
MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APR/MAY 2019

SUBJECT: AUTOTRONICS & NAVIGATION [AAE 5201]

REVISED CREDIT SYSTEM
(24/04/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Why are ground straps used in between the hood and the exhaust system of a car? **(02)**

1B. Explain Hall effect with a neat sketch. Explain the factor that determines the dwell of ignition in a Hall Ignition Distributor. **(03)**

1C. Explain CD ignition system with a schematic diagram. Discuss the merits and shortcomings of the same ignition system. **(05)**

2A. Categorize sensors based on the principle of operation and based on contact. Mention 2 examples with automotive applications. **(02)**

2B. What is the importance of using Schmitt trigger in conjunction with CKP Sensor? Explain the methodology of the switching action by considering two resistors of 2 kΩ and 1 kΩ with a voltage output of 24 kV. **(03)**

2C. Describe the construction and working of the hybrid stepper motor. Also, give a brief note on the different driving modes. **(05)**

3A. Elucidate second time around echoes effect with an apt example. **(02)**

3B. Explain snubber circuit with proper diagram. What is its importance? **(03)**

3C. Determine the power density at a target which is at a distance of 150km from a radar of 500MW from a lossless isotropic antenna. If this radar, now employs an antenna with a gain of 3000 and target has a cross-section of 1.25m^2, what is the power density of the echo signal at the receiver? Also, find the maximum range at which the radar can detect the targets having a **(05)**

cross-section of 1.25m^2. The minimum detectable signal of the radar is 10^{-8} mW and wavelength of the transmitted energy is 4cm.

4A. Explain Dead reckoning navigation. **(02)**

4B. What are the major radio navigation systems? Briefly explain each. **(03)**

4C. Explain the working of optical gyroscopes with proper diagrams and equations. **(05)**

5A. Briefly describe space segment of GPS. **(02)**

5B. Explain the working of adaptive cruise control system with proper diagrams. **(03)**

5C. Explain the working of GPS with all necessary diagrams and equations. **(05)**