Tertiary and Vocational Education Commission
Knowledge Assessment – April 2022
Automobile Mechanic
National Vocational Qualification Level 04

Time: 03 Hours

Instructions for the Candidates

- Answer all Questions
- In each of the questions from 1 to 50, pick the one of the alternatives (a), (b), (c), (d) which you consider is correct or most appropriate.
- Mark a cross (x) on the number corresponding to your choice in the answer sheet provided.
- This question paper consists of 07 pages

Part 1

1. The disjunctive valve found in the cooling circuit between the engine block and radiator, is called,
   a) Pressure Valve
   b) By pass Valve
   c) Vacuum Valve
   d) Thermostat Valve

2. The operating temperature range of an engine, could be,
   a) 75 ^{0}C - 85 ^{0}C
   b) 60 ^{0}C - 70 ^{0}C
   c) 35 ^{0}C - 45 ^{0}C
   d) 20 ^{0}C - 25 ^{0}C

3. The force feed lubrication system the oil is delivered to the engine by,
   a) Gravity.
   b) The pressure created by the oil pump.
   c) Splashing action of the crank shaft.
   d) None of the above.

4. A safety device of a full flow engine lubricating system is
   a) Oil pressure Indicator lamp
   b) Dipstick
   c) By pass valve
   d) Check Valve

5. Pressure Relief Valve of a lubricating system, controls the
   a) Temperature of oil in the system.
   b) Viscosity of oil in the system.
   c) Pressure of oil in the system.
   d) Volume of oil in the system.

6. An oil filter by-pass valve opens when the;
    a) Engine is cold.
    b) Engine is overheated.
    c) Oil filter becomes clogged.
    d) Engine runs at high speed.

7. A minor factor that reduces the lubricating oil pressure is;
    a) Failure of pressure relief valve
    b) Wearing out of crank bearings.
    c) Wearing out of cam bearings.
    d) Wearing out of valve guides.

8. More suitable circuit to start a cold petrol engine is,
    a) Idle Circuit.
    b) Choke Circuit.
    c) Floater Circuit.
    d) High Speed Circuit.

9. The information provided by the oxygen (O_2) sensor to the feedback control system is about the;
    a) Air temperature.
    b) Air flow speed.
    c) Air-fuel ratio.
    d) Exhaust gas volume.

10. When motor car is running, exhausts a heavy black smoke, due to the presence of;
    a) Heavy engine oil in combustion chamber.
    b) Heavy coolant in combustion chamber.
    c) Heavy fuel in combustion chamber.
    d) Heavy air in combustion chamber.

11. The main function of an ignition system in a petrol engine is;
    a) To develop a spark to burn the petrol air mixture.
    b) To offer the force to a smooth run in the engine.
    c) To maintain the temperature in the engine.
    d) To supply the petrol air mixture into combustion chamber.

12. What is the function of the Ballast Resister in an ignition system?
    a) Avoid the heat of coil by the battery voltage after starting the engine
    b) Avoid burnings of primary and secondary windings of ignition coil.
    c) Increase current of primary winding of ignition coil.
    d) Increase voltage of primary winding of ignition coil.

13. During the dual time of a (CB Type) distributor;
    a) Contact Breaker points are opened.
    b) Primary winding are charged
    c) Secondary winding are charged
    d) Primary and secondary windings are charged.

14. The end play of the crank shaft is adjusted by;
    a) Fly Wheel.
    b) Timing Belt.
    c) Thrust Bearings.
    d) Shell Bearings.

15. The instrument which is not used for engine bore measuring ,
    a) Telescopic gauge.
    b) Vernier calliper.
    c) Micro meter.
    d) Pitch gauge.

16. Valve Over Lap of a four stroke engine means,
    a) Opening of exhaust valve and closing of suction valve.
    b) Closing of exhaust valve and opening of suction valve.
    c) Beginning of compression stroke and ending of suction stroke.
    d) Beginning of exhaust stroke and ending of power stroke.

