

SIR ARTHUR LEWIS COMMUNITY COLLEGE
ENGINEERING AND THE CIRCULAR ECONOMY
ACADEMIC YEAR (2024/2025) - SEMESTER ONE
END OF SEMESTER EXAMINATION

TUTOR (S) : **Mr. Kevin President**

PROGRAMME : **Motor Vehicle Mechanics Foundations**

COURSE TITLE : **Motor Vehicle Technology IA**

COURSE CODE : **MVE103**

LEVEL : **Certificate/Year 1**

PAPER : **One**

DATE : **Tuesday, 17th December 2024**

COMMENCEMENT TIME : **9:00 a.m.**

DURATION : **2 hours**

INVIGILATOR (S) : **C. Bernard, A. Carrazana, E. Hunte,
D. Thompson, A. Mason**

ROOM (S) : **LFT-1R-05**

STUDENT ID :

GENERAL INFORMATION AND INSTRUCTIONS

- **This exam contains Three (3) Sections. All questions must be answered on this question paper.**
- **Section A** consists of Sixty (60) Multiple Choice questions. You are required to answer all questions. One (1) mark is awarded for every correct answer.
- **Section B** consist of two (2) questions. You are required to **answer both questions**. Marks are awarded accordingly.
- **Section C** consist of two (2) questions. You are required to **answer any ONE of the questions**. Marks are awarded accordingly.
- Students must sign **IN** and **OUT** on the examination class list.
- Students must **not** write their names on their answer sheets, only their ID number.
- **Note: Bags, Books as well as writing paper not given by the invigilator should be deposited at the front of the examination room or as otherwise indicated.**
- **All cell phones must be turned off during the exam.**

**DO NOT TURN THIS COVER SHEET UNTIL
YOU ARE TOLD TO DO SO!!!**

SECTION A – Multiple Choice Questions

(Circle the most appropriate answer)

- Which of the following components transfer combustion pressures to the crankshaft and connecting rods?
 - Piston
 - Camshaft
 - Valve train
 - Thrust bearing
- The motion of the cam is transferred to the valves through
 - Pistons
 - Rocker arms
 - Camshaft pulley
 - Valve stems
- Each of these should be followed when changing engine oil and the oil filter except:
 - Keep the vehicle level
 - Do not tighten the pan drain plug
 - Use the correct amount and type of oil
 - Tighten the oil filter with a filter wrench
- The air-fuel mixture is actually burned during the:
 - Induction stroke
 - Compression stroke
 - Power stroke
 - Exhaust stroke
- Technician 'A' says the engine camshaft converts reciprocating motion of the piston into rotary motion. Technician 'B' disagrees and says the crankshaft performs this function. Who is right?
 - 'A' only
 - 'B' only
 - Both 'A' and 'B'
 - Neither 'A' nor 'B'
- As the piston moves towards the combustion chamber while both valves are closed the:
 - Power event occurs
 - Intake event occurs
 - Exhaust even occurs
 - Compression event occurs
- Which of the following does not refer to camshaft location and design?
 - OHC
 - SOHC
 - DOHC
 - UHC
- If the air-fuel mixture in a spark ignition engine is too rich, then air-fuel ratio is about
 - 17:1
 - 15:1
 - 13:1
 - 10:1
- Variations in camshaft lobe shape controls:
 - When each valve opens
 - How long each valve stays open
 - How wide/how far each valve opens
 - All of the above are correct

10. Which of the following is not a method by which a camshaft can be driven?
 - A) Chain
 - B) Rotation
 - C) Belt
 - D) Gears

11. An engine top-end typically consists of each of these, except:
 - A) Valve train
 - B) Intake manifold
 - C) Connecting rod
 - D) Cylinder head

12. Which of the following is not a basic part of an engine bottom-end?
 - A) Manifold
 - B) Block
 - C) Crankshaft
 - D) Piston

13. Which of the following provides clearance between the piston and crankshaft counterweights?
 - A) Compression rings
 - B) Valve reliefs
 - C) Slipper skirt
 - D) Piston taper

