Tertiary and Vocational Education Commission
Knowledge Assessment – March/ April 2021
Automobile Mechanic
National Vocational Qualification – Level 04

Time: 03 Hours

Instructions for the Candidates

- This question Paper Consists of two parts namely Part 1 & Part 2
- This question Paper also includes Multiple Choice Questions and short answer questions
- Part 1 - Choose the most suitable answer from the given four answers of each questions and mark as "X" in the appropriate places of the answer sheet given separately.
- Answer all the questions in Part 2
- This question paper consists 18 pages

Part 1

1. The direction of water flow through radiator in Thermo siphon circulation system is from,
    a. Top to bottom
    b. Bottom to top
    c. Front to backward
    d. Backward to front

2. What are the features that can be observed from an engine of which thermostat is removed?
    a. Engine is heated quickly
    b. Water is evaporated quickly
    c. Engine is heated slowly
    d. Water solidifies quickly

3. Two methods of filtering used in oil lubricating system of an engine,
    a. Open and closed filtering methods
    b. Low pressure and high pressure filtering methods
    c. Full flow and by pass filtering methods
    d. Full flow and semi flow filtering methods

4. In some engines relief valve is fixed to main oil gallery ,
    a. To control maximum oil pressure of the engine
    b. To open valve when lubricating oil is heated
    c. To control supply when gallery path is blocked
    d. To prevent supply of oil to bearings when oil pressure is reduced

5. In what part the defect may occur when fan belt is loosen of the engine,
    a. Lubricating system
    b. Cooling system
    c. Valve timing diagram
    d. Fuel supply system

6. Function of venture of carburetor is,
    a. Reduce velocity of vehicle and reduce air pressure
    b. Increase velocity of air and decrease air pressure
    c. Decrease velocity of air and increase air pressure
    d. Increase velocity of air and increase air pressure

7. If petrol is bled through exhaust pipe of a carburetor the possible defect may be,
    a. The needle valve is not closed properly
    b. Reduce petrol level of floater chamber
    c. Block of emulsion tube
    d. Air brake is closed at all time

8. Quantity of diesel injected by inline type injector pump is decided by ,
    a. Size of pre stroke of plunger
    b. Size of working stroke of plunger
    c. Internal pressure of injection pump
    d. Opening pressure of injector

9. What is the most suitable type of injection nozzle for direct injection method,
    a. Multi hole nozzle
    b. Cylindrical pintle nozzle
    c. Conical pintle nozzle
    d. Throttle pintle nozzle

10. Valve clearance can be kept in all valves of second cylinder of a four stroke engine of which firing order is 1, 3, 4, 2 .What is/are valve/valves that valve clearance can be kept in 4^{th} cylinder,
    a. Exhaust valve
    b. Inlet valve
    c. Valve clearance cannot be kept in both valves
    d. Inlet valve and exhaust valve

11. Function of condenser of ignition coil circuit,
    a. Increase to high voltage
    b. Act as mechanical circuit breaker
    c. Prevent forming arcs through contact points
    d. Supply a spark to specified spark plug

12. Spark supplied by spark plug when contact point of distributer is,
    a. Completely opened
    b. Completely closed
    c. Just after contact points closed
    d. At the moment contact points opened

13. Linear motion of the piston is converted to circular motion of the axle by,
    a. By piston pins
    b. By piston rod
    c. By rocker
    d. By cam shaft

14. Mostly heated part of exhaust valve while engine is operating
    a. Valve stem
    b. Centre of valve head
    c. Valve face
    d. Whole valve

15. For cooling purpose some valves are made with a cavity of stem and cavity is filled with
    a. Water
    b. Petroliam oil
    c. Sodium
    d. Nitrogen

16. Plastic gauge is used,
    a. To measure valve clearance
    b. To measure oil clearance
    c. To measure ring gap
    d. To measure cylinder bore

17. What are the things to be decided when compression test is done for an engine?
    a. Accuracy of the compression ratio of the engine
    b. Correct functioning of bearings
    c. Any leaks through piston rings
    d. Accuracy of all given above

18. Function of brass cones used in synchromesh gear box,
    a. Connects gear wheel to main shaft
    b. Stop engaging two gears at a time
    c. Connect gear wheel to synchromesh unit
    d. Make equal speed of gear wheels

