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**B.Tech. DEGREE EXAMINATION, MAY 2024**  
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 40<sup>th</sup> 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. _____ represents the ability of a battery to carry the electrical load without aid from a generator-alternator supply. | 1     | 1  | 1  | 1   |
| (A) 20 hour rating  |       |    |    |     |
| (B) 25 ampere rating  |       |    |    |     |
| (C) 4 hour rating   |       |    |    |     |
| (D) 20 ampere rating  |       |    |    |     |
| 2. _____ can also be used to find the state of charge of a lead-acid battery.   | 1     | 1  | 1  | 1   |
| (A) High discharge test   |       |    |    |     |
| (B) Cranking motor test   |       |    |    |     |
| (C) Open circuit voltage test   |       |    |    |     |
| (D) Cadmium test  |       |    |    |     |
| 3. _____ uses the electromagnetic field of a coil to attract an armature and close the contact points.                    | 1     | 1  | 1  | 1   |
| (A) Plunger   |       |    |    |     |
| (B) Solenoid  |       |    |    |     |
| (C) Clutch spring   |       |    |    |     |
| (D) Relay   |       |    |    |     |
| 4. Premature disengagement of pinion during false start of the engine occurs in _____                                     | 1     | 1  | 1  | 1   |
| (A) Folo thro drive   |       |    |    |     |
| (B) Bendix drive  |       |    |    |     |
| (C) Pre-engaged drive   |       |    |    |     |
| (D) Overrunning clutch  |       |    |    |     |
| 5. Field current in an AC generator is usually about _____  | 1     | 1  | 2  | 1   |
| (A) 0.5 to 1.0 amperes  |       |    |    |     |
| (B) 1.0 to 2.5 amperes  |       |    |    |     |
| (C) 1.5 to 3.0 amperes  |       |    |    |     |
| (D) 2.0 to 3.5 amperes  |       |    |    |     |
| 6. The housing of an AC generator is made up of _____   | 1     | 2  | 2  | 1,3 |
| (A) Cast steel  |       |    |    |     |
| (B) Cast iron   |       |    |    |     |
| (C) Cast aluminium  |       |    |    |     |
| (D) Stainless steel   |       |    |    |     |
| 7. A _____ reflector in headlamps is made up of a number of sections each within a common focal point.                    | 1     | 1  | 2  | 1   |
| (A) Elliptical  |       |    |    |     |
| (B) Parabolic   |       |    |    |     |
| (C) Bifocal   |       |    |    |     |
| (D) Hemifocal   |       |    |    |     |

8. \_\_\_\_\_ intensifies the light that is produced by the bulb filament in a conventional sealed head lamp. 1 1 2 1  
 (A) Lens (B) Reflector  
 (C) Filament (D) Housing
9. \_\_\_\_\_ provides information to the ECU on exhaust gas oxygen content? 1 1 3 1  
 (A) Throttle position sensor (B) Lambda sensor  
 (C) Engine coolant temperature sensor (D) Mass air flow sensor
10. \_\_\_\_\_ is a method of regulating the quantity of fuel injected by varying the fuel pressure. 1 2 3 1,3  
 (A) Continuous injection (B) Intermittent injection  
 (C) Phased injection (D) Grouped injection
11. In single point fuel injection, the injector working pressure is about 1 1 3 1  
 (A) 10 to 20 PSI (B) 20 to 30 PSI  
 (C) 30 to 40 PSI (D) 40 to 50 PSI
12. In coolant temperature sensor, the coolant temperature measurement is carried out by a \_\_\_\_\_. 1 1 3 1  
 (A) Thermocouple (B) Thermometer  
 (C) Thermistor (D) Pyrometer
13. A cruise control system controls vehicle speed using 1 1 4 1  
 (A) A feedback carburetor (B) A distributor less ignition system  
 (C) A throttle actuator (D) A MAF sensor
14. \_\_\_\_\_ sensor converts steering torque input and its direction into voltage signal. 1 1 4 1,4  
 (A) Rotation sensor (B) Torque sensor  
 (C) Power sensor (D) Speed sensor
15. The ratio of cornering force to the \_\_\_\_\_ is called the cornering power. 1 1 4 1  
 (A) Slip angle (B) Slip coefficient  
 (C) Slip power (D) Slip speed
16. \_\_\_\_\_ reduces the risk of wheel locking and skidding especially in slippery conditions. 1 1 4 1  
 (A) EBD (B) ESP  
 (C) ACC (D) ABS
17. Which of the following trouble codes are grouped for engine related faults in OBD II? 1 2 5 1,5  
 (A) Pxxx codes (B) Bxxx codes  
 (C) Cxxx codes (D) Uxxx codes
18. 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