14. Petrol that detonates easily is called
 - A) High octane petrol
 - B) Low octane petrol
 - C) Unleaded petrol
 - D) Blended fuel

15. A camshaft drive must turn the camshaft at:
 - A) Twice the crankshaft speed
 - B) Crankshaft speed
 - C) One-half crankshaft speed
 - D) Faster than the crankshaft

16. High-frequency movement resulting from the twisting and untwisting of the crankshaft is called:
 - A) Engine knock
 - B) After running
 - C) Oscillating vibration
 - D) Harmonic vibration

17. Which of the following normally operates belts for the alternator, water pump, and other units?
 - A) Auxiliary chain
 - B) Timing sprockets
 - C) Vibration damper
 - D) Crankshaft pulley

18. Which of the following is used to lock a valve spring on a valve?
 - A) Retainer
 - B) Keeper
 - C) Seal
 - D) Both 'A' and 'B'

19. The engine type that uses a triangular rotor instead of conventional pistons is called a:
 - A) Spark ignition engine
 - B) Compression ignition engine
 - C) Rotary engine
 - D) Cam-in-block engine

20. A two-stroke cycle engine requires how many crankshaft revolutions per power cycle?
 - A) One
 - B) One-half
 - C) Two
 - D) Four

21. The distance a piston travels up and down in a cylinder is limited by the:
 - A) Valve train
 - B) Crankshaft
 - C) Flywheel
 - D) Camshaft

22. An overinflated tire will wear the tread most near the
 - A) Edges
 - B) Corners
 - C) Center
 - D) None of the above

23. The function of oil control rings is that
 - A) Lubricates the cylinder wall by releasing oil from its hole
 - B) Keeps the cylinder wall lubricated by holding oil in its channel
 - C) Prevents engine oil from going into the combustion chamber and returns excess lubricating oil off the cylinder wall through the return holes in the piston to the oil pan
 - D) Maintains a seal and prevents escape of burned gases and oil leakage

24. When coolant and oil mix, the solution turns:
 - A) Brown
 - B) Milky white
 - C) Reddish
 - D) Black

25. Technician A says that full frame vehicles combine the body of the vehicle with the frame structure. Technician B says that unibody vehicles combine the body of the vehicle with the frame structure. Which technician is correct?
 - A) Technician A only
 - B) Technician B only
 - C) Both technicians
 - D) Neither technician

26. Engine size is determined by:
 - A) Bore
 - B) Number of cylinders
 - C) Stroke
 - D) All of the above

27. The temperature indicating instrument in vehicles indicates the temperature of
 - A) Engine piston
 - B) Engine cylinder
 - C) Engine oil
 - D) Engine Coolant

28. Which of the following separates engine parts to prevent metal-on-metal contact?
 - A) Additives
 - B) Oil film
 - C) Galleries
 - D) Bearings

29. The most commonly used and versatile socket handle is the:
 - A) Ratchet
 - B) Flex bar
 - C) Breaker bar
 - D) Speed handle

30. Use this tool to support the automobile while working underneath
 - A) Floor jack
 - B) Jack stands
 - C) Transmission jack
 - D) Bumper jack
31. Pneumatic power tools are tools that use:
 - A) Electricity
 - B) Hydraulics
 - C) Compressed air
 - D) All of the above
32. Which component is NOT part of the chassis system?
 - A) Brakes
 - B) Suspension
 - C) Electrical system
 - D) Frame
33. Which of the following is not a good tip when dressing for work?
 - A) Secure long hair
 - B) Rolling up long shirt sleeves
 - C) Make sure all jewelry fits well
 - D) Do not carry sharp tools in pockets
34. Eye protection should be worn when:
 - A) Carrying batteries
 - B) Operating power tools
 - C) Working near a running engine
 - D) All of the above
35. During a complete lubrication service, all of the following are done except:
 - A) Change engine oil
 - B) Change oil filter
 - C) Check all fluid levels
 - D) Check ride height
36. When checking automatic transmission fluid, the following should be done:
 - A) Engine off, transmission in park
 - B) Engine running, transmission in park
 - C) Engine off, transmission in neutral
 - D) Engine on, transmission in neutral
37. Which type vehicle is most likely to have a D pillar?
 - A) Pickup truck
 - B) Station wagon
 - C) Sports coupe
 - D) None of these
38. When No. 1 piston of a 4-cylinder, 4 stroke in-line engine is performing the power stroke, No. 4 piston is on the stroke called:
 - A) Induction
 - B) Compression
 - C) Power
 - D) Exhaust
39. Which of the following is not part of the cylinder head?
 - A) Combustion chamber
 - B) Valve guides
 - C) Intake and exhaust valves
 - D) Piston rings

