**BBDNITM**

**MECHANICAL DEPARTMENT**

**SESSION (2018-19)**

**Subject- IC Engine and Compressors [RME-051]**

**Assignment no. 5**

1. Describe the working of Reciprocating and Multistage Compressor.
2. Difference between Axial and Vaned Compressor with neat sketch diagram.

A gas turbine draws in air from atmosphere at 1 bar and 100C and compresses it to 5 bar

with an isentropic efficiency of 80%. The air is heated to 1200 K at constant pressure and

then expanded through two stages in series back to 1 bar. The high pressure turbine is

connected to the compressor and produces just enough power to drive it. The low pressure

stage is connected to an external load and produces 80 kW of power. The isentropic

efficiency is 85% for both stages.

For the compressor 1.4 and for the turbines 1.333. The gas constant R is 0.287 kJ/kg K

for both.

**3**. the mass flow of air in kg/s is given by:

(a) 0.64

(b) 0.54

(c) 0.34

(d) 0.44

**4** The inter-stage pressure in bar of the turbines

(a) 2.9

(b) 2.3

(c) 3.3

(d) 3.8

**5.** Heat input in the system in KW is

(a) 333

(b) 355

(c) 345

(d) 323

**6.** Thermal efficiency of the cycle is given by:

(a) 0.24

(b) 0.31

(c) 0.39

(d) 0.45

In a gas turbine plant operating on joule cycle maximum and minimum temperature are 825oC. The pressure ratio is 4.5. Calculate the specific work output, cycle efficiency and work ratio. Assume isentropic efficiencies of the compressor and turbine at 85 and 90 per cent. If the rating of the turbine is 1300 kw.

**7**. What is the heat rate in kj/kw-hr ?

**8**. What is the mass flow in kg/sec ?

**9**. A gas turbine cycle takes in air at 250c and atmospheric pressure. The compression pressure ratio is 4. The compressor efficiency is 75 per cent. The inlet temperature to turbine is limited to 7500C. What is turbine efficiency would give overall cycle efficiency zero per cent.