will begin to peel but not come off completely. The body filler will prevent the stripper from actually stripping the surface beneath the filler, making the entire process a waste of time.

13) Where do we use plug weld in a car body?

Ans: -

14) Some beating files and panel hammers have serrated faces. Explain the reason for this.

Ans: -

Shrinking hammers

Shrinking hammers are similar in design to a normal planishing hammer but have faces which, instead of being smooth, are serrated, giving a cross-milled effect like a file. The purpose of these serrations is to achieve a shrinking effect when the hammer is used in conjunction with a dolly block. This is caused by the fact that the contact area between hammer and metal is greatly reduced by the serrations on the face. This tool is used largely when beating the surface on overstretched panel areas which have to be hot-shrunk in order to return them to their normal contours. Hammers are available for light or heavy shrinking, according to the depth of the serrations.

15) Write the techniques for using auto body filler.

Ans: - Tips and Tricks for Using Auto Body Fillers

- Always combine the exact amounts of filler and creme hardener as instructed on the packaging to achieve the best results. Too much hardener to filler ratio and the filler will be brittle and crack, and too little will delay drying and hardening almost indefinitely.
- Use a non-cardboard mixing board when combining the filler and hardener. Because of its absorbent properties, cardboard can affect the chemistry of the filler. Auto Body Toolmart sells disposable mixing boards that are designed specifically for mixing body filler. Completing any filler projects on a warm dry day, as opposed to a humid day, will help the filler cure faster.
- NEVER use filler over an area that has pre-existing rust. When rusty spots are not removed first, there is higher potential for staining and discoloration, and the filler will not adhere completely. For best results, remove the rust and then proceed. Filler adheres best to non-smooth surfaces, so sanding the area that needs improvement
- to roughen the surface is essential to achieving the best results possible.

  Because of its chemical make-up, make sure you're in a well-ventilated area when using filler. Wearing a dust mask is recommended.

- Occasionally, your filler will feel as if it's hardening too quickly during the application process. You avoid this problem by having a filler thinner on hand. Sometimes called "Honey", Ever-coat's filler thinner is fiberglass-reinforced — much like a medium grade filler — and helps keep the filler spreading evenly and smoothly.

16) What is dolly-on and dolly-off hammering.

Ans: -

Dolly-On/Dolly-Off Hammering

In most situations, using a hammer by itself (without a dolly behind the metal) will merely cause a larger than desired area of metal to move inward, which is not the desired effect when repairing a dent in sheet metal. By using a dolly behind the panel and a hammer in front of the panel, the sheet metal can be worked in a more predictable manner, as the dolly focuses the force of the hammer.

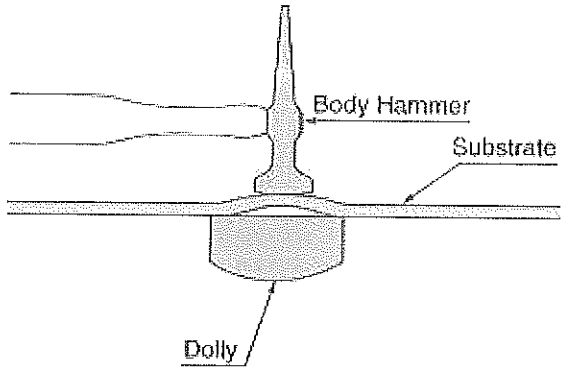

Fig. Dolly-On Hammering

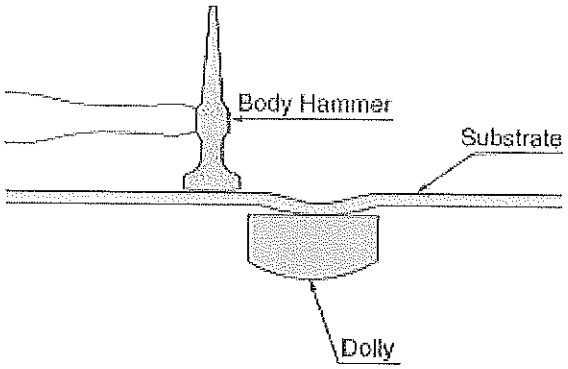

Fig. Dolly-Off Hammering

Dollies are used in two basic ways: dolly on or dolly off. When hammering on the dolly, the dolly is located behind the sheet metal and directly beneath the hammer below. This method knocks down high spots or smooth ripples within the relatively small size of the dolly. Hammering off the dolly is done by hitting the surface of the panel adjacent to the dolly, rather than directly on it. This cause the dolly to push outwards while the hammer pushes inward, a method typically used on larger areas of repair.

17) Where do we use the different types of body hammers?

Ans: -

Leading the least of basic tools are hammers. They may seem truly basic, but there are many types of hammer used for bodywork with specific characteristics and applications. Some situations call for a big hammer, while others require a smaller hammer and a lighter touch. Learning all the types and knowledge when to use them can be challenging for amateur body men.

Most body hammers have a head and a pick, making each hammer a dual-purpose tool. The head is usually large (between one and two inches in diameter) and relatively flat with a smooth surface, while the pick end is much smaller and pointed. The larger head is used for flattering metal against a dolly. Typically, the pick end is used for hammering out very small, localized dents, with or without a dolly. Picks can come to a very narrow point or can be blunter.

In a collision, sheet metal bend and stretches. A shrinking hammer with a serrate head can be used to reduce some of this stretching. Different hammer manufactures combine different heads with different picks. When you buy bodywork hammers, look for a set that includes a flat face, a shrinking face, a blunt pick, and a sharp pointed pick. This range should be enough for you to handle most of your hammering needs.

Body hammer come in a variety of shapes, sizes, and uses. Those with a serrate head are used for shrinking metal. Round heads are used for general panel flattening. While square heads are used for restoring bodylines.

18) List the hand tools which you would expect to find in a body repairer's toolkit.

