University of Mumbai

PSPR

Course Code: **EEDLO 8044** Course Name: Power System Planning and Reliability

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MCQ

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	If the actual demand for a period is 100 units but forecast demand was 90 units. The forecast error is
Option A:	-10
Option B:	10
Option C:	-5
Option D:	5
2.	The aim of Energy forecasts is to determine the type of
Option A:	transmission facilities required
Option B:	distribution facilities required
Option C:	utilization facilities required
Option D:	generation facilities required
3.	Industrial loads are the
Option A:	base loads
Option B:	peak loads
Option C:	intermittent loads
Option D:	variable loads
4.	The study period of generation planning is normally
Option A:	ten to fifteen years
Option B:	five to ten years
Option C:	twenty to twenty-five years
Option D:	two to three years
5.	Planning of LV network is to find the placement and rating of
Option A:	distributors and LV feeders
Option B:	distribution transformers and service mains
Option C:	distribution transformers only
Option D:	distribution transformers and LV feeders
6.	Reactive power planning (RPP) is one of the most difficult
Option A:	numeric problem of power system
Option B:	optimization problem of power system
Option C:	statistics problem of power system
Option D:	minimization problem of power system
7.	if there are 200 surviving components after 400 seconds, and 8 components fail over the next 10 seconds, the failure rate after 400 seconds is given by;
Option A:	4%

Option B:	0.40%
Option C:	0.39%
Option D:	0.42%
8.	The static capacity requirement relates to the
Option A:	capacity of transformer
Option B:	capacity of reactor
Option C:	long-term evaluation of the overall system requirement
Option D:	short-term evaluation of this overall system requirement
9.	A system consists of two 3 MW units and one 5 MW unit with forced outage rates of 0.02. What will be the probability of 5 MW generating unit of being in service
Option A:	0.05
Option B:	0.98
Option C:	0.02
Option D:	0.95
10.	The generation model required in the loss of load approach is sometimes known as a
Option A:	capacity outage probability index
Option B:	capacity outage probability ratio
Option C:	capacity outage probability system
Option D:	capacity outage probability table
11.	Loss of load expectation (LOLE) is widely accepted and utilized probabilistic method in power generation reliability evaluation for purposes of
Option A:	system expansion
Option B:	system expansion and interconnection
Option C:	system adequacy and security
Option D:	system facilitation and interconnection
12.	"The probability of the generation just satisfying or failing to satisfy the system load is known as"
Option A:	unit commitment risk
Option B:	unit commitment failure
Option C:	unit commitment style
Option D:	unit commitment process
13.	The advantage of modified PJM is that
Option A:	it allows the exclusion of rapid start units
Option B:	it allows the inclusion of rapid start units
Option C:	it does not allow the inclusion of rapid start units
Option D:	it does not allow the exclusion of rapid start units
14.	The ORR is
Option A:	time invariant quantity
Option B:	time-dependent quantity
Option C:	time independent quantity
Option D:	time variant quantity

15.	The period of time during which generation cannot be replaced is
Option A:	lead time
Option B:	lag time
Option C:	sharp time
Option D:	active time
16.	The PJM method was proposed in
Option A:	1960
Option B:	1961
Option C:	1963
Option D:	1962
17.	The development of the transmission model is relatively
Option A:	straight forward
Option B:	complex
Option C:	critical
Option D:	simple
18.	There are a number of load points in a power system and each point has a distinct set of
Option A:	reliability indices
Option B:	adequacy indices
Option C:	capacity indices
Option D:	distribution indices
19.	The evaluation of a composite system including both generation and bulk transmission is a very
Option A:	advanced problem
Option B:	complex problem
Option C:	interesting problem
Option D:	serious problem
20.	The data required for composite system reliability evaluation is
Option A:	deterministic data and stochastic data
Option B:	real life data
Option C:	raw data
Option D:	arranged data

21.	What is the diversity factor of commercial load?
Option A:	1.2-1.8%
Option B:	1.1-1.4%
Option C:	1.0-1.4%
Option D:	1.0-1.2%

