UNIT WISE QUESTION BANK II -EEE
SUBJECT: POWER SYSTEMS-I AY: 22-23.

UNIT-I GENERATION OF ELECTRIC POWER

1. With neat sketch ,enumerate & explain about the essential components of hydro electric plant.
2. Discuss merits and de-merits of of a hydro-electric plant.
3. Explain the essential factors which influence the choice of site for a hydro-electric plant.
4. State the different methods of classifying hydro electric power plant & give the classification of HPS based on all three methods.
5. What are the factors of selection of the site for hydro electric stations.
6. If the catchment area of a reservoir is 50km^2 and average rainfall id 150 cm/year , find the power in KW for which station having mean head of 40m should be designed. Only 75% of rainfall is utilized and expected load factor of station is 75%. Assume the turbine and generator efficiency are 88% and 93% respectively.
7. With a neat sketch explain the construction and working principle of pumped storage power plant.
8. What are the factors of selection of the site for hydro electric power stations.
9. Explain with a neat schematic diagram of a thermal power plant.
10. Differentiate between boilers and super heaters. Highlight their functions.
11. The over all efficiency of a 100 MW thermal power station is 30% . If the load factor of the station is 40% and the coal consumption is 0.9 kg/kwh, find the annual coal bill if the cost is Rs. 50 per tonne.
12. What are the methods for arresting ash from flue gasses ? Explain any one method in detail.
13. Explain with neat diagram with various parts and its function and its functions in nuclear power plant.
14. Describe working of P WR (pressurized water reactor) . what are its advantages and disadvantages?
15. What is the basic principle of ocean thermal energy conversion (OTEC) ?
16. Explain with neat sketches the various methods of tidal power generation . what are the limitations of each method?
17. Describe the main considerations in selecting a site for a wind generators.
18. Describe with a neat sketch the working of wind energy conversion system (WECS) with main components.
19. How are WEC systems classified? Discuss in brief.
20. Discuss advantages and disadvantages of wind energy conversion system.
21. What is fuel cell ?
22. How does a fuel cell differ from traditional methods of energy generation?
23. How is a fuel cell different than a battery ?
24. What are the benefits of fuel cells?
25. What types of fuel cells are available?
26. Explain the principle of conversion of solar energy into heat.
27. What are the main components of a flat-plate solar collector ,explain the function of each.
28. Explain the solar power generation by using concentration collectors.
29. What are the advantages and disadvantages of concentrating collectors over a flat-plate collectors.

UNIT WISE QUESTION BANK II -EEE
SUBJECT: POWER SYSTEMS-I AY: 22-23.

UNIT-II **ECONOMICS OF POWER GENERATION**

1. Define the following terms
   i) Connected load ii) maximum demand iii) demand factor iV) load factor
   vi) Diversity factor vii) load duration curve.
2. Explain base load and peak load plants.
3. Define i) fixed-cost ii) running cost iii) Tariff.
4. The annual working cost of a power station is represented by the formula Rs(a+bkw+ckwh) where the various terms have their usual meaning. Determine the values of a, b and c for a 60 MW station operating at annual load factor of 50% from data:
   (i) Capital cost of building and equipment is Rs 5×10^6
   (ii) the annual cost fuel ,oil, taxation and wages of operating staff is Rs 9,00,000.
   (iii) The interest and depreciation on building and equipment are 10% per annum
   (iv) Annual cost of organization and interest on cost of site etc.is Rs 5,00,000.