Ans: -

The tools which we would find in body repairer's toolkit are:

- Hammer
- Dollies
- Spanner
- Spoons
- Mallet
- Files
- Screwdriver
- Pliers
- Cutter
- Nibbler

- Shears
- Clamps

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Section – C

05X10 = 50 Marks

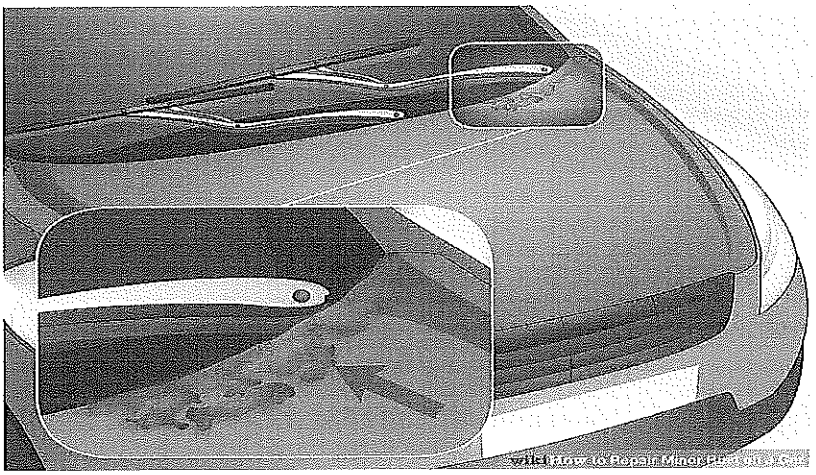
19) Discuss the major and minor rust removal procedures.

Ans: -

How to repair rusted Panel?

Although we usually envision collision repair whenever we think of automotive bodywork, rust repair is often just as common. Rust may be rare in some regions, but it is all too common in the rest of the world.

Anywhere that humidity meets unprotected sheet metal, rust is hard at work eating its way through your automobile's sheet metal. Sadly, you may not even know that the rust is present, as it tends to do its damage to area of your vehicle that you don't normally see during everyday operation. When you dealing with rust, you should determine whether it is just surface rust or a rust-through.



MINOR SURFACE RUST REMOVAL

1) Mask off the affected area with paint-appropriate tape. You want a few inches of protection surrounding the rust spot.
2) Follow the directions on the rust remover, usually spraying or brushing it onto the rust and letting it sit for a few minutes. Then, wipe off any residue with a clean rag. Remember that rust remover is nasty stuff, so be sure to wear the appropriate protective gear when handling it.
3) The rust should be gone, but remove any leftover rust with sandpaper.
4) Clean with a grease and wax remover soap, then air dry.
5) Spray primer in a light-to-medium coat, and allow an hour to dry. Spray three coats.
6) Spray the color base coat, going thinner than the primer. You may have to do five or six coats for complete coverage. Give it plenty of time between coats to prevent drips.

7) Spray the clear coat. Wait two or 3 days before washing, and wait a minimum of two months (some body shops suggest waiting for six) before waxing.

MAJOR RUST REMOVAL

1) Mask off the affected area. If sanding through paint and primer, cover the rest of the vehicle to protect it from the super-fine dust.
2) Use a grinder with a sanding wheel to remove as much surface rust as you can. When removing the rust, remember not to bear down any heavier than you absolutely need to.
3) Clean the work area with grease remover.
4) Use a fiberglass-reinforced body filler for holes and depressions left over after digging out the rust. Allow it to cure completely. This could take quite some time, and shouldn't be done at all if it's any cooler than about 65 degrees outside.
5) Sand the filler with progressively finer grit sandpaper, and then clean with wax and grease remover.
6) Tape off the area to be painted.
7) Use the self-etching primer and wait the required drying time.
8) Spray several light coats of paint.
9) Finish with a coat or two of clear. Like above, hold off on washing and waxing.

20) Describe the door skins replacement procedures.

Ans: -

Door and Door Skins

Since automobile doors consist of two basic components- a mostly hollow inner panel and an outer skin- some door repairs can be made by simply re-skinning the door. Before you attempt these repairs, consider the following:

- First and foremost, this repair will be beneficial only if the original inner panel is still undamaged (or at least straight). If the collision impact cause damage to the inner panel, which cannot be easy repaired, you should consider finding a replacement door. Likewise, if the outer skin is damaged due to rust, you should verify that the inner panel is still structurally round. It may be usable, but it might be actually being in worse shape than the outer skin.
- If the inner panel is still usable, you should determine if an outer skin is available for your vehicle's make and model. If it is, you are in luck, as a door skin will be considerably less expensive than replacement door. Of course, if this is your daily driver, you may choose to replace the entire door while you're at it.

If you decide to replace the door skin, the following steps should be taken. First remove the door from the vehicle, the internal components from the inside of the door, and then set the door atop a pair of sawhorses or other suitable work stand.

- The original door is secured by the edges wrapping around the flange of the inner door panel. To remove it, use a grinder along with the edge of door to separate the main part of the door skin from the part that flaps over. When this is completed, you should be able to remove the skin. If it can't be removed, there may be spot welds around the flange that must be drilled out. Once you have done this, you should have able to remove the part that flaps over from the inside of the inner door panel.
- To install a new skin, first double-check to make sure that no fragments of the previous door skin, any spot welds, or panel adhesive remain on the surface to which the new skin will be applied. Then positioned the new skin so that the excess "skin" is centsered front to back and to top to bottom. Using a permanent marker or a scribe, make some positioning reference marks on the inside of the door skin so that it can be placed in this position again. Then remove the door skin, apply a bead of panel adhesive to get slightly tacky, then press the door skin into position. Use clamp to secure the door skin in place. You can use C-clamp, clamping pliers (vise-grips), or other types of clamps. However, be sure to take appropriate precautions to avoid damaging the new door skin or inner panel. After the two panels are clamped together, wipe away any excess panel adhesive that oozes from inside the door.
- After the panel adhesive has set (refer to the product label for the time this will take), the edges of the door skin still need to be folded over the edge of the inner door panel. There are several ways to do this and even more tool available to do it. Some body men use door-skinning pliers to fold the edge over, while others are duckbill locking pliers. After the edge is folded over somewhat, it must be pressed down flat against the inside of the door panel. Some use a light door-skinning hammer, while others use mallet or a smooth-faced body hammer and a dolly. This is one of those cases where there are several ways to perform the same task, depending on what tools you have available and how they are use them. The main this to remember is that the edge of the door skin must be flat against the inner panel, but you don't want to do any damage to the outer side.

21) How to repair a car windows?

Ans: -

Any time a door is damaged, the glass and interior door panel should be remove to make necessary repairs.