17. The valve Over Lap angle in four stroke petrol engines is approximately,
    a) 30^0
    b) 60^0
    c) 90^0
    d) 120^0

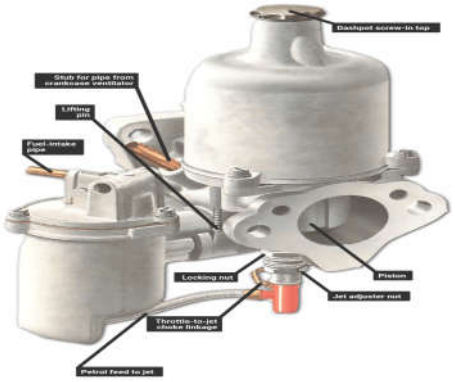
18. The purpose of adjusting the tappet clearance, is
    a) To keep valves moving free.
    b) To keep the valve timing.
    c) To reduce the tappet noise.
    d) To keep distance for valve expanding.

19. When the cam shaft of a four cylinder four stroke engine rotates 300 RPM, the no. of rotations of its crank shaft is,
    a) 150 RPM
    b) 600 RPM
    c) 300 RPM
    d) 1200 RPM

20. Following data are needed to calculate the compression ratio of an engine.
    a) Diameter of the cylinder bore and length of stroke.
    b) Volumes of cylindrical compression and combustion chamber.
    c) Compression pressure and temperature of combustion chamber.
    d) Diameter of the cylinder bore and the speed of crank shaft.

21. In an engine with an constant Venturi carburetor,
    a) Injects fuel into the inlet manifold.
    b) Injects fuel into the venturi at idling speed.
    c) Injects fuel into the venturi at high speed.
    d) None of the above.

22. In the pictorial view shown is,
    a) A down draught carburetor.
    b) A carburetor with none venturi.
    c) A variable venturi carburetor
    d) A fixed choke carburetor.



23. A says, that pre combustion chambers are installed only in diesel engines, but B says, that it's not needed glow plugs for direct injection diesel engines. When considering the above statements,
    a) Only A is correct.
    b) Only B is correct.
    c) Both A and B are wrong.
    d) Both A and B are correct.

24. The correct statement about high fuel consumption in a diesel vehicle is, due to,
    a) Failure in the injector pump.
    b) Brake bind.
    c) Clogged air cleaner.
    d) All of the above.

25. In self-ignition engines,
    a) Glow plugs supplies ignition.
    b) Injectors are needed to spray fuel into combustion chambers.
    c) Injectors are needed to mix fuel with compressed air.
    d) Injectors are needed to increase the fuel temperature.

26. The Free Play of the clutch pedal is,
    a) 1cm.
    b) 2cm.
    c) 3cm.
    d) 4cm.

27. In a synchromesh type gear box, the top gear rotates every time with,
    a) Main Shaft.
    b) Lay Shaft/Counter Shaft.
    c) Reverse Shaft.
    d) None of the above

28. The gear type which is used for automatic gear boxes named,
    a) Sliding mesh.
    b) Constant mesh.
    c) Synchromesh.
    d) Planetary.

29. When you start a car with an automatic gear type, the gear shifting position should be in,
    a) D or N
    b) R or P
    c) N or P
    d) P or D

30. Statement 1 -- An inner leakage of an automatic gear box can be checked by pressure test.
    Statement 2 -- Pressure testing ports are placed in Transmission case.
    The correct statement is;
    a) Statement 1
    b) Statement 2
    c) Both are wrong.
    d) Both are correct.

31. The device which helps to change gears according to speeds, is called
    a) Synchronizer.
    b) Planetary gears.
    c) Magnetic clutch.
    d) Hydraulic multi plate clutch.

32. A Sliding Joint is used in a propeller shaft
    a) To get change the distance between the gear box and differential.
    b) To get change the distance between the gear box and engine.
    c) To get change the distance between the differential and wheels.
    d) To get change the distance between front wheels and rear wheels

33. When a vehicle drives on a straight line;
    a) All gear wheels in the final drive are rotated
    b) Only the crown wheel and pinion in the final drive are rotated
    c) Only the crown wheel, pinion and sun wheels in the final drive are rotated
    d) Only the sun wheel and star wheels in the final drive are rotated

34. The drive axle type which is used in heavy vehicles is
    a) Quarter Floating
    b) Semi Floating
    c) Three Quarter Floating
    d) Full Floating

35. A problem that can be caused with over filled air pressure to tyre is;
    a) More wearing on the middle of tire.
    b) More wearing in the inner edge of tire
    c) More wearing in the outer of tire
    d) More wearing on place by place of tire

36. The problems caused by the wheel imbalance are,
    a) Hard to steering and hard to riding.
    b) Poor acceleration and hard to steering.
    c) Steering wheel vibrations and uneven tire wear.
    d) Poor acceleration and reduced fuel efficiency.

