CBCS SCHEME

USN | | | | | | | | | | 17AU71

Seventh Semester B.E. Degree Examination, July/August 2021
Automotive Electrical and Electronic Systems

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. With a schematic diagram, explain the differences between earth return and insulated systems with respect to automobile wiring. **(04 Marks)**
b. Compare 6V and 12V systems in automobiles. **(04 Marks)**
c. What are the types of cables and describe the function of fuse? **(04 Marks)**
d. Write a typical wiring circuit of an automobile electrical system. **(08 Marks)**

2 a. With reaction equation and explain the principle of lead acid battery? Write a schematic diagram and name the basic components. **(06 Marks)**
b. Mention the causes of few common problems and remedies in lead acid batteries. **(04 Marks)**
c. Discuss the pros and cons of lithium ion battery. **(04 Marks)**
d. Explain the following battery tests:
(i) High discharge test (ii) State of charge test (iii) Battery discharge test
(iv) Charging test (v) Cranking motor test (vi) Open circuit voltage test **(06 Marks)**

3 a. Explain the working of a 3 brush dynamo and their limitations. **(06 Marks)**
b. What is the need for voltage and current regulation in charging system? With neat sketch, explain construction and working of cut out relay. **(06 Marks)**
c. Why are 3 phase alternators common in charging system? Show with a schematic diagram, how the output of alternators provide dc supply. **(08 Marks)**

4 a. Show with simple sketches, the differences in mechanism of inertia type and pre-engaged type of cranking motor. Summarize the advantage of pre-engaged starter compared to inertia type. **(08 Marks)**
b. Draw the circuit diagram of a cranking motor and explain. **(04 Marks)**
c. What are the considerations in choosing a starter motor? **(04 Marks)**
d. Write a note on dynamic behaviour of starter motor during starting and terms used for the motor. **(04 Marks)**

5 a. Draw a neat sketch of a conventional ignition system of a 4-cylinder engine. **(04 Marks)**
b. Draw a neat sketch of an electronic ignition and explain the advantages of electronic ignition compared to contact breaker system. **(06 Marks)**
c. With a block diagram, explain high energy of "distributor less" direct ignition system. **(06 Marks)**
d. Explain "Electronic Spark Advance (ESA)". **(04 Marks)**

6 a. Discuss the principle of automobile illumination. Show how high beam and low beam is produced. **(06 Marks)**
b. Write a note on head lamp mounting and construction. **(04 Marks)**
c. Show the construction and working of a fuel gauge and electric horn. **(08 Marks)**
d. What is the difference between speedometer and odometer? From where do these take inputs? **(02 Marks)**

7 a. Explain with a block diagram, combined ignition and fuel control system. (06 Marks)
b. Explain with help of a block diagram, ECU controlled complete vehicle control system. (06 Marks)
c. With an algorithm, show how ignition timing is decided? (08 Marks)

8 a. With a block diagram, show the basic components of an ABS. Explain the functions of each of the components. (06 Marks)
b. Explain the active suspension system with the help of a block diagram showing all their functional components. (06 Marks)
c. Explain the working of air bags and seat belt tensioners. Should they be used together for safety? (08 Marks)

9 a. Define nominal voltage, crate, capacity, power density with respect to a battery. What are the desirable properties of battery for an electric vehicle? (06 Marks)
b. Enumerate the pros and cons of electrification of mobility. (04 Marks)
c. With a schematic diagram, explain series and parallel hybrid electric vehicles configuration. (06 Marks)
d. Name five Indian electric 2 wheeler and 4 wheeler models that are currently running on Indian roads. (04 Marks)

10 a. What are active and passive sensors? Give examples. (04 Marks)
b. What are proximity sensors? What are their applications in automotive? Explain the principle of any two of them. (06 Marks)
c. Explain the principle of light sensor? Show how this could be used to measurement of shaft speed. (05 Marks)
d. With a suitable diagram, explain the principle of hall effect sensor. Show how this can be used. (05 Marks)

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