1) To remove the inner door panel, look for nuts and bolts hidden behind trim.
2) The door panel is usually one big piece with components such as armrests screwed on.
3) **Remove all the windows mechanisms.**

QUICK TIPS

1) Interior designers work hard to hide the screws and clips holding the door together, so peek under and behind places you wouldn't normally look.
2) Tools you'll need include screwdrivers and a socket set, but a trim-removal tool will help a lot. It makes popping off clips and retainers much easier than with a screwdriver.
3) Since we're dealing with glass, wear a heavy long-sleeve shirt, full pants, covered shoes, gloves, and safety glasses. Tempered glass is safer than plate, but still treat it with respect.
4) When handling glass, be very methodical and don't force anything. If getting something to fit is too hard, you're not doing it right. Step back and examine the situation again.
5) Take pictures in sequence to remember how everything goes together. Keep removed parts in a cup or on a tray so they don't get lost.

22) Explain the different types of body fillers and their uses.

Ans: -

Body Filler

Body fillers are generally a polyester resin based filler with a creme hardener that can be used to even out dents and cover blemishes on vehicles. Body fillers all fall into three general categories: standard, mid-range, and premium, and are generally available in a two-part material consisting of a polyester resin and a cream hardener. The filler grade you select will depend on the scope of the project and the size of the damaged spots needing to be repaired. Standard grade is a great option for minimal hail damage and small rust spots, while premium grade should be used for actual tears or a large surface area.

- **Standard Body Fillers**
  Standard grade body fillers are a lightweight substance or putty that spreads easily and cures in about 20-25 minutes. While not appropriate for use on galvanized steel, standard grade fillers are perfect for repairing minor dents and scratches. They sand easily to blend in with the rest of the vehicle once primed and painted. Standard grade also offers the least stain-resistance.

- **Medium Body Fillers**
  Medium grade body fillers adhere well to a wide variety of body surfaces since they are fiber-glass filled. Due to being a slightly higher quality than the standard grade, medium grade body fillers hold better stain-resistance. They are perfect for repairing small holes, tears and cracks in metal and fiberglass.

- **Premium Body Fillers**
  Made from top-quality resin that has the highest stain-resistance of the three, premium grade body fillers are the easiest to sand down and offer the best adhesion of filler materials to underlying surfaces. This type of body filler is best used when high-quality work is required or there are large areas or dents needing to be repaired.

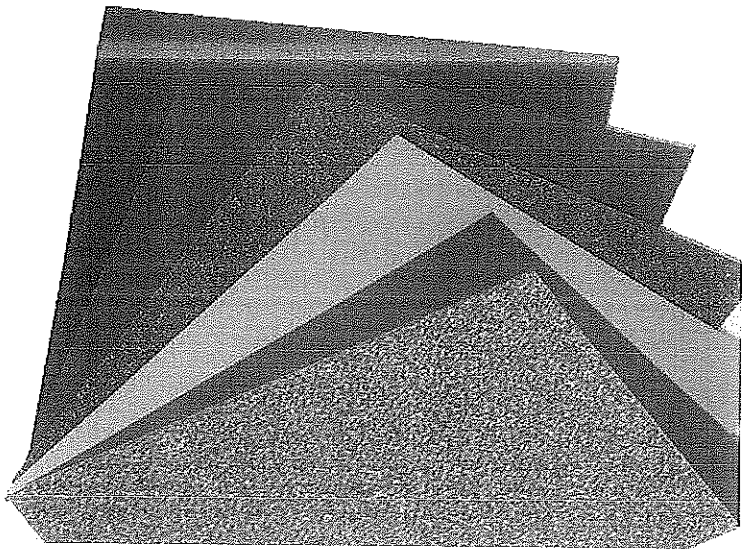
23) Describe the sandpaper and also the types of abrasive materials.

Ans: -

Sandpaper

Sandpaper and glasspaper are names used for a type of coated abrasive that consists of sheets of paper or cloth with abrasive material glued to one face. Despite the use of the names neither sand nor glass are now used in the manufacture of these products as they have been replaced by other abrasives such as aluminium oxide or silicon carbide. Sandpaper is produced in a range of grit sizes and is used to remove material from surfaces, either to make them smoother (for example, in painting and wood finishing), to remove a layer of material (such as old paint), or sometimes to make the surface rougher (for example, as a preparation for gluing). It is common to use the name of the abrasive when describing the paper, e.g. "aluminium oxide paper", or "silicon carbide paper".

The grit size of sandpaper is usually stated as a number that is inversely related to the particle size. A small number such as 20 or 40 indicates a coarse grit, while a large number such as 1500 indicates a fine grit.



Types of abrasive materials include:

- Glass: no longer commonly used
- Flint: no longer commonly used
- Garnet: commonly use in woodworking
- Emery: commonly used to abrade or polish metals
- Aluminium oxide: The most common in modern use, with the widest variety of grits, lowest unit cost; can be used on metal (i.e. body shops) or wood
- Silicon carbide: available in very coarse grits all the way through to micro-grits, common in wet applications
- Alumina-zirconia: (an aluminium oxide–zirconium oxide alloy), used for machine grinding applications
- Chromium(III) oxide: used in extremely fine micron grit (micrometer level) papers
- Diamond: used for finishing and polishing hard metals, ceramics and glass
- ceramic aluminum oxide: used in high pressure applications, used in both coated abrasives, as well as in bonded abrasives.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

3rd Semester End Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1304 **Time: 3 Hour**

Course Name: Automotive Refinish Painting **Max. Marks: 100**

Instruction: Attempt all questions from section-A and each question carries 1 mark.

2. Attempt any six questions from section-B and each question carries 5 marks.

3. Attempt all questions from section-C and each question carries 10 marks.

Section-A

Select the one correct option from the given options in the following questions :- 10x2=20 Marks

Q-1 (i) Polyester putty is a ...

a. 2K product
c. 1K product
b. 3K product
d. None of the above

(ii) Check putty is a ....

a. 2K product
c. 1K product
b. 3K product
d. None of the above

Q-2 (i). Which of the sander is having the highest rpm?

a. Single action
c. Double action
b. Hand block
d. None of the above

(ii). What is the purpose of feather edging?

a. It creates good adhesion
c. Done for flexibility
b. It provides gloss
d. None of the above

Q-3 (i). What is the function of fluid regulator in spray gun?

a. Control pattern size
c. Control air pressure
b. Control discharge of fluid from nozzle
d. None of these

(ii). What is the transfer efficiency of HVLP spray guns?

a. Less than 30%
c. More than 65%
b. Less than 40%
d. None of these

Q-4(i). What is the another name of double action sander?

a. Orbital sander
c. Flat bed sander
b. Single action sander
d. None of these

(ii). Infrared dryer works on the principle of...

a. Conduction
c. Radiation
b. Convection
d. None of these

Registration No.: .....

