Code No: **R42241** **R10** **Set No. 1**

**IV B.Tech II Semester Regular Examinations, April/May - 2014**

# AUTOMOTIVE CONTROL SYSTEMS

**(Automobile Engineering)**

**Time : 3 hours** **Max. Marks: 75**

**Answer any Five Questions**
**All Questions carry equal marks**
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1 a) With the help of 'p-v' diagram, explain the principle of operation of a spark-ignition engine.
b) What are the alternative fuels do you suggest for automotive engines? Explain briefly their advantages.

2 a) What is the importance of air-fuel ratio? Explain.
b) Draw a cross-sectional view of intake manifold, and write the equation of 'change in internal energy of the air-mass' into the intake manifold, in terms in-coming and out-going energy flows.

3 a) Draw the schematic structure of a fuel injector and express the 'flow-rate of injected fuel-mass with respect to crankshaft angle'.
b) What is the importance of fuel evaporation? Explain briefly.

4 a) What is the importance of 'idle speed control'? Explain briefly.
b) What do you understand about 'adaptive knock control'? Explain briefly.

5 a) What are the advantages of model based diagnostic system? Explain.
b) What is the purpose of residual evaluation? Explain.

6 a) Derive the following basic driveline equations of 'front-engine rear-wheel' drive.
b) What is 'drive-line speed control'? Explain briefly.

7 a) What is ABS? Explain.
b) How do you estimate the 'road-gradient' by using 'acceleration and wheel speed' method? Explain.

8 a) What are the requirements of road model?
b) What do you understand about the 'stabilization level' of vehicle control? Explain briefly.

Code No: **R42241** **R10** **Set No. 2**

**IV B.Tech II Semester Regular Examinations, April/May - 2014**

# AUTOMOTIVE CONTROL SYSTEMS

**(Automobile Engineering)**

**Time : 3 hours** **Max. Marks: 75**

**Answer any Five Questions**

**All Questions carry equal marks**

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1 a) With a line diagram, describe the working principle of Stirling engine.
b) With the help of 'p-v' diagram, describe the principle of operation of a compression –ignition engine.

2 a) What do you understand about Stoichiometric combustion? Explain.
b) With a simple diagram, explain the process of in-cylinder injection in internal combustion engines.

3 a) With a schematic diagram, explain the sequence of the evaporation process.
b) State the equations: (i) Flow of exhaust gases (into exhaust manifold) with respect to crankshaft angle, and (ii) Mass of remaining gases in the combustion chamber after exhaust. Also explain the significance of these equations.

4 a) What is the effect of 'fuel self-inflammation' on knocking of SI engine? Explain briefly.
b) What is 'combustion pressure sensor'? How do you estimate the engine-knock by using in-cylinder pressure data? Explain briefly.

5 a) What is the necessity of 'on-board diagnosis' of automotive engine? Explain briefly.
b) Explain briefly the 'crankshaft moment of inertia' method of misfire detection:.

6 a) Explain briefly, the stationery gear- shift experiments.
b) What is 'drive-line torque control'? Explain.

7 a) What is road gradient? Explain briefly.
b) Draw the block diagram (and its closed loop circuit) of 'torque balance at wheel base' and briefly explain the torque balance.

8 a) Define the term 'course-path'. What is the importance of course path?
b) What do you understand about the following vehicle control tasks: (i) Navigational level, and (ii) Guidance Level?

Code No: **R42241** **R10** **Set No. 3**

**IV B.Tech II Semester Regular Examinations, April/May - 2014**

# AUTOMOTIVE CONTROL SYSTEMS

**(Automobile Engineering)**

**Time : 3 hours** **Max. Marks: 75**

**Answer any Five Questions**

**All Questions carry equal marks**

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1 a) What is an isochoric process? What is the importance of isochoric process? Explain briefly.
   b) How do you classify automotive engines based on fuel usage? What are the advantages? Explain.

2 a) With a simple diagram, briefly explain the process of manifold-injection in IC engines.
   b) What is flame propagation? What are the parameters, which influence on flame propagation? Explain briefly.

3 a) Explain briefly the 'zero-dimensional modeling' of cylinder dynamics.
   b) With simple schematic diagrams, describe the working principle of a compression-ignition engine.

4 a) Draw the 'circuit of engine model for lambda control' and explain briefly the steps of response.
   b) What are the advantages and disadvantages of 'mechanical vibration (knock) sensor'?

5 a) What are the characteristics of model based diagnosis? Explain briefly.
   b) What is fault? What are the types of faults? Explain briefly.

6 a) Explain briefly, the dynamical gear- shift experiments.
   b) What is anti-jerking control? Explain briefly

7 a) What are the advantages of ABS?
   b) How do you estimate the 'road-gradient' by using 'model based road gradient observation (Luenberger-observer)'method? Explain.

8 a) What is wind-strength? What is the significance of wind-strength? Explain.
   b) What do you understand about hybrid-driver model? Explain.

Code No: **R42241** **R10** **Set No. 4**

**IV B.Tech II Semester Regular Examinations, April/May - 2014**

# AUTOMOTIVE CONTROL SYSTEMS

**(Automobile Engineering)**

**Time : 3 hours** **Max. Marks: 75**

**Answer any Five Questions**
**All Questions carry equal marks**
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1 a) What is an isentropic process? What is the practical importance of isentropic process? Explain.
b) With a simple diagram, explain the principle of gas turbine engine with the help of Brayton cycle.

2 a) What do you understand about lean-burn engines? Explain briefly.
b) What is the effect of fuel- temperature on inflammation delay? Explain.

3 a) What do you understand about 'charge-exchange' in IC engines? Write the mathematical expression.
b) Draw a typical fuel-injection curve of a modern Diesel injection system and explain briefly the importance of the shape of injection curve.

4 a) What are the advantages and disadvantages of 'combustion pressure sensor'? List out.
b) Draw the block diagram of a lambda-controlled spark-ignition engine, and explain the Stoichiometric operation of spark-ignition engine.

5 a) List out the variable used for modeling air-intake system.
b) What are the principles of model-based diagnosis? Explain briefly.

6 a) Explain the fuel-injection strategy used for speed control.
b) What is the necessity of anti-jerking control? Explain.

7 a) What do you understand about 'yaw dynamics and its control'?
b) Draw the pattern of ABS cycle signals of wheel speed and cut-out of wheel acceleration and explain the detection of ABS cycle.

8 a) What are the different types of road surfaces? Explain.
b) What do you understand about PID driver model? Explain briefly.