40. The stroke of an engine is the:
 - A) Volume of the cylinder
 - B) Distance between TDC and BDC
 - C) Length of the connecting rod
 - D) Internal diameter of the cylinder

41. Technician A says that gasoline engines are internal combustion engines. Technician B says that diesel engines are internal combustion engines. Which technician is correct?
 - A) Technician A only
 - B) Technician B only
 - C) Both technicians
 - D) Neither technician

42. When using a fire extinguisher, what word can be used to remember what to do?
 - A) PASS
 - B) FIRE
 - C) LEVER
 - D) RED

43. A car with a dead battery is brought into the shop. Technician 'A' says to check the output of the alternator. Technician 'B' says to check the condition of the spark plugs. Who is right?
 - A) Technician A only
 - B) Technician B only
 - C) both 'A' & 'B'
 - D) neither 'A' nor 'B'

44. To avoid over-tightening or breaking a bolt _____ should always be used when tightening fasteners.
 - A) a box end wrench
 - B) a torque wrench
 - C) penetrating oil
 - D) a pitch gauge

45. The number of threads per inch is referred to as _____.
 - A) gauge
 - B) pitch
 - C) TPI
 - D) None of these

46. Which of the following is a safety device that keeps a slotted nut from turning or coming off?
 - A) Lock tab
 - B) Snap ring
 - C) Cotter pin
 - D) Thread pitch

47. Which threaded tool is used for cutting internal threads in holes?
 - A) Tap
 - B) Helicoid
 - C) Thread chaser
 - D) Die

48. Engine coolant consists of:
 - A) Water , anti-freeze, additives
 - B) Oil and additives
 - C) Water, oil and stop leak
 - D) Water only

49. When changing engine oil, technician 'A' says the engine oil should be cool. Technician 'B' says the oil should be warm. Who is correct?
- A) Technician A only
 - B) Technician B only
 - C) both 'A' & 'B'
 - D) neither 'A' nor 'B'
50. Which of the following should NOT be done when changing an engine's oil and filter?
- A) Torque the drain plug only enough to prevent leakage and loosening
 - B) Use an oil filter wrench to remove the old filter
 - C) Wipe clean oil on the new filter O-ring seal
 - D) Use a filter wrench to tighten the filter.
51. Technician A says that impact sockets have thicker walls than conventional sockets. Technician B says that impact sockets have a black oxide finish. Which technician is correct?
- A) Technician A only
 - B) Technician B only
 - C) Both technicians
 - D) Neither technician
52. The vehicle identification number is how many characters long?
- A) 17
 - B) 10
 - C) 12
 - D) 21
53. When should the engine oil be replaced?
- A) Every three months, regardless of miles
 - B) Every 3,000 miles regardless of time
 - C) According to the vehicle manufacturer's recommended interval based on time and mileage, whichever occurs first
 - D) All of these
54. Most manufacturers recommend that cooling systems with conventional (green) antifreeze should be drained, flushed, and filled every:
- A) Six months
 - B) Yearly
 - C) Two years
 - D) Five years
55. The typical recommended mixture of water and antifreeze to form engine coolant is:
- A) 30/70
 - B) 50/50
 - C) 40/60
 - D) 60/40
56. Why are modern cooling systems pressurized?
- A) To raise coolant's boiling point.
 - B) To prevent leaks
 - C) To move the coolant through the system
 - D) To prevent corrosion in the system
57. What inflation pressure specifications should be used when checking or correcting tire pressure?
- A) The MAX pressure as imprinted on the tire sidewall
 - B) 35 PSI in all tires
 - C) The driver's door placard pressure
 - D) 32 PSI in most tires