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Q-5(i). What is the recommended hours for changing floor filters?

a. 200-250
c. 400-450
b. 300-350
d. None of these

(ii). The best light for color matching is....

a. Sun light
c. Sodium lightr
b. Fluorescent light
d. None of these

Q-6 (i). What is the baking temperature for 2k refinish paint?

a. 45 degree Celsius
c. 90 degree Celsius
b. 60 degree Celsius
d. None of these

(ii). The paint defect occurred due to wrong sanding is...

a. Sanding scratches
c. Water spotting
b. Orange peel
d. None of these

Q-7 (i). How to create orange color?

a. Red-Blue
c. Red-Yellow
b. Green-Red
d. None of these

(ii). How many angles are required to inspect a metallic color?

a. 1
c. 2
b. 3
d. 5

Q-8 (i) Which paint is more environment friendly?

a. NC paint
c. Waterborne paints
b. Synthetic paints
d. None of these

(ii). How can we speed up the drying process of waterborne paints?

a. By increasing temperature of booth
c. Both a & b
b. By using external blowers
d. None of these

Q-9 (i) Which one of these are secondary colours?

a. Red, Blue and Yellow
c. Violet, Green and Blue
b. Green, Orange and Violet
d. None of these

(ii) Which one of the paint is less durable?

a. NC paint
c. Waterborne paint
b. 2k paints
d. None of these

Q-10 (i). What is the purpose of dry guide coat ?

a. To facilitate sanding
c. To remove dust
b. Both a & c
d. None of these

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(ii). DFT (Dry film thickness) is an instrument which is used to measure...

a. Thickness of coating
b. Colour quantity
c. Gloss of paint
d. None of these

Section-B

6x5=30 Marks

Q-11 What are the factors involved in shade variation?

Q-12. Explain the three angles used in inspection of colour panel.

Q-13. What is metamerism?

Q-14 What are the differences between body filler and putty?

Q-15 Why do we use flexi panels in painting?

Q-16 Explain Hue, Value and Chroma?

Q-17 Write about the LAB principle?

Q-18 How do we develop a color for refinish painting?

Section-C

5x10=50 Marks

Q-19. Write standard operating procedures, safety requirements and material requirements for putty application?

Q-20. Explain the working of paint booth along with its components.

Q-21.Explain any five paint defects with its causes and prevention.

Q-22. What is metallic color? Write down the steps for application of metallic painting.

Q-23..Explain DFT meter, Glossometer, luxometer and viscometer.

BSDU

Registration No: .....

SCHOOL OF AUTOMOTIVE SKILLS

3rd sem END-SEMESTER EXAMINATION – 2018

SUMMER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1304 **Time: 3 Hour**

Course Name: AUTOMOTIVE REFINISH PAINTING

Max. Marks: 100

Instructions: (1) Attempt all questions from section A and section C.

(2) Attempt any six questions from section B

Section-A

Select the one correct option from the given options in the following questions :- 10x2=20 Marks

Q-1 (i) Polyester putty is a ……**2K**…… (2K / 1K) product.

(ii) Check putty is a …**1K**….. (2K / 1K) product

Q-2 (i). Which of the sander is having the highest rpm?

a. Single action
c. Double action
b. Hand block
d. None of the above

Ans c

(ii). What is the purpose of feather edging?

a. It creates good adhesion
c. Done for flexibility
b. It provides gloss
d. None of the above

Ans a

Q-3 (i). What is the function of fluid regulator in spray gun?

a. Control pattern size
c. Control air pressure
b. Control discharge of fluid from nozzle
d. None of these

Ans b

(ii). What is the transfer efficiency of HVLP spray guns?

a. Less than 30%
c. More than 65%
b. Less than 40%
d. None of these

Ans c

Q-4(i). What is the another name of double action sander?

a. Orbital sander
b. Single action sander
c. Flat bed sander
d. None of these

Ans a

(ii). Infrared dryer works on the principle of...

a. Conduction
b. Convection
c. Radiation
d. None of these

Ans c

Q-5(i). What is the recommended hours for changing floor filters?

a. 200-250
b. 300-350
c. 400-450
d. None of these

Ans a

(ii). The best light for color matching is....

a. Sun light
b. Fluorescent light
c. Sodium lightr
d. None of these

Ans a

Q-6 (i). What is the baking temperature for 2k refinish paint?

a. 45 degree Celsius
b. 60 degree Celsius
c. 90 degree Celsius
d. None of these

Ans b

(ii). The paint defect occurred due to wrong sanding is...

a. Sanding scratches
b. Orange peel
c. Water spotting
d. None of these

Ans a

Q-7 (i). How to create orange color?

a. Red-Blue
b. Green-Red
c. Red-Yellow
d. None of these

Ans c

(ii). How many angles are required to inspect a metallic color?

a. 1
b. 3
c. 2
d. 5

Ans b

Q-8 (i) Which paint is more environment friendly?

a. NC paint
b. Synthetic paints
c. Waterborne paints
d. None of these

Ans a

(ii). How we can speed up the drying process of waterborne paints?

a. By increasing temperature of booth
b. By using external blowers
c. Both a & b
d. None of these

Ans b

Q-9 (i) Which one of these are secondary colours?

a. Red, Blue and Yellow
b. lime, Orange and Violet
c. Violet, Green and Blue
d. None of these

Ans b

(ii) Which one of the paint is less durable?

a. NC paint
b. 2k paints
c. Waterborne paint
d. None of these

Ans a

Q-10 (i). What is the purpose of dry guide coat ?

a. To facilitate sanding
b. Both a & c
c. To remove dust
d. None of these

Ans a

(ii). DFT (Dry film thickness) is an instrument which is used to measure...

a. Thickness of coating
b. Colour quantity
c. Gloss of paint
d. None of these

Ans a

Section-B

6x5=30 Marks

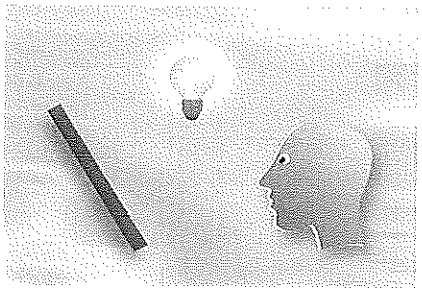
Q-11 What are the factors involved in shade variation?

