Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/EEE/NEW/SEM-6/EEE-605A/2013

2013
POWER PLANT ENGINEERING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten of* the following : $10 \times 1 = 10$

   i) Load factor of power station is defined as
      a) maximum demand / average load
      b) average load x maximum demand
      c) average load / Maximum demand
      d) (maximum demand)^2 / average load.

   ii) A load curve indicates
      a) average power used during the period
      b) average kWh (KW) energy consumption during the period
      c) Total energy used during the period
      d) maximum power used peak period only

iii) A steam power plant works on which one of the following eye

a) Gas power b) Rankine

c) otto d) diesel.

iv) Match list-I (type of boiler) with list-II (classification of boiler), select the correct answer using the code given below the list

List – I	List – II
A. Babcock and Wilcox	1. water-tube with staight type tube
B. Cochrn	2. water tube with bent type tube
C. Stirling	3. Vertical fire tube

Code :	A	B	C
a)	1	2	3
b)	3	2	1
c)	1	3	2
d)	None of these.		

v) Boiler efficiency is the ratio of

a) Actual heat utilised in generation of steam to the heat supplied by the fuel

b) The heat supplied by the fuel to Actual heat utilised in generation of stem

c) enthalpy of steam to the enthalpy of water at given feed temperature

d) Entropy of steam to the entropy of water at given feed temperature

vi) The mechanical efficncy of a diesel engine is defined as

a) B.B.P/I.H.P b) I.H.P / B.H.P

c) B.H.P × I.H.P d) $(B.H.P)^2/I.H.P.$

vii) Thermal efficiency of closed cycle gas turbine plant increases by

a) reheating b) intercooling

c) regenerator d) all of above.

viii) The power output from a hydro-electric power plant depends on three parameters

a) head, type of dam and discharge

b) head, discharge and efficiency of the system

c) Efficiency of the system, type of draft tube and type of turbine used

d) type of dam, discharge and type of catchment area

ix) The Knocking tendency in C.I engine increases with

a) decrease of compression ratio

b) increase in compression ratio

c) increasing the temperature of inlet air

d) increasing cooling water temperature.

x) Gross head of a hydropower station is

a) the difference of water level between the level in the storage and tail race

b) the height of water level in the river where the storage is provided

c) the height of water level in the river where tail race is provided

d) none of these.

xi) The specific speed of turbine is given by

a) $N\ x(P)^{1/2}/H^{5/4}$ b) $N\ x\ (P)^{1/2}/H^{3/4}$

c) $N\ x\ (P)^{1/2}/H^{3/2}$ d) $N\ x\ (P)^{1/2}/H^{2/3}$.

xii) The function of moderator in nuclear reactor is

a) to slow down the fast moving electron

b) to speed up the fast moving electron

c) to start the chain reaction

d) to transfer the heat produced inside the reactor to a heat exchanger.

xiii) In CANDU type nuclear reactor

a) Natural uranium is used as fuel and water as moderator

b) Natural uranium is used as fuel and heavy water as moderator

c) Enriched uranium is used as fuel and water as moderator

d) Enriched uranium is used as fuel and heavy water as moderator

xiv) the function of solar collector is to convert

a) solar energy into electricity

b) solar energy into radiation

c) solar energy into thermal energy

d) solar energy into mechanical energy.

xv) maximum wind energy available is proportional to

a) square of diameter of rotar

b) air density

c) cube of the wind velocity

d) all of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. A Power station supplies the following loads to the consumers

Time in hours	0-6	0-10	10-12	12-16	16-20	20-22	22-24
Load in MW	30	70	90	60	100	80	60

Draw the load cuve and estimate the load factor of the plant.

3. What is meant by load curve ? Explain its importance in power generation.

4. Explain with a sketch a fluidized bed combustion system.

5. Explain briefly the working a geothermal plant.

6. What is the necessity of generator cooling ? What are methods used for generator cooling ?

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Draw a general layout of steam power plant and explain the working of different circuits. 12

   b) Compare fire-tube and water-tube boiler. 3

8. a) The following readings were taken during the test of single cylinder four stroke diesel engine : 10

   Cylinder diameter = 250 mm

   Stroke length = 400 mm

   Mean Effective pressure = 6.5 bar

   Engine speed = 250 rpm

   Net load on the brake = 1080 N

   Effective diameter of the brake = 1.5 m

   Fuel used per hour = 10 kg

   Calorific value of fuel = 44300 Kj/Kg

   Calculate :

   i) Indicated Power (ii) Brake Power (iii) Mechanical Efficiency (iv) Indicated Thermal Efficiency (v) Brake Thermal Efficiency.

   b) Explain the layout of gas turbine power plant. 5

9. a) Sketch the layout of hydro electric power plant & explain the functions of each component in it. Discuss the advantages & limitations of this power plant. 12

   b) Why is the Electricty the most convenient form of Energy ? 3

10. a) What are different types of reactors commonly used in nuclear power stations ? Describe the fast breeder reactor ? 10

    b) Explain briefly how tidal energy converted to electrical energy. 5

11. Write short notes on the following : 3×5

    a) wind power

    b) pollution from nuclear power plant

    c) Solar Power.