37. The correct way to rectify an imbalanced wheel is to,
    a) Adjust the tyre pressure.
    b) Rotate the tyres.
    c) Changing tyres.
    d) Attach appropriate weights to the wheel at appropriate positions.

38. The function of a shock absorber in a suspension system is to;
    a) Reduce noises in shocks when waving.
    b) Absorb shocks when waving.
    c) Keep proper connection between axles and frame.
    d) Safe guard suspension system.

39. According to Ackermann principle, the front wheels steer to a side;
    a) Less turning of inner side of the wheel on the bend than outer side.
    b) More turning of inner side of the wheel on the bend than outer side.
    c) Both wheels turn equal angles on the bend
    d) Exactly two turnings of sides of the wheel on the bend than outer wheel.

40. The power steering system, mostly seen in heavy vehicles is,
    a) Worm and Peg Type
    b) Re-circulating Ball Type
    c) Worm and Sector Type
    d) Rack and Pinion Type

41. The fluid that is used for power steering;
    a) Needs a higher boiling point.
    b) Needs a less viscosity.
    c) Needs to match with rubber and metal parts.
    d) Needs all of the above.

42. The check valve of master cylinder,
    a) Controls the liquid pressure of master cylinder.
    b) Keep liquid in the pump tank.
    c) Bleed the air out of the pump.
    d) Keep a pre pressure in the system.

43. When starting a car with a pressed brake pedal position, which is with Vacuum Brake Booster, the pedal goes ¼”down. This condition is,
    a) A normal position.
    b) Caused trouble in brake booster.
    c) Caused trouble in master cylinder.
    d) With air in the circuit.

44. After pressing the brake pedal, it does not come back to the initial position. If there is no any leak in the circuit, the reason could be mostly
    a) A trouble with Vacuum Brake Booster.
    b) A trouble with Check Valve of Vacuum Brake Booster.
    c) Due to Dirty Brake Oil.
    d) A trouble with Master Pump.

45. Which of the following is available on the Shells of discharged Lead Acid battery?
    a) Lead Peroxide (PbO_2).
    b) Spongy Lead (Pb).
    c) Lead Sulfate ($PbSO_4$).
    d) Sulfuric Acid (H_2SO_4).

46. The spark plug gap of a motor car with battery ignition type is;
    a) 0.3mm - 0.4mm
    b) 0.4mm - 0.5mm
    c) 0.6mm – 0.7mm
    d) 0.8mm – 1.0mm

47. Wheel Base of a vehicle is;
    a) Distance between the centers of the front and rear wheels.
    b) Distance between the centers of the front wheels.
    c) Distance between the centers of the rear wheels.
    d) Full length of the vehicle side

48. When viewing from a side, the caster is called positive when the top of the king pin is inclined to the;
    a) Rear of the vehicle.
    b) Front of the vehicle.
    c) Left of the vehicle.
    d) Right of the vehicle.

49. The most effective method for controlling Petrol engine exhaust emission is by;
    a) Recirculating exhaust.
    b) Using catalytic converter.
    c) Using some additives in the fuel.
    d) None of these.

50. The assisted power is taken to Power Assisted Steering Systems by;
    a) Compressed Air.
    b) Vacuum.
    c) Hydraulically.
    d) Mechanically.

(01 x 50 = 50 Marks)

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Instructions for the Candidates

- Answer four (04) questions including question number one (01) (Question number one (01) is compulsory and total number of questions should be answered is four (04) in part 2).
- Answer the questions in the spaces provided in the same question paper
- This question paper consists of 08 pages.

Part 2

1.

i). Name two (02) types of water cooling systems used in engines.

ii). What is S.A.E. means? Write the ranges for engine lubrications and transmission lubrications separately.