19. Lock up clutch in torque converter
    a. Operates all the time
    b. Operates at the maximum engine speed
    c. Operates at the maximum speed of vehicle
    d. Operates when gear changing

20. Type of rear axle generally used in heavy vehicles,
    a. Semi – floating axles
    b. Three quarter floating axles
    c. Fully floating axles)
    d. Ridge axles

21. Two types of gear wheels used in differentials
    a. Helical gear and bevel gear
    b. Helical gear and spur gear
    c. Spur gear and bevel gear
    d. Bevel gear and spiral bevel gear

22. In disc brake method when brake is released brake pads becomes free because,
    a. Brake oil gone to tank again
    b. Due to centrifugal force made by rotating of disc
    c. By return springs
    d. By caliper piston rings

23. Stabilizer is used in front part of the vehicle to,
    a. Balance the weight applied in front wheels
    b. Increase ability to absorb vibrations
    c. Prevent rolling of body of the vehicle
    d. Control oscillation of body

24. Drop arm is connected in steering wheel system,
    a. Draglink and steering box
    b. Draglink and knuckle arm
    c. Steering box and steering wheel
    d. Steering arm and drag wheel

25. What parts of the tyre is subjected to wear when air pressure of tyre is law and high respectively?
    a. Centre and both sides
    b. Both sides and centre
    c. Centre and inside
    d. Centre and outside

26. Specific gravity of electrolyte used in fully charged lead acid battery is
    a. 0.26
    b. 1.1
    c. 1.6
    d. 1.28

27. The main ECU input parameters for calculation of ignition timing and injection duration are,
    a. Speed and temperature
    b. Speed and load
    c. Pressure and temperature
    d. Pressure and load

28. Load of an engine fitted with electronic fuel injector may be determined by a,
    a. MAP sensor
    b. Throttle position sensor
    c. Lambda sensor
    d. Vacuum capsule

29. Following a frontal impact the time taken to fully inflate an air bag will be approximately,
    a. 10ms
    b. 20ms
    c. 30ms
    d. 40ms

30. Main function of ABS computer is
    a. Collect data in a brake stroke
    b. Take necessary decisions according to available data
    c. Control hydraulic modulator
    d. Maintain slipping ratio of wheels at specified limit when braking

($1 \times 30 = 30$ Marks)

Part 2

Answer all questions

Sinhala and English Languages can be used in answering questions

1. (i) Write two advantages and disadvantages for air and water cooling systems

(04 Marks)

	advantages	disadvantages
(a)Air cooling system	1. 2.	1. 2.
(b)Water cooling system	1. 2.	1. 2.

(ii) Name the valves of radiator pressure cap and describe their operation. (01 Mark)

2. (i) Name four lubrication methods and make a brief description about them. (04 Marks)

Lubrication method	Brief description
1.	
2.	
3.	
4.	

(ii) Draw two methods of oil filtering used in engines and explain. (02 Marks)

3. (i) Explain what are rich mixture and weak mixture.in petrol vehicle (01 Mark)

(ii) Draw a diagram of simple carburetor and make a short description of its operation. (03 Marks)

4. (i) What is the function of delivery valve of diesel injection pump? (01 Mark)

(ii) State two main tests to be done on injectors. (01 Mark)

(iii) State two main injection methods used in diesel injection systems. (01 Mark)

(iv) State four main functions of electronic diesel control systems of modern diesel vehicles. (02 Marks)

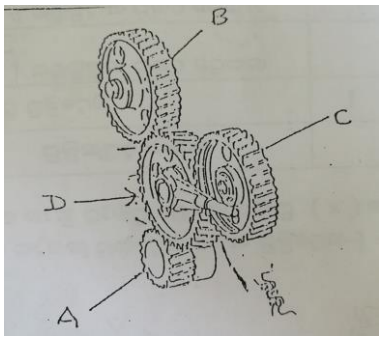
5. (i) Draw a circuit diagram of battery operated ignition system and name main parts. Give a brief description of its operation. (04 Marks)

(ii)State two advantages of electronic ignition system over contact point ignition system. (01 Mark)

6. (i) Name gears shown by letters of the timing gear set.

If the number of teeth of gear A is 23 what are the number of teeth of gear B and C.

(02 Marks)



A .....
B .....
C .....
D .....

Teeth of A 23
Teeth of B .....
Teeth of C .....