Ans Factors involved in colour variation are: -

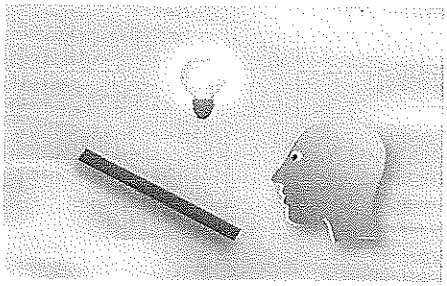
1. Environment
2. product
3. Application
4. equipment

Q-12. Explain the three angles used in inspection of colour panel.

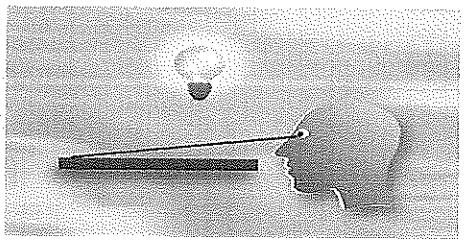
Ans Head on :- Light source is above obsever



Near specular :- No reflection of Light source

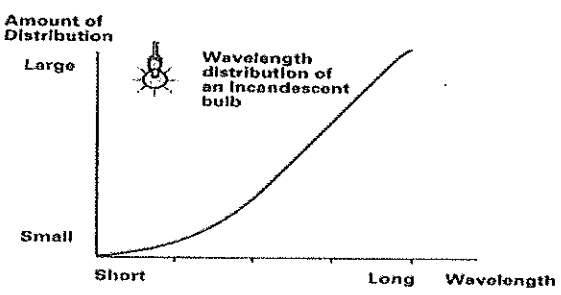


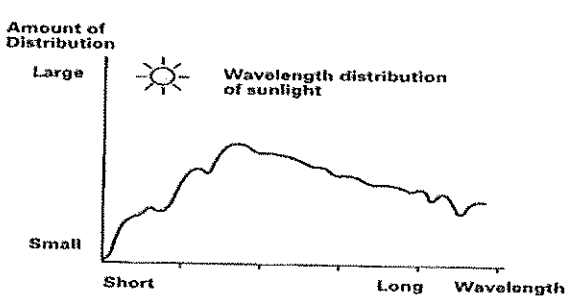
Side on :- Watch over the surface



Q-13. What is metamerism?

Ans Metamerism is the change of colour influenced by another light source (esp. during darkness).Metamerism can be avoided by adjusting colors with their "proper" tinting's.





Q-14 What are the differences between body filler and putty?

Ans :- Body filler is used when the size of dent is large because the density of body filler is lesser than the putty due to bigger grain size.
Putty is used to finish the layer of body filler and to fill the scratches and small dents as the density of putty is more than body filer due to smaller grain size

Q-15 Why we use flexi panels in painting?

Q-16 Explain Hue , Value and Chroma?

Ans **Hue:** - Hue is the most important property of colour as it simply described by simply names of colour. Colour names like red, blue, yellow etc. all are hue names.

Value: - The attribute with which we can classify color on the basis of their lightness and darkness is called value.

Chroma: - The attribute with which we can classify color on the basis of their Brightness and dullness is called chroma.

Q-17 Write about the LAB principle?

Q-18 How we develop a colour for refinish painting?

Ans

Section-C

5x10=50 Marks

Q-19. Write standard operating procedures, safety requirements and material requirements for putty application?

Q-20. Explain the working of paint booth along with its components.

- Paint booths are walled structures used to safely contain painting and other finishing processes.
- Paint booths are present in a variety of industries including automotive, aviation, manufacturing, millworks, and many more.

In general, there are two types of paint booths:

- Non-ducted (open face)

Directly ducted (enclosed

REASON TO USE PAINT BOOTH

- Confine the application of a hazardous material to a restricted controlled environment
- Prevent hazardous overspray and volatiles from escaping confinement and causing fire or explosion to nearby operations.
- Control air fuel/mixture so that a combustible combination cannot occur.
- Provide a clean environment in which to paint

Q-21.What is paint defect?Explain any four paint defects with its causes and prevention.

Paint defect- Any dissimilarity between the original paint and refinish paint work is considered to be a paint defect.

There are lot of paint defects like:-

1.runs

2.water spotting

3.clouding

4.bird droppings

5.solvent popping

Brief description of defects:-

1.Runs

Causes:-

- Incorrect spraying viscosity, spraying technique.
- Defective spray gun set up .
- Incorrect spraying pressure .
- Temperature of paint, substrate or spray booth too low.
  Incorrect choice of hardeners and thinners

Prevention:-

- Ensure that the spray gun is in good working order.
- Warm object and material up to room temperature of 20 °C/68 °F.
- Use correct combination of hardeners and thinners .
-

Remedies:-

- Sand and polish.
- Sand and repaint

2. **water spotting**

Causes:-

- Topcoat not sufficiently cured.
- Excessive film thickness, drying time too short.
- Use of unsuitable thinner.
- Incorrect hardener mixing ratio.
- Wrong hardener used

Prevention:-

- Follow application recommendations on technical data sheets

Remedies:-

- After through-drying, remove marks by polishing
- Thoroughly dry topcoat, sand and repaint

3.**Clouding**

Causes:-

- Incorrect spraying viscosity, spraying technique, flash-off times, spray booth temperature.
- Defective spray gun set up, incorrect spraying pressure.

- Use of unsuitable thinner.

Prevention:-

- Adjust material correctly.
- Keep spray gun parallel to object.
- Choose suitable spray gun set up.
- Use manufacturer's thinners.

Remedies:-

- When using conventional base coat: use droplet method before spraying clear.
- After clear has through-dried, sand surface and repaint.

4. **sanding scratches**

Causes:-

- Sanding paper too coarse.
- Filler sanded when soft.
- Insufficient sanded polyester stopper.
- Insufficient isolation of the stopper before topcoat application

Prevention:-

- Use recommended grade sanding paper.
- Isolate repaired areas with 2K filler.
- Dry filler thoroughly.

Remedies:-

- Thoroughly dry and sand.

Isolate or remove substrate, repaint

Q-22. What is metallic color? Write down the steps for application of metallic painting.

Q-23..Explain DFT meter, Glossometer, luxometer and viscometer.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills
3rd Semester, End Sem. Examination
B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT 1305 **Time: 3 Hour**
Course Name: Automotive electrical and air conditioning **Max. Marks: 100**

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer any six questions from section – B, each question carries five marks.
3. Answer all questions from section – C, each question carries ten marks.

