CLASS: MTECH   SEMESTER : I/NA
BRANCH: EEE   SESSION : MO/18

SUBJECT: EE533 MODERN POWER SYSTEM PLANNING

TIME: 3 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Establish the basic philosophy of power system planning. Enumerate the hierarchy of power system   [5]
         planning with basic description.
Q.1(b)   The recorded peak load from 2010 to 2016 for a given area is as follows: Find the forecasted load   [5]
         for next 5 years using extrapolation method.
         Year: 2010   2011   2012   2013   2014   2015   2016
         MW: 65   67   69   71   74   76   80

Q.2(a)   Formulate equivalent load duration curve for power system production simulation and derive   [5]
         LOLP.
Q.2(b)   Estimate the different types of cost functions for generation planning with the mathematical   [5]
         expressions.

Q.3(a)   Formulate the mathematical objective function for maintenance scheduling for a power system   [5]
         with using the levelized reserve capacity method.
Q.3(b)   Formulate the maintenance scheduling for a power system with installed capacity of 2500 MW using   [5]
         the levelized reserve capacity method. There are five generating units that should be scheduled
         for maintenance within 8 weeks. The data for the generating unit to be scheduled for maintenance
         and the load are listed in the tables 1 and 2 below respectively.

Table 1: Data for the generating units

Unit No.	Capacity (MW)	FOR	Maintenance Duration (weeks)
1	400	0.04	4
2	300	0.03	1
3	200	0.02	4
4	100	0.02	2
5	100	0.02	1

Table 2: Load data

Duration (weeks)	Maxm Load (MW)
1	2000
2	1920
3	1800
4	1740
5	1640
6	1500
7	1580
8	1620

Q.4(a)   Evaluate the generation planning optimized according to generating unit categories WASP) based   [5]
         on mathematical objective function.
Q.4(b)   The investment in generation planning project is Rupees 20 crores. The construction period is 10   [5]
         years. Each year has a share of 2000 lakhs rupees investment. The credit interest is 10 per cent if
         all the investment comes from bank loans. What is the debt to the lending bank when the project
         goes into production?

Q.5(a)   Design philosophy of Smart Grid involves three layers, as per IEEE. Assess the smart grid   [5]
         performance based these layers.
Q.5(b)   Construct a typical Micro-grid with essential elements and evaluate its advantages in terms of green   [5]
         energy generation and reliability.