(ii) Explain the process inside the engine when gear marks of A,B,C are connected to marks of gear D . (03 Marks)

7. (i) Draw valve timing diagram of the engine according to the following data.

(a) Opening inlet valve 23^{o} before TDC
(b) Closing inlet valve 65^{o} after BDC
(c) Opening exhaust valve 64^{o} before BDC
(d) Closing exhaust valve 18^{o} after TDC

(02 Marks)

(ii) According to the above valve timing diagram

(a) What is the duration of inlet valve opening?

(b) What is the duration of exhaust valve opening?

(c) What is the duration of overlap?

(01 Mark)

(iii)When valves are overlapping in each cylinder of a four cylinder engine of firing order1,3,4,2, mark the position of valves in other cylinders in the table.

(02 Marks)

	1		2		3		4	
	IN	EX	IN	EX	IN	EX	IN	EX
1								
3								
4								
2								

Use EX for exhaust valve, IN for inlet valve, C for closed valve and O for open valve.

8. State clearly relevant formula used in the following both calculations. Show clearly the unit conversions.

(i) Find the capacity(liter) of four stroke four cylinder engine of which cylinder bore is 70mm and stroke is 80mm. (03 Marks)

(ii) If the compression ratio of the engine is 8:1 find the volume of combustion chamber in cm^3

(03 Marks)

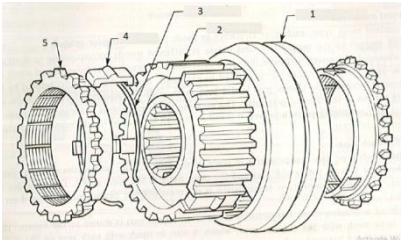
9. (i) Name two possible defects of a gear box and give one reason for each.

(01 Mark)

Defect	reason
1.	
2.	

(ii) Name numbered parts of synchromesh assembly in the given diagram and give brief description of operation.

(03 Marks)



1	
2	
3	
4	
5	

Brief description:-

(iii) Explain short, the work of starter in torque converter.

(01 Mark)

(iv) Write two hydraulic pressures using speed of the engine and load for a complete hydraulic pressure automatic gear box.

(01 Mark)

10. (i) Write two types of drive shafts used to transmit rotating force. (01 Mark)

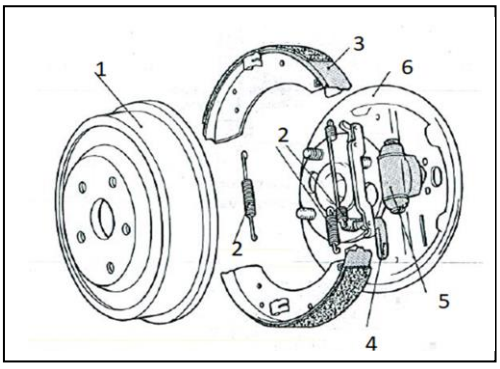
(ii) Write two adjustments that a differential unit should do. (01 Mark)

(iii) Write two reasons that can make a sound in a differential. (01 Mark)

(iv) Write four features that propeller shaft should have. (02 Marks)

11. (i) State four advantages of disc brake system over drum brake system.
(02 Marks)

(ii) Name parts of drum brake as given in the diagram according to given numerical order. (02 Marks)



1	
2	
3	
4	
5	
6	

12. (i) Make a brief description of basic functions of suspension system. (02 Marks)

(ii) Name two types of Shock Absorbers (dampers). (01 Mark)

(iii) Name two possible defects due to non-operative shock absorber. (01 Mark)

13. Draw the following angles.

(02 Marks)

i. Positive camber angle Negative camber angle

ii. Toe – in angle

Toe – out angle

iii. Caster angle

iv. King pin inclination

14. Explain for what purpose the following sensors are used in EFI system.

(03 Marks)

Sensor	Use
Crank angle sensor	
Cam angle sensor	
Throttle position sensor	
Coolant temperature sensor	
Knock sensor	
Lambda sensor	

15. (i) Make a brief description with regard to operation of following parts of ABS brake system. (03 Marks)

Part	Operation description
1. Wheel speed senor	
2. ECU	
3. Hydraulic modulator	
4. Drum brake	

(ii) Make a brief description about SRS air bag system. (02 Marks)