

**BTAE 401 Internal Combustion Engines****Time allowed = 3 hrs.****Max. Marks = 60***Attempt any four questions from section B, any two questions from section C and section A is compulsory***Section A**

- Q.No.1 (a) What is firing order; Describe factors affecting its selection.  
 (b) Define volumetric efficiency; how it is calculated and state its importance?  
 (c) What is the function of vibration damper?  
 (d) Describe how enrichment of F/A ratio is achieved in carburetor during cold starting.  
 (e) Define Octane number and Performance number?  
 (f) What is crank case ventilation?  
 (g) What is the function of Thermostat in engine cooling system?  
 (h) Why Governor is important in diesel engine and not in petrol engine?  
 (i) What is volumetric efficiency?  
 (j) What are the antiknock agents? (10 X 2 = 20)

**Section B**

- Q.No.2 Draw Port timing diagram for a two stroke cycle engine, why actual valve timing diagram differs from actual valve timing diagram?  
 Q.No.3 Explain the difference between pre ignition and post ignition. Which factors/conditions lead to these combustion phenomenon?  
 Q.No.4 Draw a line diagram of Electronic Fuel Injection system, discuss it briefly and state its merits over carburetor System  
 Q.No.5. Discuss working of atleast two combustion chambers for C.I. engines  
 Q.No.6 Explain the purpose and limitations of supercharging of engines? (4 X 5 = 20)

**Section C**

- Q.No.7. Discuss in detail the different stages of combustion in a S.I engine. Explain briefly the influence of various factors on knocking in S.I. engine.  
 Q.No.8. Differentiate between (i) individual pump and nozzle system, (ii) unit injector system (iii) common rail system (iv) distributor system  
 Q.No.9. A test on single cylinder, 4-stroke oil engine, having bore 180mm and stroke 360mm gave the following results: Speed 290 r.p.m; brake torque 392Nm; indicated mean effective pressure 7.2 bar; oil consumption 3.5 kg/hour; cooling water temperature rise by 36°C; air-fuel ratio by weight 25; exhaust gas temperature 415°C; barometric pressure 1.01325 bar; room temperature 21°C. The fuel has calorific value of 45,200 kJ/kg and it contains 15% of hydrogen by weight. Calculate:- (a) the indicated thermal efficiency (b) volumetric efficiency (c) draw up Heat balance Sheet in terms of kJ/min. take  $R=0.287\text{kJ/kg-K}$  and  $c_p$  for dry exhaust gases =  $1.0035\text{kJ/kg-K}$  and  $C_{ps}$  for superheated steam =  $2.093\text{kJ/kg-K}$  (2 X 10 = 20)