GYANMANJARI INSTITUTE OF TECHNOLOGY
MECHANICAL ENGINEERING DEPARTMENT
CLASS TEST No.2

Subject: Elements of Mechanical Engg. **Date: 19.03.2016**

Instruction: **Marks: 30**

1. All questions are compulsory

2. Make suitable assumption wherever necessary

Q. N	A	B	Mark
1	Derive expression of efficiency for diesel cycle	Derive expression of efficiency for otto cycle	07
2	1 kg of air at 9 bar pressure and 80° C temperature undergoes a non-flow work poly tropic process. The law of expansion is PV1.1 = C. The pressure falls to 1.4 bar during process. Calculate (1) Final temperature (2) Work done (3) Change in internal energy (4) Heat exchange. Take R=287 J/kg and γ = 1.4 for air.	One cubic meter of air at pressure of 1.5 bar and 80°C is compressed to final pressure 8 bar and volume 0.28 m3. Determine (i) mass of air (ii) index of 'n' compression (iii) change in internal energy (iv) Heat transfer during compression. Take γ = 1.4 and R= 287 J/kgK.	07
3	With neat sketch explain construction and working of combined separating and throttling calorimeter		07
4	Determine the enthalpy and internal energy of 4 kg of steam at a pressure 26 bar (abs.), (i) when the dryness fraction of the steam is 0.76 (ii) when the steam is dry and saturated (iii) when the steam is superheated to300ºC. Take the specific heat of superheated steam as 2.29 kJ/kgK.	3.5 kg of steam at a pressure of 17 bar and temperature of 250°C is expanded until the pressure becomes 3.8 bar. The dryness fraction of steam is then 0.78. Calculate change in internal energy. Take C_p=2.1 kJ/kgK.	07
5	State the function and location of the following (i)Fusible plug (ii)Steam stop valve	State the function and location of the following (i)Feed check valve (ii)Economizer	02

Use Following Values

P (bar)	**T_{sat}(ºC)**	**h_f(kJ/kg)**	**h_{fg}(kJ/kg)**	**h_g (kJ/kg)**	**v_f (m^3/kg)**	**V_g (m^3/kg)**
17	**204.3**	**871.8**	**1921.5**	**2793.4**	**0.001163**	**0.117**
26	**226.0**	**971.7**	**1829.6**	**2801.4**	**0.001201**	**0.0769**
3.8	**141.8**	**596.8**	**2138.6**	**2735.3**	**0.001082**	**0.486**