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58. Engine oil level should be checked _____.
- A) with the engine running
 - B) with the vehicle parked on level ground
 - C) Both with the engine running and with the vehicle parked on level ground
 - D) Neither with the engine running nor with the vehicle parked on level ground
59. Which of the following would be likely cause excessive oil consumption?
- A) Faulty PCV system
 - B) Worn piston rings
 - C) Neither A nor B
 - D) Both A and B
60. An SOHC V8 engine has how many camshafts?
- A) One
 - B) Two
 - C) Three
 - D) Four

Total (60 Marks)

SECTION B – Short Answer Questions.

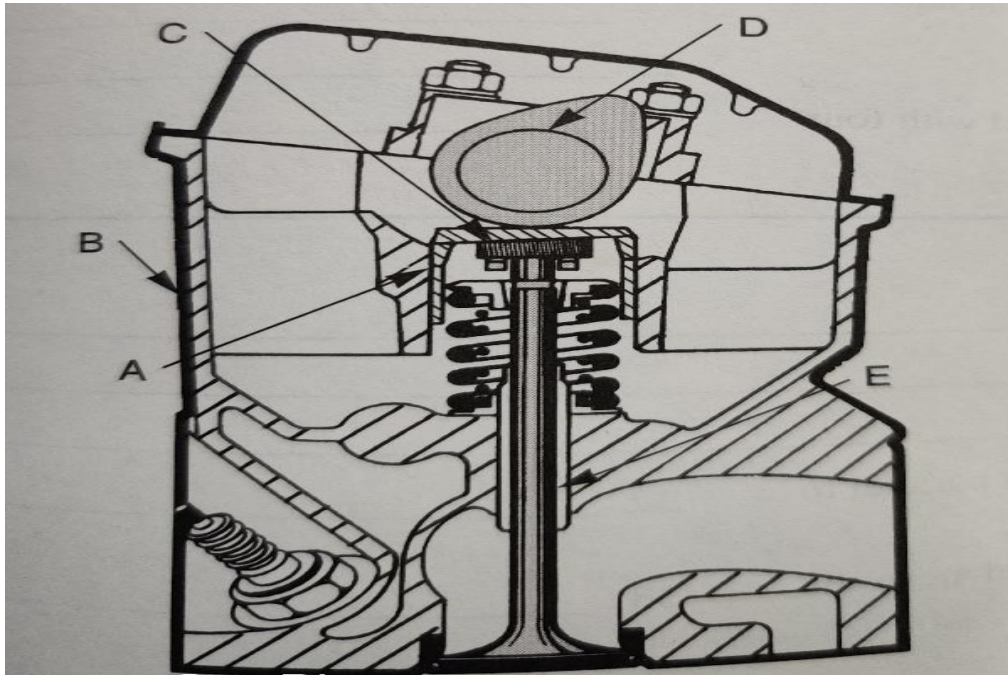
Answer both questions.

- 1) (a) Define what the **deck surface** is and where it's located in an internal combustion engine. **(2 marks)**

- (b) Explain why the condition of the deck surface is important for the engine's performance and efficiency. How does it impact the way the engine operates? **(4marks)**

- 2) Look at the cylinder head shown below. Identify which type of valve train it has (OHV, SOHC, or DOHC). Then, label each part as instructed.