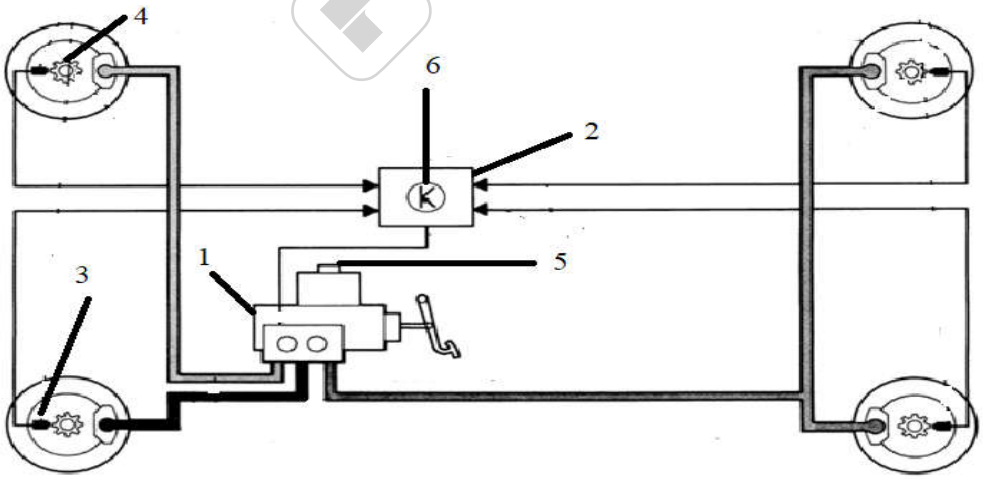
iii). What is needed to be checked, if a petrol engine does not run properly in the idling speed?

iv). Write four (04) reasons for high fuel consumption in a diesel vehicle.

v). Name the adjustments that are needed to be done in an assembling of final drive.

vi). Write four (04) reasons for reducing braking power of a vehicle with hydraulic brakes

vii). Name the numbered parts of the below given Auto-lock braking system (ABS) brake circuit.



1 4

2 5

3 6

viii). Write three (03) operational steps of ABS hydraulic modulator.

ix). Name three (03) major types of hybrid systems that are being used in the hybrid vehicles currently in the market.

x). Name four (04) special components that are found in hybrid vehicles compared to conventional vehicles.

(02 x 10 = 20 Marks)

2.

i). What is the temperature range for opening of a thermostat valve? And how it is called?

ii). What are the valves installed in a radiator pressure cap? And what are their functions?

iii). A reserve tank is used for cooling systems in present vehicles. What is the use of it?

iv). Name two (02) types of filtering systems used in engine lubricating.

v). Write 4 reasons for burning lubricating oil in an engine

(02 x 5 = 10 Marks)

3.

i). Name 3 types of carburetors according to air suction through the venturi.

ii). Name 5 circuits of a carburettor.

iii). Write four (04) reasons for more fuel combustions in a motor car.

iv). Name three (03) types of injector pumps used in diesel engines.

v). What are the measuring instruments needed to measure the followings.

a) Measuring cylinder bore -

b) Ignition timing -

c) Measuring cylinder compression -

d) Measuring diameters of crank journals -

(02 x 5 = 10 Marks)

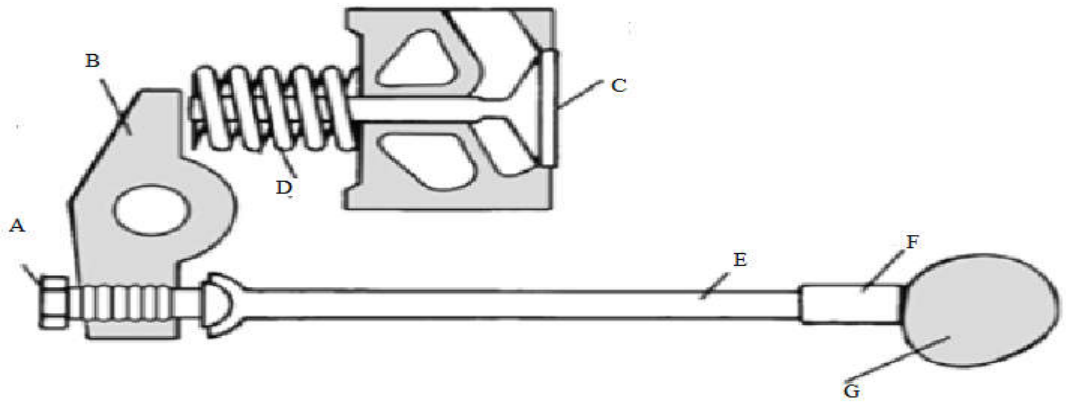
4. The suction valve of a four stroke engine opens at 14^0 before TDC. And it closes at 35^0 after BDC. The exhaust valve opens at 35^0 before BDC and it closes at 12^0 after TDC.

