**Registration No :** | | | | | | | | | | |

**Total Number of Pages : 02** **B.Tech.**
**PME4I103**

**4th Semester Regular / Back Examination 2017-18**
**IC ENGINE & GAS TURBINE**
**BRANCH : MECH**
**Time : 3 Hours**
**Max Marks : 100**
**Q.CODE : C779**

**Answer Part-A which is compulsory and any four from Part-B.**
**The figures in the right hand margin indicate marks.**
**Answer all parts of a question at a place.**

**Part – A (Answer all the questions)**

**Q1** **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

**a)** Thermal efficiency of CI engine is higher than that of SI engine due to
(a) Fuel used (b) Higher compression ratio
(c) Constant pressure heat addition (d) None of the above

**b)** Optimum spark timing gives
(a) Higher mean effective pressure (b) Higher efficiency
(c) Both (a) and (b) (d) None of the above

**c)** Scavenging air in diesel engine means
(a) Air used for combustion sent under pressure
(b) Forced air for cooling cylinder
(c) Burnt air containing products of combustion
(d) Air used for forcing burnt gases out of engine's cylinder during the exhaust period

**d)** The volumetric efficiency is effected by
(a) The exhaust gas in the clearance volume
(b) Valve timing
(c) The design of intake and exhaust valve
(d) All of the above

**e)** Ignition quality of diesel fuel is indicated by its
(a) Octane number (b) Cetane number
(c) Flash point (d) Fire point

**f)** The theoretically correct air fuel ratio for petrol engine is of the order of
(a) 5 : 1 (b) 10 : 1
(c) 15 : 1 (d) 20 : 1

**g)** Supercharging is essential in
(a) Diesel engines (b) Gas turbines
(c) Petrol engines (d) Aircraft engines

**h)** Combustion in compression ignition engines is
(a) Homogeneous (b) Heterogeneous
(c) Turbulent (d) Laminar

**i)** An engine indicator is used to determine the following
(a) Speed (b) Temperature
(c) BHP (d) Mean effective pressure and I.H.P.

**j)** Pressure ratio for a gas turbine may be in the range
(a) 2 to 3 (b) 3 to 5
(c) 16 to 18 (d) 18 to 22

**Q2** **Answer the following questions : *Short answer type :*** **(2 x 10)**

**a)** Define mean effective pressure? What is its significance?
**b)** What is calorific value?
**c)** Define equivalence ratio. What is its value for lean and rich mixture?
**d)** What is the purpose of firing order in multi-cylinder engines?
**e)** Draw the PV Diagram for super charged CI engine.
**f)** What do you mean by Dwell angle?
**g)** What is meant by ignition delay?
**h)** What do you understand by alternative fuels for IC engines?
**i)** What are the limitations of air cooling system?
**j)** What is meant by abnormal combustiom?

**Part – B (Answer any four questions)**

**Q3** **a)** Compare air standard cycle and actual cycle. Briefly explain time loss factor, heat loss factor and exhaust blow down factor. **(10)**

**b)** Compare CI and SI on the basis of performance characteristics. **(5)**

**Q4** **a)** Discuss various qualities of an SI and CI engine fuels. **(10)**

**b)** Briefly describe the different types of fuel injection system? **(5)**

**Q5** **a)** With neat sketch explain modern ignition system (TCI and CDI). **(10)**

**b)** With neat sketch describe the stages of combustion in SI engine? **(5)**

**Q6** **a)** The following observations were recorded during a trial of a four-stroke, single cylinder oil engine. Duration of trial is 30 min; oil consumption is 4 liters; calorific value of the oil is 43 MJ/kg; specific gravity of the fuel =0.8; average area of the indicator diagram =8.5 cm2; length of the indicator diagram=8.5 cm; spring constant =5.5 bar/cm; brake load =150 kg; spring balance reading =20 kg; effective brake wheel diameter =1.5 ; speed =200 rpm; cylinder diameter=30 cm; stroke = 45 c; jacket cooling water = 10 kg/min; temperature rise is 36 °C. Calculate (i) indicated power (ii) brake power (iii) mechanical efficiency (iv) brake specific fuel consumption in kg/kW h and (v) indicated thermal efficiency. **(10)**

**b)** What is EGR? and Explain how it reduces NOx emission. **(5)**

**Q7** **a)** Explain briefly different types of lubricating mechanism and their functions. **(10)**

**b)** With neat sketch explain the operation of a simple elementary carburetor. **(5)**

**Q8** **a)** Derive the expression for efficiency and specific work output for a simple gas turbine in terms of pressure ratio. **(10)**

**b)** Discuss the relative advantages and disadvantages of closed cycle and open cycle gas turbine plants. **(5)**

**Q9** **Write short notes on any THREE :** **(5 x 3)**

**a)** Dual fuel engine
**b)** Supercharging
**c)** Morse Test
**d)** MPFI