Reg. No.															

B.Tech. DEGREE EXAMINATION, DECEMBER 2023

Sixth Semester

18AUC303J – AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS

(For the candidates admitted from the academic year 2020-2021 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 used for checking the specific gravity of the electrolyte in a lead acid battery? (A) Ammeter (B) Voltmeter (C) Multimeter (D) Hydrometer	1	1	1	1
2. The electrolyte used in a lead acid battery is a liquid combination of _____ (A) 36% sulphuric acid and 64% water (B) 36% water and 64% sulphuric acid (C) 50% water and 50% sulphuric acid (D) 25% sulphuric acid and 75% water	1	1	1	1
3. The lamination is provided in the armature core of the starter motor so as to reduce the loss due to _____ (A) High current (B) Eddy current (C) Low current (D) Induced current	1	1	1	1
4. _____are not used as automotive starters because of their low initial torque. (A) Series motors (B) Shunt motors (C) Compound type motors (D) Switched reluctance motors	1	2	1	1
5. _____is belt driven by the engine and converts mechanical motion into charging voltage and current. (A) DC generator (B) Voltage regulator (C) AC generator (D) Cut out relay	1	1	2	1
6. Field current in an AC generator is usually about _____ (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	1	1	2	1
7. To protect many wires from damage and to keep them from becoming a confusing tangle, the automotive electrical system is organised into bundles of wires known as _____ (A) Connector pin (B) Cable assembly (C) Conductor counts (D) Wiring harness	1	2	2	1,2

8. _____intensifies the light that is produced by the bulb filament in a conventional scaled head lamp? 1 1 2 1
   (A) Lens (B) Reflector
   (C) Filament (D) Housing

9. The ignition voltage in battery ignition systems is in the range of _____ 1 2 3 1,2
   (A) 1000 to 3000 volts (B) 3000 to 5000 volts
   (C) 5000 to 20000 volts (D) Above 20000 volts

10. _____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

11. _____fires the injection according to engine firing order and is most accurate and durable method of regulating port fuel injection. 1 1 3 1,3
   (A) Grouped injection (B) Simultaneous injection
   (C) Sequential injection (D) Throttle body injection

12. Exhaust gas re-circulation technique helps us to reduce _____ 1 2 3 1,3
   (A) HC emissions (B) CO emissions
   (C) Smoke emissions (D) NO_x emissions

13. Distance measurement in adaptive cruise control system is measured by 1 1 4 1
   (A) Radar sensor (B) Oxygen sensor
   (C) Wheel speed sensor (D) Yaw rate sensor

14. A traction control system in an automobile controls the _____ 1 2 4 1,4
   (A) Engine power during acceleration (B) Vibrations on the steering wheel
   (C) Stopping distance in case of emergency (D) Torque that is transmitted by the tyres to the road surface

15. _____is the process of altering the timing of a valve lift event, and is often used to improve performance, fuel economy and emissions. 1 1 4 1
   (A) Variable valve timing (B) Cam switching
   (C) Cam phasing (D) Gear hobbing

16. The function of anti-lock braking system (ABS) is that it 1 2 4 1,4
   (A) Reduces the stopping distance (B) Maintains directional control during braking by preventing the wheels from locking
   (C) Prevents nose dives during braking and thereby postpones locking of the wheels (D) Minimizes the brake fade

17. Diagnostic trouble code P0400 indicate 1 2 5 1,5
   (A) Computer output circuit fault (B) Trans axle fault
   (C) Emission control system fault (D) Idle speed control fault

18. The number of ports in OBD II data link connector are 1 1 5 1
   (A) 8 (B) 12
   (C) 16 (D) 18

19.	_____is a method of determining present position from a known earlier position and information about vehicle motion. (A) Dead reckoning navigation (B) Inertial navigation (C) Radio navigation (D) Signpost navigation	1	1	5	1
20.	Which of the following trouble codes are grouped for suspension and steering related faults in OBD II? (A) P_{xxx} codes (B) B_{xxx} codes (C) C_{xxx} codes (D) U_{xxx} codes	1	2	5	1,5

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Draw the starting system circuit and overrunning clutch mechanism.	4	2	1	1
22.	Brief about trickle charging and float charging in a lead acid battery.	4	2	1	1
23.	Explain how the rectification of AC to DC is done in an alternator using suitable circuit diagram.	4	2	2	2
24.	Brief about cutout relay with a neat sketch.	4	2	2	2
25.	Brief the types of fuel injection techniques used for regulating the quantity of fuel injected inside the engine.	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.	Name any five components tested by comprehensive component monitor of OBD II.	4	2	5	5

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
28. a.	Explain the construction and working principle of lead acid battery. Write short notes on sulphation issue in lead acid batteries.	12	3	1	1
	(OR)				
b.	Explain the following starter motor drive mechanisms in detail.		3	1	1
	(i) Bendix drive mechanism	6			
	(ii) Folo-thru drive mechanism	6			
29. a.	Explain the working of mechanical and electronic voltage regulator using necessary sketches and circuit diagrams.	12	3	2	1,3
	(OR)				
b.	Why reflectors are used in head lamps? Explain in detail various types of reflectors used in head lamps using suitable sketches.	12	3	2	1
30. a.	Explain the principle of operation of Multi Point Fuel Injection (MPFI) system pertaining to gasoline engine with neat sketches. Also discuss its merits.	12	3	3	1
	(OR)				

b.	Explain the construction and working of programmed ignition system and various sensors used in it with suitable sketches.	12	3	3	1,3
31. a.	What do you mean by electronic suspension system? Discuss the variable damping suspension control system in an automobile with a neat sketch.	12	3	4	1
	(OR)				
b.	Discuss in detail with neat sketches and circuit diagram the working of adaptive cruise control system in an automobile.	12	3	4	1,3
32. a.	With the help of neat sketches, discuss the GPS navigation system and its structure in detail. Write short notes on telematics.	12	3	5	1
	(OR)				
b.i.	Define OBD. What are the requirements of OBD I?	6	3	5	1
ii.	What are the major categories of Diagnostic Trouble Codes (DTCs)? Explain the code nomenclature in detail using the DTC identification format.	6	3	5	1

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