

- b. What is meant by ignition advance in an SI engine? Explain in detail the vacuum advance and centrifugal advance mechanism with suitable diagrams. 12 3 3 1
31. a. What is the need for ABS? Explain the construction and working of anti-lock braking system by drawing suitable ABS layout. 12 3 4 1,3
- (OR)**
- b. Draw the layout of electric power steering and discuss in detail about the column drive type rack drive type of electric power assisted steering with suitable sketches. 12 3 4 1
32. a. Discuss the objective of onboard diagnostics II and describe the diagnostic trouble codes in detail. 12 3 5 1,5
- (OR)**
- b. Explain the dead reckoning and inertial navigation GPS system with suitable block diagrams. 12 3 5 1

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B.Tech. DEGREE EXAMINATION, MAY 2023
Sixth Semester

18AUC303J – AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS
(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

- | | Marks | BL | CO | PO |
|--|-------|----|----|-----|
| 1. _____ is added to pure lead which adds strength to the lead grids (A) Sulphur (B) Nickel (C) Antimony (D) Rubber | 1 | 1 | 1 | 1 |
| 2. Lithium ion batteries have a nominal voltage of _____ (A) 3.7V (B) 1.2V (C) 2.1V (D) 12V | 1 | 1 | 1 | 1 |
| 3. In starter motor, the pole core or poles are made up of (A) Copper (B) Cast steel (C) Aluminium (D) Rolled steel | 1 | 2 | 1 | 1,3 |
| 4. _____ prevents the pinion striking from the flywheel ring gear while the engine is running? (A) Lock pin (B) Drive pin (C) Anti drift pin (D) Overrunning clutch | 1 | 1 | 1 | 1 |
| 5. Duty cycle in a fuel injector actuator refers to ratio of fuel (A) ON time / OFF time (B) OFF time / ON time (C) OFF time / (ON time + OFF time) (D) ON time / (ON time + OFF time) | 1 | 1 | 2 | 1 |
| 6. In DC generator, the generated AC current is rectified into DC by means of (A) Rectifier (B) Commutator (C) Regulator (D) Cut out relay | 1 | 1 | 2 | 1 |
| 7. A _____ reflector in head lamps is made up of a number of sections each within a common focal point. (A) Elliptical (B) Parabolic (C) Bifocal (D) Homifocal | 1 | 1 | 2 | 1 |
| 8. The housing of an AC generator is made up of _____ (A) Cast steel (B) Cast iron (C) Cast aluminium (D) Stainless steel | 1 | 2 | 2 | 1,3 |

9. _____ has an advantage of equal fuel distribution to all the cylinders and no chance for it to condense on the walls of the intake manifold. 1 2 3 1,4
 (A) GDI (B) CRDI
 (C) MPFI (D) TBI
10. In conventional ignition system, the ignition coil is used to step up the voltage from _____ upto ignition voltage _____. 1 2 3 1,3
 (A) 6V, 1000V (B) 10V, 5000V
 (C) 1.5V, 15000V (D) 12V, 20000V
11. In _____ technique, the fuel quantity can be regulated by varying the fuel pressure. 1 2 3 1,3
 (A) Continuous injection (B) Phased injection
 (C) Intermittent injection (D) Throttle body injection
12. _____ sensor measures the temperature of the engine coolant and from this data the computer adjusts the mixture of strength to rich side for cold starting. 1 1 3 1,3
 (A) Exhaust gas oxygen (B) Engine temperature
 (C) Air flow (D) Manifold pressure
13. Statement A : ABS reduces the stopping distance 1 2 4 1,2
 Statement B : ABS removes the wheel slip completely
 (A) Statement A is correct, B is wrong (B) Statement B is correct, A is wrong
 (C) Both statements are correct (D) Both statements are wrong
14. _____ sensor converts steering torque input and its direction into voltage signal. 1 1 4 1,4
 (A) Speed (B) Torque
 (C) Load (D) Pressure
15. In adaptive cruise control system, which of the following is/are controlled? 1 2 4 1,4
 (A) Throttle (B) Brake
 (C) Throttle and steering (D) Throttle and brake
16. Antilock braking system can apply or release braking pressure 1 1 4 1
 (A) 5 times per second (B) 15 times per second
 (C) 25 times per second (D) 50 times per second
17. An inertial navigation system incorporates which of the following sensors? 1 2 5 1
 (A) Radio receiver (B) Doppler radar
 (C) Gyros and accelerometer (D) IR sensor
18. Which of the following DTC indicates ignition system faults? 1 2 5 1,5
 (A) P0100 (B) P0200
 (C) P0300 (D) P0400

19. Which of the following trouble codes are grouped for engine related faults the OBD II? 1 2 5 1,5
 (A) P_{xxx} codes (B) B_{xxx} codes
 (C) C_{xxx} codes (D) U_{xxx} codes
20. The most critical and costly component in the navigation system is 1 1 5 1
 (A) Speed sensor (B) Position sensor
 (C) Vehicle angular motion sensor (D) Map sensor

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

- | | Marks | BL | CO | PO |
|--|-------|----|----|----|
| 21. Brief the ampere hour rating and reserve capacity rating in a lead acid battery. | 4 | 2 | 1 | 1 |
| 22. What are the requirements of a starter motor? | 4 | 2 | 1 | 1 |
| 23. Differentiate γ-type and delta type stator present in alternator. | 4 | 2 | 2 | 2 |
| 24. List the merits of MPFI system. | 4 | 2 | 3 | 3 |
| 25. Draw the block diagram of electronic power steering. | 4 | 2 | 4 | 4 |
| 26. Brief about variable damping and variable spring rate. | 4 | 2 | 4 | 4 |
| 27. Write short note on telematics. | 4 | 2 | 5 | 5 |

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

- | | Marks | BL | CO | PO |
|--|-------|----|----|-----|
| 28. a. What is meant by battery rating? Explain the various types of battery ratings available for a lead acid battery. List some practical ways of calculating battery ratings. | 12 | 3 | 1 | 1 |
| (OR) | | | | |
| b. Discuss in detail the principle and construction of solenoid operated starter motor design with neat sketch. Also list out the steps involved in its operation. | 12 | 3 | 1 | 1 |
| 29. a. Explain the construction and working of alternator with neat sketches. | 12 | 3 | 2 | 1,3 |
| (OR) | | | | |
| b.i. Explain the construction of conventional sealed bulb head lamps using suitable sketch. | 6 | 3 | 2 | 1 |
| ii. Explain the construction and working of electric horn with a neat sketch. | 6 | 3 | 2 | 1 |
| 30. a. Draw the block diagram of electronic engine control system and discuss the various engine control modes. | 12 | 3 | 3 | 1,3 |

(OR)