University of Mumbai

Examinations Commencing from 17th May 2022 to 4th June 2022

Program: **BE Electrical Engineering**

Curriculum Scheme: Rev2016

Examination: Summer 2022/BE/Semester VIII

Course Code: **EEDLO8044** and Course Name: **Power System Planning and Reliability**

Time: 2-hour 30 minutes Max. Marks: 80

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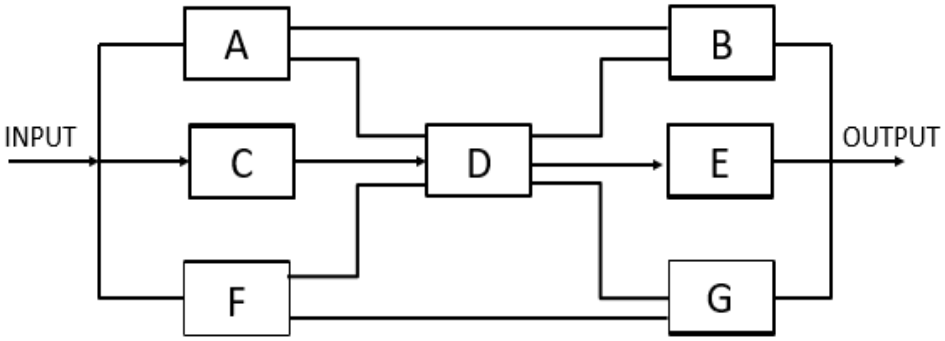
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	MTTF means
Option A:	Major time to fail
Option B:	Mean time to fail
Option C:	Major time to failure
Option D:	Mean time to failure
2.	The main aim of short-term planning is
Option A:	Developing new connections for distribution consumers.
Option B:	Reduction of transmission and distribution losses.
Option C:	Development of interstate grid.
Option D:	Reducing environmental issues for development of newer power plants.
3.	What will the total power capacity be in a system when three 50MW unit and one 70MW unit is operated at FOR of 0.02 and 0.03 respectively?
Option A:	170 MW
Option B:	150 MW
Option C:	220 MW
Option D:	70 MW
4.	Wear-Out region is where failure rate is
Option A:	Perpetual
Option B:	Decreasing
Option C:	Constant
Option D:	Increasing
5.	Reserve capacity is a difference between Installed capacity and .....
Option A:	base load
Option B:	Peak load
Option C:	origin
Option D:	Half of peak load
6.	MTTF is
Option A:	μ
Option B:	$1/\mu$
Option C:	$1/\lambda$
Option D:	λ
7.	Calculate the forced outage rate if failure rate is 3.65 F/year and repair rate is 48.4928 repairs /year.
Option A:	0.02
Option B:	0.05

Option C:	0.09
Option D:	0.07
8.	Street lighting is _____ type of load?
Option A:	Residential load
Option B:	Municipal load
Option C:	Industrial load
Option D:	Commercial load
9.	Development and installation of new power plant is done in
Option A:	Long term planning
Option B:	Short term planning
Option C:	Reactive power planning
Option D:	Medium term planning
10.	Select rapid start unit from following
Option A:	coal power plant
Option B:	gas turbine power plant
Option C:	nuclear power plant
Option D:	geothermal power plant

Q2. (20 Marks Each)	**Solve any Four out of Six. 5 marks each**
A	Explain operating reserve in detail?
B	Differentiate between long term & short-term planning?
C	A system is to be designed with overall reliability of 0.97 using components having individual reliability of 0.6. What is the minimum number of components that must be connected in parallel?
D	A generating system is consisting of one generator of 40 MW with FOR 0.02 and another generator of 60 MW with FOR 0.04. Prepare capacity outage table.
E	Derive the general expression for reliability in terms of Hazard Rate.
F	Explain weather load model?

Q3. (20 Marks Each)	**Solve any Two Questions out of Three. 10 marks each**
A	Explain Frequency and Duration method and hence explain the concept of Rate of Departure.
B	For the system shown in figure, calculate the unreliability of the system if all components are identical with a reliability of 0.95.

	
C	Consider a system containing six units of 40 MW each with FOR of 0.03. Prepare the capacity outage table for the system. Find loss of load expectation (LOLE) and the risk factor if the annual peak load is 170 MW and Base load is 40 % of peak load.

Q4. (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	Explain classification and characteristics of load?
ii.	Explain bathtub curve?
iii.	Explain co-relation techniques used in load forecasting?
B	**Solve any One** **10 mark each**
i.	Explain modified PJM method?
ii.	Explain data requirement for composite generation & transmission system?