Section – A

20x01 = 20 Marks

1. How much current is required for the ignition in vehicle?
   A. Approx. 2 amperes.
   B. Approx. 3 amperes.
   C. Approx. 2.5 amperes.
   D. none of above.
2. Speed of the alternator in comparison to engine speed is?
   A. 2-3 times.
   B. 3-4 times.
   C. Both A & B
   D. Same as engine speed
3. Induction current is taken from which part
   A. stator.
   B. Rotor.
   C. Armature.
   D. All of the above
4. Alternator produces which voltage?
   A. Constant DC.
   B. A.C. voltage.
   C. Pulsating DC voltage.
   D. Both B & C.
5. Partial current is taken from each phase and rectified by
   A. stator.
   B. P-N diodes.
   C. Exciter windings.
   D. None of the above.
6. The refrigerant supplied to a compressor must be:
   A. superheated vapour
   B. dry saturated liquid
   C. a mixture of liquid and vapour
   D. none of the above
7. Condenser in refrigeration system is used to:
   A. decrease pressure
   B. increase pressure
   C. heat transfer
   D. none of these

8. In vapour Compression refrigeration system, heat is rejected by the refrigerant in:
   A. compressor
   B. condenser
   C. throttle valve
   D. evaporator
9. The pressure in a capillary tube is decreased due to:
   A. frictional resistance offered by the tube wall
   B. acceleration of refrigerant in the tube
   C. heat transfer from the tube
   D. both a and b
10. In which part, the cooling is achieved in the refrigerator:
   A. compressor
   B. condenser
   C. evaporator
   D. capillary
11. What is the condition when a thermocouple junction is formed between two metals?
   A. Dissimilar Metal
   B. Similar Metal
   C. Al-Cu
   D. None of the above
12. What is the voltage required for working of acceleration pedal?
   A. 2 V
   B. 4 V
   C. 5V
   D. 4.5V
13. Piezoelectric accelerometer is generally used as:
   A. Pressure sensor
   B. NOX sensor
   C. Thermistor
   D. All of the above
14. Which sensor monitors the top dead sensor position in the piston-cylinder assembly?
   A. CPS
   B. Air fuel- ratio meter
   C. MAF sensor
   D. None of the Above
15. Which sensor measure the speed of the vehicle?
   A. VSS
   B. CPS
   C. MAP
   D. None of the above
16. What is the full form of ODP?
   A. On Direct Potential
   B. Ozone Double Potential
   C. Ozone Depletion Power
   D. Ozone Depletion Potential

17. What is the full form of GWP?
    A. Global Water Potential
    B. Global Warming Product
    C. Global Warming Potential
    D. None of the Above
18. In which component of refrigeration cycle pressure is dropped by conversion of pressure energy into friction?
    A. Compressor
    B. Condenser
    C. Evaporator
    D. Expansion valve
19. Wet compression is good for optimal working of a compressor:
    A. True
    B. False
20. A good refrigerant has low values of ODP and GWP
    A. True
    B. False

Section – B

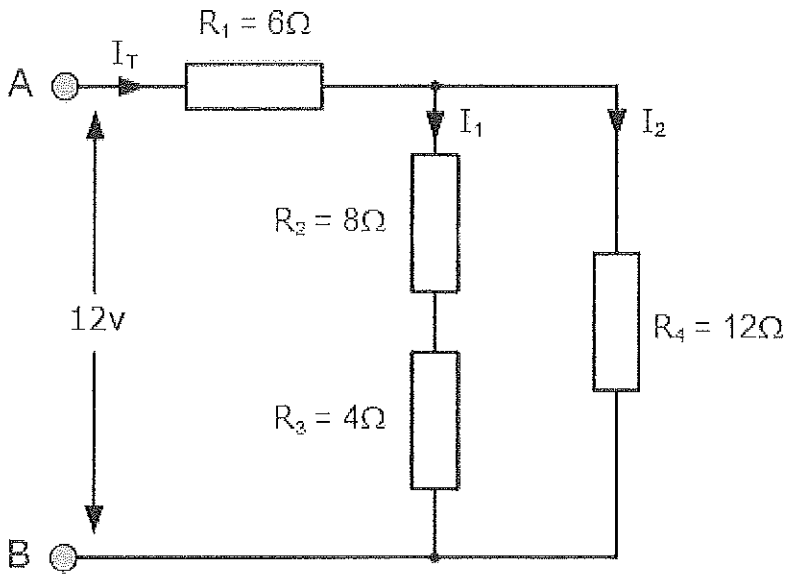
05X06 = 30 Marks

21. What are the components of three phase generator? Explain.
22. Why we use diodes in the alternator? Explain the tasks of a starter battery.
23. Describe one-way rectification, bridge rectification and full wave rectification with diagram.
24. What are the components of a vapour compression refrigeration cycle?
25. Write briefly about the reciprocating compressor and its working. Draw a diagram.
26. Write the working of a shell and tube type condenser. Draw a diagram
27. Write briefly about the desired properties of a refrigerant.
28. What are the differences between a sensor and a actuator?

Section – C

10X05 = 50 Marks

29. In the following circuit calculate the total current taken from the 12v supply.



30. Draw and explain the circuit diagram of charging circuit.

31. Solve the problems given below:
    (1) A bulb has an output of 60 W at a voltage of 12 V. Find the value current and resistance. .
    (2) A wiper motor has a resistor of 4Ω. The on-board voltage in a car is 4.5 Volts. How current is flowing through the windshield wiper moto?
32. Differentiate between heat engine, heat pump and refrigeration with help of a neat sketch.
33. Explain with neat sketch
    (a) Rotary compressor.
    (b) Steps involved in AC Servicing

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills
3rd Semester, End Sem. Examination
B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT 1305 **Time: 3 Hour**
Course Name: Automotive electrical and air conditioning **Max. Marks: 100**
Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer all questions from section – B, each question carries two marks.
3. Answer all questions from section – C, each question carries three marks.