i). With the above data, draw the valve timing diagram. (2.5 Marks)

ii). What is the valve overlap time of it? (01 Mark)

iii). What are the opening times of suction and exhaust valves? (01 Mark)

iv). Name the numbered parts of below mentioned figure. (3.5 Marks)



A		**E**	
B		**F**	
C		**G**	
D			

v). Joint with arrows with functions of below mentioned components. (02 Marks)

1	Crank angle sensor
2	Cam angle sensor
3	Throttle position sensor
4	Lambda sensor

Measure the O_2 percentage of exhaust gas
Produce data of crank position according to stokes of 4strokes.
Maintain firing order of engine accordingly to the compressions of cylinders.
Measure the throttle position.

5.

i). Name three (03) types of clutches used for vehicles. (03 Marks)

ii). What is the use of springs installed in the middle of a single plate dry clutch?
(2.5 Marks)

iii). Write four (04) reasons for reducing power of a vehicle with an automatic gear box.
(02 Marks)

iv). Match the below tables with arrows. (2.5 Marks)

1	Coil Springs
2	Leaf Springs
3	Air Springs
4	Torsion Bar
5	Shock absorbers

Fluid
Compressor
U Bolts
Macpherson Strut
Steel Bar

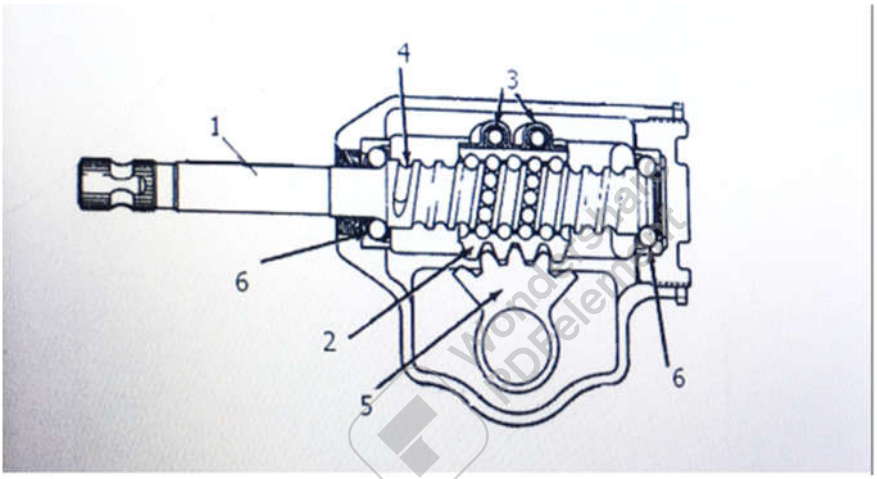
6.

i). What are the reasons for irregular wearing of outer or inner edges of tyres? (Select from below given hints). (2.5 Marks)
(Failures of hub bearing / failures of air pressure / failures of final drive / failures of clutch / failures of wheel alignments / wheel unbalancing / failures of ball joints / failures of suspensions)

ii). Match the followings with arrows or numbers. (2.5 Marks)

1	Caster angle	Low distance of front side of front wheels than rear side when in front vision
2	Camber angle	More distance of front side of front wheels than rear side when in front vision
3	Included angle	Top of the wheels are inclined in or out when in front vision of the vehicle
4	Toe in	Top of the king pin is inclined to rear side when in side vision of vehicle
5	Toe out	Addition of camber angle and king pin angle

iii). Mention the type of steering gear box shown below and name the parts given with numbers. (03 Marks)



1		**4**	
2		**5**	
3		**6**	

iv). What should be checked in a vehicle before adjusting the wheel alignment (01 Mark)

v). Name four (04) passenger safety systems of a motor car. (01 Mark)