(d) A power station supplies the following loads to the consumers :

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

Contd : Time. 22–24
Load 60
Draw the Load Curve and Find the load factor of the plant. 5+5+6+9=25

6. (a) What are Solar Water Heaters ?
   (b) What are Solar Driers and Solar Desolination Systems ?
   (c) How wind energy can be used for electricity generation by Wind Millo ?
   (d) 'Power from Solar Photovaltaic is fed to a smart or Dynamic Grid'–What does it mean ? Write briefly ? 5+10+5+5=25

7. Write notes on any ***five*** of the following : 5x5=25
   (a) Nuclear Power Generation
   (b) Microhydel power plants
   (c) Kyto Protocol and Paris agreement on climate
   (d) Role of Renewables in future power generation
   (e) Impulse and Reaction Turbines
   (f) Cogeneration
   (g) Alloy Steels in Boilers

Ex./PG/PE/T/114A/2017

MASTER OF POWER ENGINEERING EXAMINATION, 2017

(1st Semester)

Power Generation Methodology

Time : Three hours Full Marks : 100

Answer any ***four*** questions.
All questions carry equal marks.
Use of Steam Tables permitted. Graph paper may be used.
PARTS OF SAME QUESTION MUST BE ANSWERED TOGETHER

1. (a) Name four primary and four secondary sources of energy.
   (b) Differentiate between Renewable and Non-Renewable Energy Sources on following points :
   (i) Capital Cost/kw, (ii) Lifetime of supply (iii) Cost at source, (iv) Pollution & Environmental damage.
   (c) Write maximum 10 lines on what is climate change and how new Power Generation Methods can solve the problem. 8+8+9=25

2. (a) Sketch the T-S and h-s diagram for a Simple Rankine Cycle for a steam power plant.

(b) Steam at 20 bar (p_1), 360°C is expanded in a steam Turbine to 0.08 Bar (p_2). Then it enters a condenser, condensed to saturated liquid water and a pump feeds back the water to the Boiler.

Calculate, per kg of steam, the network and the cycle efficiency. Plot the cycle on T-S diagram, take 1 as inlet to Turbine point.

Given,

$h_1 = 3159.3$ KJ/kg

$h_3 = h_{fp2} = 173.88$ KJ/kg

$h_{fgp2} = 2403.1$ KJ/kg

$\upsilon_{fp2} = 0.001008$ m^3/kg

$s_1 = 6.9917$ KJ/kg

$s_3 = s_{fp2} = 0.5926$ KJ/Kg K

$s_{gp2} = 8.2287$ KJ/kg

(c) Explain the effects of pressure and temp. of supply steam and condenser pressure on Rankine Cycle efficiency. 6+15+4=25

3. (a) Sketch a layout diagram of a coal based power plant.

(b) What is a Boiler ? What is the difference between Water Tube and Fire Tube boiler ? What type of boilers are used in modern power plants ?

(c) How do you specify a boiler ?

(d) The boiler efficiency can approach 90% wheras a power plant efficiency is of the order of 40%. Why ? 10+6+4+5=25

4. (a) Name 3 accessories and 3 mountings of a Boiler or Steam Generator. Also state their functions.

(b) What are Super Critical Boilers ? Why Super Critical Boilers are more efficient ?

(c) Name 2 methods how boilder emissions are controlled.

(d) A spray type desuperheater is supplied with water at 60°C. It is connected with a steam line carrying 200 tonnes/hr. of steam at 35 bars. Calculate the amount of water that must be sprayed per hour to maintain the steam at 600°C, when the boiler load causes steam to enter the desuperheater 450°C. 6+4+5+10=25

5. (a) What are the different types of loads in a Power System as regards consumption ?

(b) Sketch a daily load curve for power system. Then show, how you can obtain the load duration curve (Daily).

(c) Define Peak Load, load factor and capacity factor for a power plant.