Section – A

20x01 = 20 Marks

1. How much current is required for the ignition in vehicle?
   - **A. Approx. 2 amperes.**
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   - **A. 2-3 times.**
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   - C. Both A & B
   - D. Same as engine speed
3. Induction current is taken from which part
   - A. **stator.**
   - B. Rotor.
   - C. Armature.
   - D. All of the above
4. Alternator produces which voltage?
   - A. Constant DC.
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   - A. stator.
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   - C. Exciter windings.
   - **D. None of the above.**
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   - C. a mixture of liquid and vapour
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   - A. decrease pressure
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   - **C. heat transfer**
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8. In vapour Compression refrigeration system, heat is rejected by the refrigerant in:
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   B. **condenser**
   C. throttle valve
   D. evaporator
9. The pressure in a capillary tube is decreased due to:
   A. **frictional resistance offered by the tube wall**
   B. acceleration of refrigerant in the tube
   C. heat transfer from the tube
   D. both a and b
10. In which part, the cooling is achieved in the refrigerator:
   A. compressor
   B. condenser
   C. **evaporator**
   D. capillary

Section – B

05X06 = 30 Marks

11. What are the components of three phase generator? Explain.

1. fan prop
2. drive end shield
3. stator, stand
4. field winding
5. rotor
6. slip ring bearing shield
7. diode plate
8. slip rings
9. control

12. Why we use diodes in the alternator? Explain the tasks of a starter battery.

diodes are used for rectification of positive or negative waves of the electrical signal. It works as a filter for the electrical signals

. These are the following tasks of a battery: -

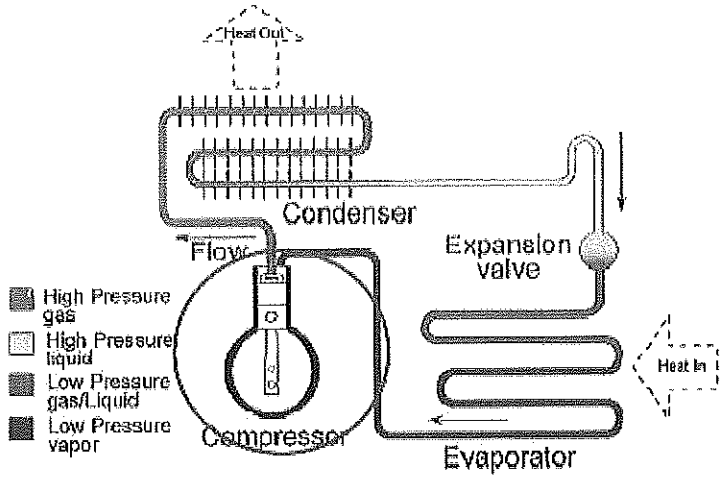
- Supply the starter with electrical energy during the starting process.
- When the motor is at a standstill, supply the switched on
- Electrical consumers with power.
- Store part of the energy supplied by the alternator.

13. Describe one-way rectification, bridge rectification and full wave rectification with diagram.

- a) one-way rectification
- This circuit is used for rectifying single-phase alternating current. The induced current can only flow in one direction because of the diode. This means that only half the wave of alternating current is used. The second half-wave is suppressed (locked).
-
- b) Bridge rectification (Graetz circuit)
- In this circuit there are two diodes for each pole conductor. The negative Half waves can thus be routed to the positive output of the circuit. This means that both half-waves of the alternating current. This circuit is used in most alternators are used.
- Mandatory
-
- c) Full-wave rectification (bridge rectification) For bridge rectification, the star point is normally not led out. The return is via the negative diodes and the other phases

14. What are the components of a vapour compression refrigeration cycle?
Compressor function: to compress the refrigerant
Condenser function: To remove heat from condenser
Expansion valve function: To decrease the pressure
Evaporator function: To extract heat from room

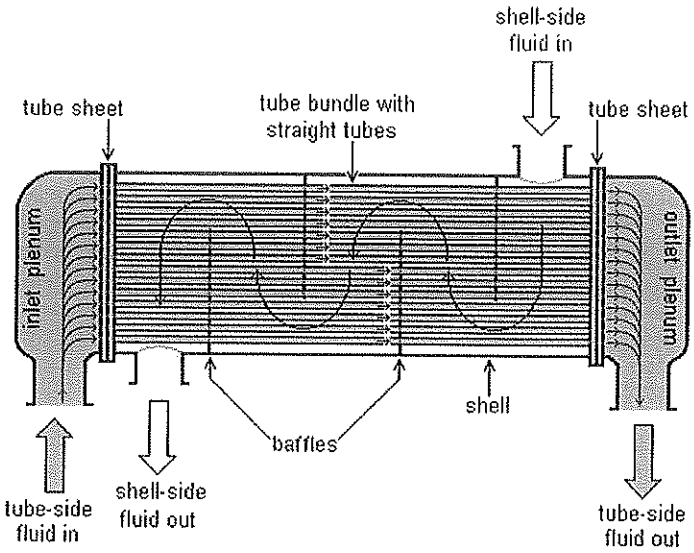
Compressors



15. Write briefly about the reciprocating compressor and its working. Draw a diagram.
16. Write the working of a shell and tube type condenser. Draw a diagram

- It is essential for the designer to have a good working knowledge of the mechanical features of STHEs and how they influence thermal design.
- The principal components of an STHE are:
- shell; shell cover;
- tubes; tubesheet;
- baffles; and nozzles.
- Other components include tie-rods and spacers, pass partition plates, impingement plate, longitudinal baffle, sealing strips, supports, and foundation.

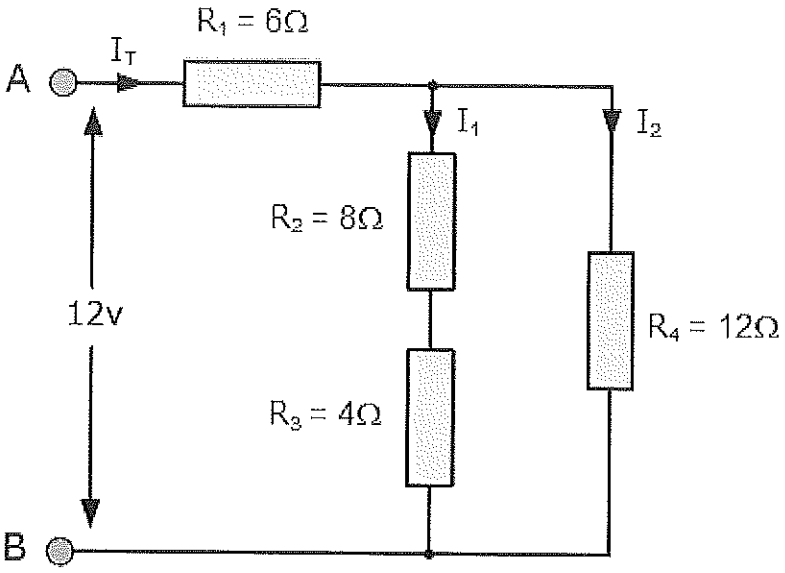
Two fluids can exchange heat, one fluid flows over the outside of the tubes while the second fluid flows through the tubes. The fluids can be single or two phase and can flow in a parallel or a cross/counter flow arrangement.