22.	"The calculation of future load consumption based on various historical data and information available as per consumer pattern" is
Option A:	Weather Forecasting
Option B:	Energy Forecasting
Option C:	Power System Planning
Option D:	Load Forecasting
23.	Static reactive power source consist of
Option A:	Synchronous condenser
Option B:	FACTS devices
Option C:	shunt capacitor
Option D:	Synchronous generators
24.	How will you represent the reliability that the device will not fail before time 't', if 'T' is the time to failure?
Option A:	R(t)=P(T-t)
Option B:	R(0)=1
Option C:	R(t)=P(t)
Option D:	$R(\infty)=0$
25.	The probability that a unit fails and is not replaced during lead time is known as
Option A:	Operating Reserve
Option B:	Outage Replacement Rate
Option C:	Outage Reserve
Option D:	Operating Replacement Rate
26.	A four component series contain identical component each having reliability of 0.99. Evaluate unreliability of the system.
Option A:	0.03940399
Option B:	0.96059601
Option C:	0.3439399
Option D:	0.6561
27.	What are determined by Demand forecasts?
Option A:	further development in load
Option B:	the type of facilities required
Option C:	installing of new power plant
Option D:	capacity of generation , transmission and distribution
28.	A generating system consist of three 35 MW units, each having 4% FOR. What is the probabity when 70MW unit is operating?
Option A:	0.11
Option B:	0.8847
Option C:	0.8404
Option D:	0.1045
29.	A system consist of two 3MW units. Forced Outage Rate is 0.02.Calculate Probability when the Generating Capacity is 3MW?
Option A:	0.9604
Option B:	0.0004
Option C:	0.0392

Option D:	1
30.	In the following which one is load classified according to consumer category?
Option A:	Inductive Load
Option B:	Commercial Load
Option C:	Electrical Load in kW
Option D:	Three phase Load
31.	What will be the cummulative probability for a system consisting of two 3MW and one 5MW unit with FOR 0.04?
Option A:	0.9998
Option B:	0.941192
Option C:	1.0004
Option D:	1
32.	What is the period of long term planning?
Option A:	8-20 years
Option B:	6-12 years
Option C:	10 years and above
Option D:	5-10 years
33.	A system is to be design with an overall reliability of 0.999 using component having individual reliability of 0.7. What is the minimum number of components that must be connected in parallel.
Option A:	3
Option B:	6
Option C:	10
Option D:	4
34.	The data requirement for composite system reliability evaluation are
Option A:	Deterministic data and Speculative data
Option B:	Deterministic data and Stochastic data
Option C:	Determining data and Susceptive data
Option D:	Conditional data and Speculative data
35.	Which task is performed in medium term planning?
Option A:	Development of electricity grid for power transmission
Option B:	Performing Unit Commitment
Option C:	Development of distribution network
Option D:	Developing interconnections between the transmission network and grids
36.	What will the total power capacity in a system when three 50 MW unit and one 70 MW unit is operated at FOR of 0.02 and 0.03 respectively?
Option A:	170MW
Option B:	150MW
Option C:	220MW
Option D:	70MW
37.	Wear-Out region is where failure rate is
Option A:	Perpetual
Option B:	Decreasing

Option C:	Constant
Option D:	Increasing
38.	Unit Unavailability is given as:
Option A:	m/(m+r)
Option B:	μ/(μ+λ)
Option C:	λ/(μ+λ)
Option D:	m/T
39.	A system consist of 10 identical components all of which must work for system success.What is the system reliability if reliability of each component is 0.88?
Option A:	0.999
Option B:	0.107
Option C:	0.598
Option D:	0.278
40.	Reactive power planning is needed for _____
Option A:	Availability of adequate spinning reserve
Option B:	Improvement of power factor
Option C:	Development of interstate grid
Option D:	Investment Cost
41.	**which is not method of load forecasting**
Option A:	extrapolation method
Option B:	correlation method
Option C:	random model
Option D:	ANN model
42.	The extrapolation method is based on the
Option A:	Curve fitting to present data
Option B:	Extrapolation of past data
Option C:	Extrapolation of present data
Option D:	Curve fitting to previous data available
43.	Unit commitment and economic dispatch calculations are conducted using:
Option A:	Long term loadforecast
Option B:	Short term load forecast
Option C:	Medium term load forecast
Option D:	Reactive load forecast
44.	Time period for longt term planning
Option A:	15 year to 10 year
Option B:	15 year to 100 year
Option C:	above 100year
Option D:	5 year to 10 year
45.	For optimal reactive power dispatch which are not control variable
Option A:	static var source
Option B:	transmission line

