



B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

AUTOMOBILE ENGINEERING

U14AUT605: Automotive Systems

COURSE OUTCOMES

CO1: Apply the concept of embedded systems in the automobile applications.

CO2: Outline the stability and safety systems used in automobiles.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The main ECU 'input' parameters for calculating ignition timing and injector duration are: CO1 [K₂]
 - a) speed and temperature
 - b) speed and load
 - c) pressure and temperature
 - d) pressure and load

2. Multiple selection item with multiple choice code CO1 [K₂]
 Sensor inputs to the ECM are:
 - i. used only for generating fault codes
 - ii. used to provide data that enables the ECM to know the state of variables
 - iii. always analogue signals
 - iv. always frequency signals
 - a) i,ii,iii
 - b) ii,iii,iv
 - c) iii,iv,i
 - d) iv, ii,iii,

3. Exhaust gas recirculation valves: CO1 [K₃]
 - a) blow hot gas into the exhaust system to heat up the catalyst
 - b) control the movement of exhaust gas from the exhaust system into the intake system to reduce NOx
 - c) are not used on diesel engines
 - d) are used to operate exhaust brakes on heavy vehicles

4. A potentiometer is CO1 [K₃]
 a) variable capacitance circuit b) to measure throttle angle
 c) to sense air flow d) all of the above
5. Following a frontal impact, the time taken to fully inflate an airbag will be approximately: CO2 [K₄]
 a) 10 ms b) 20 ms
 c) 30 ms d) 40 ms
6. Remote keyless entry systems has the following sequence CO2 [K₃]
 i. Transmitter sends Unidirectional code transmission
 ii. The key should match
 iii. Frequency range lies between 315-900 MHz
 iv. Receiver accepts the code
 a) i,ii,iii,iv b) ii,iii,iv, i
 c) iii,iv, i ,ii d) iv, i,ii,iii
7. A traction control system: CO2 [K₃]
 a) uses a high speed bus b) is not networked because it does not need to work with other systems on the vehicle
 c) is not used on front-wheel drive vehicles d) can only operate on vehicles equipped with a differential lock
8. Assertion (A): OBD II is mainly concerned with emissions related problems CO2 [K₃]
 Reason (R): OBD II is mainly concerned with making it easier for owner drivers to service their own vehicles
 a) both A and R are individually true and R is the correct explanation of A b) both A and R are individually true but R is not the correct explanation of A
 c) A is true but R is false d) A is false but R is true
9. An inertial navigation system incorporates the following sensors CO2 [K₂]
 a) radio receivers b) Doppler radar
 c) gyros and accelerometers d) All of the above
10. Matching type item with multiple choice code CO2 [K₃]

List I	List II
A) Speed control	i. Cruise control
B) Vehicle stabilization system	ii. ABS
C) Active safety	iii. After the occurrence of accident
D) Passive safety	iv. Before the occurrence of accident

	A	B	C	D
a)	ii)	i)	iii)	iv)
b)	i)	ii)	iv)	iii)
c)	iii)	iv)	i)	ii)
d)	iv)	iii)	ii)	i)

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|-------------------|
| 11. State the significance of electronics in automobiles? | CO1 | [K ₂] |
| 12. Mention few methods used for the measurement of crash. | CO1 | [K ₃] |
| 13. Draw the characteristic curve of excess-air-factor (λ) on pollutant composition in untreated exhaust gas. Also comment on conditions: $\lambda < 1$ and $\lambda > 1$. | CO1 | [K ₃] |
| 14. Give the advantages of electronic ignition system compared with the normal contact breaker system. | CO1 | [K ₂] |
| 15. What are the diagnostic methods available for obtaining fault codes? | CO2 | [K ₄] |
| 16. What is traction control system? | CO2 | [K ₃] |
| 17. Differentiate active and passive safety. | CO2 | [K ₃] |
| 18. State few advantages of an intelligent airbag. | CO2 | [K ₂] |
| 19. Mention the subsystems involved in vehicle navigation system. | CO2 | [K ₃] |
| 20. List the basic components used in automotive vision system. | CO2 | [K ₄] |

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

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|--|-----|-------------------|
| 21. Identify the components of the Electronic Engine control system and explain the working of the engine control system. Explain how the data are being processed from/to the sensors /actuators. | CO1 | [K ₃] |
| 22. How does an airbag inflate? Explain the process of inflating an airbag. Also explain the working of seat belt pretensioner systems with relevant diagram. | CO2 | [K ₄] |

23. What is driver assistance system? List some of the driver assistance systems. Explain how these systems help the drivers to drive the vehicle safely. CO2 [K3]
24. Explain how GPS is used as an infotainment system in automobiles? CO2 [K4]
25. State the different systems available to stabilize a vehicle. Elaborately explain any two of them CO2 [K3]
26. Describe the single point and multi point injection system with neat sketch. CO1 [K3]
27. List the types of solid state ignition system and state the purpose and working of each component with necessary diagrams. CO1 [K3]