Section – C

10X05 = 50 Marks

17. In the following circuit calculate the total current taken from the 12v supply.



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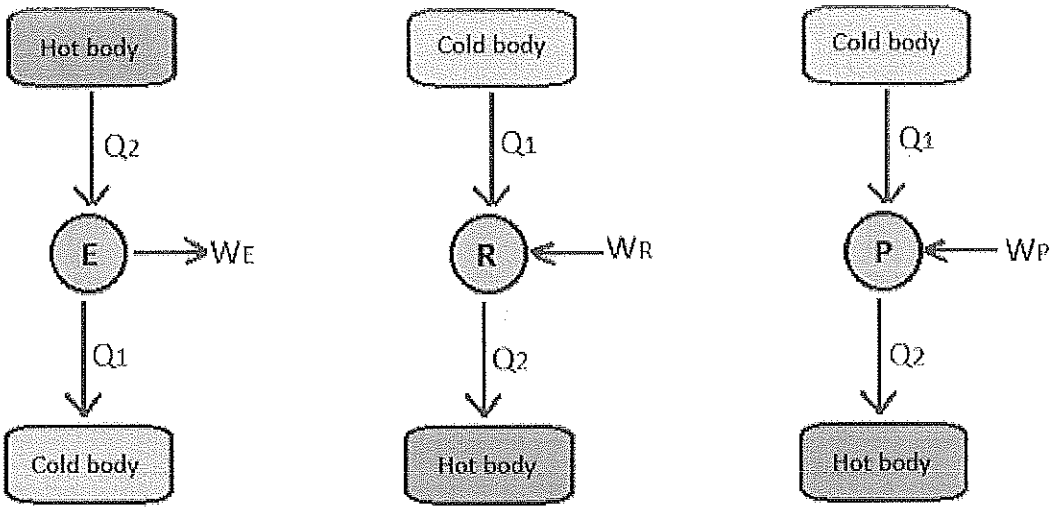
20. Differentiate between heat engine, heat pump and refrigeration with help of a neat sketch.



Heat engine: Fig c shows diagram of heat heat engine. heat engine took Q2 amount of heat from the hot body and did equivalent to W_E. The heat supplied is equal to Q1. Here the useful effect is work done, W_E equal to Q2-Q1.

Cop of heat engine = work done/heat supplied

Efficiency = Q2-Q1/Q2

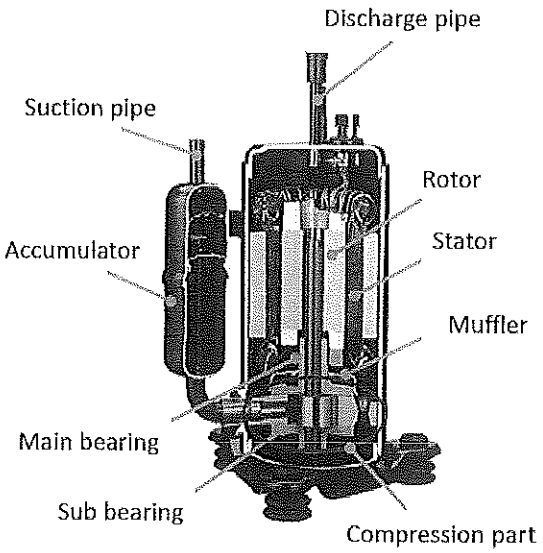
Refrigerator

In fig b Q1 amount of heat is extracted from the cold body and deliver Q2 amount of heat to the hot body with the help of input work WR. Then COP of refrigeration is $Q1/W_R$= Q1/Q2-Q1

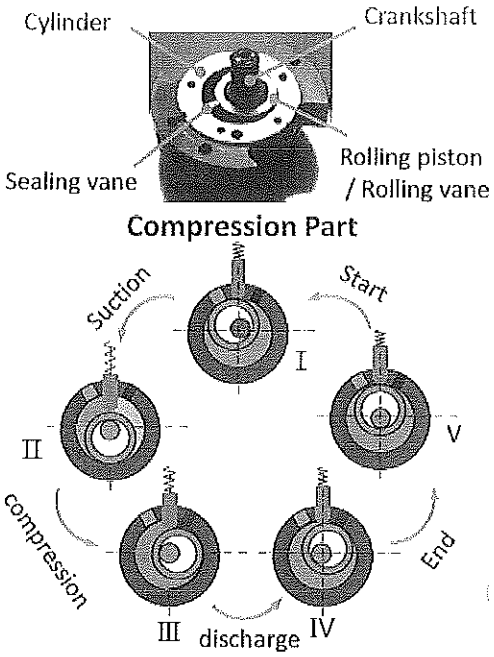
Heat pump

Fig c shows diagram of heat pump. Here desired effect is the heat delivered Q2. COP of refrigerator is$Q2/W_P$= Q2/Q2-Q1

21. Explain with neat sketch
    (a) Rotary compressor.
    (b) (a): A rotary-vane compressor is also known as a rotary piston compressor because the function of the vane is similar to that of a piston (shown in Figure). The fixed casing is known as a cylinder. The vane splits the space between the cylinder and the rolling piston into two sections (suction and discharge). As the rolling piston rotates these two volumes are increased and decreased to achieve gas suction, compression and discharge. This compressor type can also be sub-classified by the drive speed (constant and variable) and number of vanes. Each operation cycle includes five actions: start, suction, compression, discharge and end. Each crankshaft rotation can achieve these five actions by average. The capacity can be adjusted through cylinder unloading or inverter drive.



Cut-away View



Theory of Operation

(c) Steps involved in AC Servicing

Recovery

Recovery is to accumulate refrigerant and compressor oil in a place.

Place can be a tank in a recovery machine or it can be outdoor unit or a tank in case of a domestic Air-conditioner.

Vacuuming:

It is a process in which air and moisture is removed from the system. It is done with the help of a vacuum pump

Recharging

Process of filling of required amount of refrigerant and compressor oil in the system. Amount of refrigerant and compressor oil varies with systems.