(6 marks)



- A) _____
- B) _____
- C) _____
- D) _____
- E) _____

Total (12 Marks)

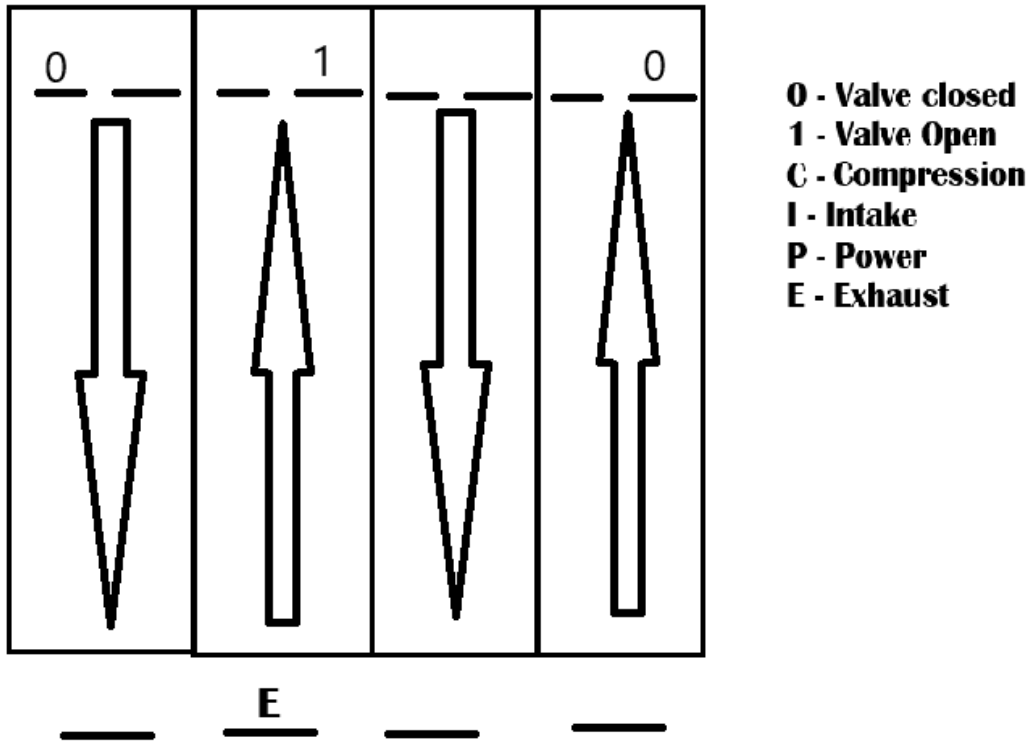
SECTION C: Long Answer Questions.

Answer Only One question.

- 1) (a) Explain how a four-stroke internal combustion engine changes gasoline into energy that can be used to power a vehicle. (8marks)

- (b) The diagram below shows the movement of the piston and valves in a cylinder during each stroke of the four-stroke engine cycle. Each stroke plays a specific role in the engine's function, with the piston and valves working together to generate power. **(8marks)**

Instructions: Use the key below to fill in the blanks.



Total (16 marks)

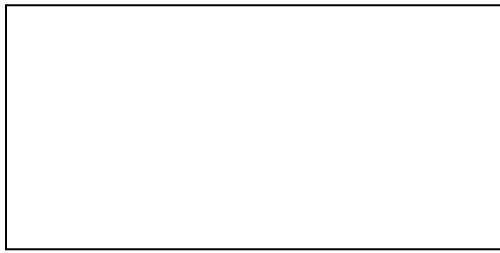
- 2) (a) Explain the difference between Body on Frame and Unibody construction. **(6marks)**

- (b) Give two advantages and two disadvantages of Body on Frame versus Unibody construction. **(4marks)**

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(c) A technician is preparing a vehicle for alignment and needs to record specific measurements. You are required to explain the concepts of track width and wheelbase as they relate to vehicle identification by answering the questions below:

i. Define the track width and sketch how it is measured. **(3 marks)**



ii. Define the wheelbase and sketch how it is measured. **(3 marks)**



Total (16 marks)

END OF EXAMINATION!!!