- |   |   |   |   |     |
|---|---|---|---|-----|
| 19. Diagnostic trouble code P <sub>0400</sub> indicates | 1 | 2 | 5 | 1,5 |
| (A) Trans axle fault                                    |   |   |   |     |
| (B) Emission control system fault                       |   |   |   |     |
| (C) Idle speed control fault                            |   |   |   |     |
| (D) Computer output circuit fault                       |   |   |   |     |
- 
- |   |   |   |   |   |
|---|---|---|---|---|
| 20. The number of ports in OBD II data link connector are _____ | 1 | 1 | 5 | 1 |
| (A) 8   |   |   |   |   |
| (B) 12  |   |   |   |   |
| (C) 16  |   |   |   |   |
| (D) 18  |   |   |   |   |

**PART – B (5 × 4 = 20 Marks)**

Answer ANY FIVE Questions

- |  | Marks | BL | CO | PO |
|--|-------|----|----|----|
| 21. Write the equations for chemical reactions during charging and discharging in a lead acid battery.   | 4     | 2  | 1  | 1  |
| 22. Draw and explain the ways in which the field and armature windings are connected in a starter motor. | 4     | 2  | 1  | 1  |
| 23. Define head light dazzle and explain different types of reflectors used in automobiles.              | 4     | 2  | 2  | 2  |
| 24. Explain any two methods of wiring the electrical circuit in automobiles with neat sketches.          | 4     | 2  | 2  | 2  |
| 25. Brief the advantages of electronic ignition over conventional ignition systems.                      | 4     | 2  | 3  | 3  |
| 26. Draw the layout of digital cruise control system and mark all the components present in it.          | 4     | 2  | 4  | 4  |
| 27. Write short notes on telematics.   | 4     | 2  | 5  | 5  |

**PART – C (5 × 12 = 60 Marks)**

Answer ALL Questions

- |  | Marks | BL | CO | PO  |
|--|-------|----|----|-----|
| 28. a.i. Explain the effect of temperature on capacity and voltage in a lead acid battery. | 4     | 3  | 1  | 1   |
| ii. Explain various battery charging methods.  | 8     | 3  | 1  | 1   |
| <b>(OR)</b>  |       |    |    |     |
| b. Draw and explain the following starter motor drive mechanisms using suitable sketches.  | 12    | 3  | 1  | 1   |
| (i) Bendix drive   |       |    |    |     |
| (ii) Over running clutch   |       |    |    |     |
| 29. a. Explain the construction and working principle of an alternator with neat diagram.  | 12    | 3  | 2  | 1,3 |

**(OR)**

- |      |  |   |   |   |
|------|--|---|---|---|
| b.   | Explain the construction and working of following automotive electrical accessories. | 3 | 2 | 1 |
| (i)  | Electric horn  | 6 |   |   |
| (ii) | Direction indicators   | 6 |   |   |
30. a. Why ignition advance is necessary? Explain the vacuum spark advance mechanism with neat sketch. 12 3 3 1
- (OR)**
- b. Explain the construction and working of distributorless ignition system with neat sketch. 12 3 3 1,3
31. a. Discuss in detail with neat sketches and circuit diagram with the working of adaptive cruise control system in an automobile. 12 3 4 1,3
- (OR)**
- b. What is the need for ABS? Explain the construction and working of antilock braking system by drawing suitable layout. 12 3 4 1,3
32. a. With the help of neat sketches, discuss the GPS navigation system and its structure in detail. 12 3 5 1
- (OR)**
- b. What are the major categories of Diagnostic Trouble Codes (DTC's)? Explain the code nomenclature in detail using the DTC identification format. 12 3 5 1

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