

(6 pages)

S.No. 6420

P 22 ELE 3 B

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Electronics

AUTOMOTIVE ELECTRONICS

Time : Three hours

Maximum : 75 marks

SECTION A — (20 marks)

Answer ALL questions.

I. (A) Multiple choice questions: (5 × 1 = 5)

1. _____ is the main aim of an engine management system to achieve?

- (a) High reliability and durability with lowest possible initial cost
- (b) High power output and torque
- (c) Low levels of gaseous and particulate emissions
- (d) All of the mentioned

2. _____ is a device that detects the change in the environment and responds to some output on the other system.

- (a) sensor
- (b) ECU
- (c) actuator
- (d) shaft

3. The _____ method involves dividing the data into equally sized segments and using a 1's complement to calculate the sum of these segments.

- (a) checksum
- (b) CRC
- (c) parity bit
- (d) cryptographic

4. LIN is designed to support _____ slave devices

- (a) 8
- (b) 16
- (c) 24
- (d) 32

5. The electric vehicle drivetrain system is responsible for delivering _____ from the battery to the wheels.

- (a) power
- (b) current
- (c) voltage
- (d) both (a) and (c)

(B) Fill in the following: (5 × 1 = 5)

6. Electronic management of a chassis system uses _____ to regulate the hydraulic pressure delivered to the brakes.
7. _____ is an important variable in automotive control systems, particularly for controlling ignition timing and fuel injection timing.
8. _____ is the physical and logical arrangement of nodes and connections in a computer network.
9. _____ multiplexing technology is used by FlexRay protocol.
10. _____ are powered by an internal combustion engine and one or more electric motors, which uses energy stored in batteries.

II. Answer the following: (5 × 2 = 10)

11. Mention the classification of vehicle based on fuel.
12. What is the need for air flow rate sensor?

13. What are the voltage levels in the CAN protocol?
14. What is the use of FlexRay protocol?
15. What is the use of super capacitor?

SECTION B — (5 × 5 = 25)

Answer ALL questions.

16. (a) Discuss about current trends in modern automobiles.

Or

- (b) Write short notes on vehicle motion control.

17. (a) Explain magnetic reluctance position sensor.

Or

- (b) Illustrate the use of strain gauge MAP sensor.

18. (a) Elucidate the main characteristics of CAN.

Or

- (b) Explain the twin wire medium in physical layer of CAN.

19. (a) Explain the frame format of LIN.

Or

(b) Discuss the need for FlexRay.

20. (a) Illustrate the energy density of various energy sources.

Or

(b) Write short notes on good practice for battery maintenance.

SECTION C — ($3 \times 10 = 30$)

Answer any THREE questions.

21. Describe the components of electronic engine management system.

22. Explain the following

(a) Crankshaft position sensor and

(b) Airflow rate sensor

23. Elucidate the error detection and management in CAN.

24. Illustrate the working of FlexRay network topology.

25. Explain the concept of fly wheel technology.