Option C:	generator voltage
Option D:	tap ration of transformer
46.	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 plant
47.	what is full form of HRF
Option A:	heavy rate function
Option B:	heavy rate failure
Option C:	hazard rate function
Option D:	hazard rate failure
48.	MTTF of an exponential distribution is
Option A:	propotional to repair rate
Option B:	propotional to failure rate
Option C:	inversly propotional to failure rate
Option D:	inversly propotional to repair rate
49.	The diversity factor is defined as the
Option A:	(Average demand)/(Maximum demand)
Option B:	(Sum of consumers maximum demand)/(Maximum load on the station)
Option C:	(Maximum demand)/(Sum of consumers maximum demand)
Option D:	(Average demand)/(Maximum load on the station)
50.	Which of the following statements is true about bath-tub curve?
Option A:	The early phase represents wearout failures.
Option B:	The middle phase represents wearout failures.
Option C:	The last phase represents random failures.
Option D:	The middle phase represents random failures.
51.	A system has an availability of *95%* when the MTBF is *500hrs* . What is its mean time to repair?
Option A:	20 hrs
Option B:	25 hrs
Option C:	35 hrs
Option D:	50 hrs
52.	Scheduled outages are for
Option A:	yearly maintanance
Option B:	routine maintanence
Option C:	half yearly maintanance
Option D:	qurterly maintanance
53.	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
54.	A generating station has 3 units the total number of operating capcity states are
Option A:	6
Option B:	8
Option C:	10
Option D:	12
55.	The unit of LOLE is
Option A:	year/day
Option B:	hr/day/year
Option C:	days per year
Option D:	min/year
56.	The overall probability that load demand will not be met is called……
Option A:	LOLE
Option B:	LOLP
Option C:	LOEE
Option D:	LOED
57.	The basic of PJM method is to
Option A:	evaluate probability of committed distribution
Option B:	evaluate probability of committed generation
Option C:	evaluate probability of committed transmission
Option D:	evaluate probability of non committed generation
58.	Rapid start unit such as gas turbine & hydro plant can be represented by
Option A:	single state model
Option B:	three state model
Option C:	four state model
Option D:	two state model
59.	composite system reliability is affected by
Option A:	bus load
Option B:	consumer demand
Option C:	load growth
Option D:	generation capacity
60.	System data and Component data are the parts of which data requirements?
Option A:	Only Deterministic
Option B:	Only stochastic
Option C:	Both Deterministic and Stochastic
Option D:	Only Random

Descriptive Questions

	10 marks each
1.	Categorize loads in power system and explain load growth characteristics for various loads.
2.	Explain reactive power planning of system.
3.	Derive the general expression for reliability in terms of hazard rate.
4.	Explain in detail various factors affecting generation planning.
5.	What is the importance of Markov process in reliability of power system? Explain two state Markov model.
6.	Explain PJM method in detail.
7.	What is the impact of weather on load forecasting? Explain weather load model.
8.	What is reactive power planning? What are the methods used for reactive power planning?
9.	A system consists of four components system success requires that at least any one of these components must function. What is the probability of system success if component reliability is 0.9? What is the system reliability if five components are placed to perform the same function?
10.	Explain two state Markov model and write the expression for availability and unavailability. Draw the state space model for three units indicating all transition rates.
11.	Explain modified PJM method in details.
12.	Explain data requirement for composite system reliability evaluation.
13.	Explain Peak Load forecasting.
14.	What is reactive power planning? What are the methods used for reactive power planning?
15.	Explain two state Markov model and derive the expression of availability and unavailability.
16.	Explain frequency and duration method and hence explain the concept of rate of departure.
17.	Explain modified PJM method in detail.
18.	Describe various data requirement for composite system reliability evaluation.