UNIT-III **OVER HEAD TRANSMISSION LINE PARAMETERS**

1. Explain what do you understand by GMR and GMD of a transmission line and derive inductance of single phase line in GMR.
2. Calculate the capacitance per phase of a three phase , three wire system, when the conductors are arranged in a horizontal plane with spacing $\mathbf{D}_{12}=\mathbf{D}_{23}=3.5$m, and $\mathbf{D}_{13}=7$m. the conductors are transposed and each has a diameter of 2.0 cm. Assume the transmission line is 4 m above the ground level.
3. Derive inductance of a group of a parallel wires carrying current.
4. Calculate a inductance of a conductor per phase of a three phase, three wire system, three wire system. When the conductors are arranged at the corners of an equilateral triangle of 3.5 m sides and the diameter of each conductor is 2 cm.
5. Explain the concept of self **GMD** and mutual **GMD** for evaluating inductance of a transmission lines.
6. Derive expression for the inductance of a 3-phase line with conductors untransposed. What is the significant of imaginary term in the expression for inductance? Hence derive the expression for inductance for a completely transposed line.
7. What ate bundled conductors ? discuss the advantages of bundled conductors when used for overhead lines .
8. What are ACSR conductors ? Explain the advantages of ACSR conductors when used for over head lines.
9. Derive an expression for the flux linkages of one conductor in a group of n conductor carrying currents whose sum is zero. Hence derive an expression for inductance of composite conductors of a 1-phase line consisting of m strands in one conductor and n strands in the other conductor.
10. Prove that the inductance of a group of parallel wires carrying current can be represented in terms of their distance.
11. Calculate the inductance of each conductor in a 3-phase , 3-wire system, when the conductors are arranged in a horizontal with spacing such that DRY=4 m; DYB=3 m; DBR= 2m. the conductors are transposed and each has a diameter of 2.5 m.
12. Explain composite conductor transposition and bundles conductors?.
13. Explain about Skin and proximity effects?

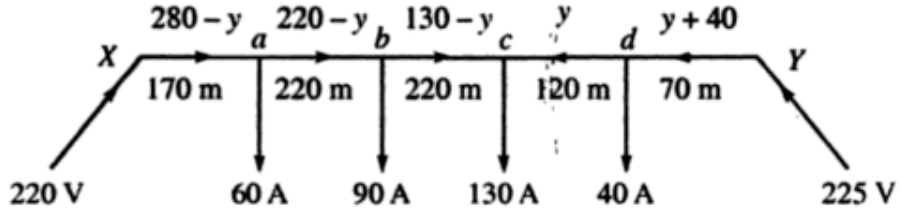
UNIT WISE QUESTION BANK II -EEE
SUBJECT: POWER SYSTEMS-I AY: 22-23.

UNIT-IV **PERFORMANCE OF TRANSMISSION LINES**:

1. Analyze in detail nominal T and nominal π circuits ?
2. Derive the expression for the ABCD constants for the nominal- π & nominal-T circuit of a medium transmission line.
3. Explain the classification of lines based on their length of transmission .
4. Determine the sending end voltage, current power factor of a 1-phase 50 Hz, 76.2 kV transmission delivering a load of 12 MW at 0.8 pf . the line constants are R= 25 ohms, inductance 200 mH and capacitance between lines 2.5 μF. Also determine the regulation and η of transmission . Use nominal – π method.
5. What is Ferranti effect ? derive a simple expression for the voltage rise of and unloaded line.
6. A three phase line delivers 4000 kW at a power factor 0.9 lagging to a load. If the sending end voltage is 66 kV, determine i) receiving end voltage ii) line current iii) transmission efficiency . The resistance and reactance of each conductor is 3.31 Ώ respectively.
7. A three-phase over-head transmission line, 80 Km long delivers 24 MVA at 66 KV , 50 Hz,0.8 power factor lagging. The line conductance have a diameter of 1.5 cm and are symmetrically spaced at a distance of 2.5 m. determine the regulation and efficiency of the line, using the nominal – π method. The ;one resistance is 8.72 Ώ /phase.
8. Derive equation which represent the performance of a long transmission line with its electrical parameters uniformly distributed along its length.

UNIT-V **D C DISTRIBUTION**

1. A DC distributor of 800m is loaded as shown in below figure. The both ends X and Y are maintained at 220V and 225 V respectively. If the minimum voltage allowed at consumers end is 215 V find out the diameter of the conductor. The resistivity is 1.72 micro-ohm-cm.



2. A 2-eire DC ring main is fed at a and at points b, c and d loads are tapped off as shown in figure. Find out the minimum potential and locate the point. The resistances are shown conductors.

UNIT WISE QUESTION BANK II -EEE
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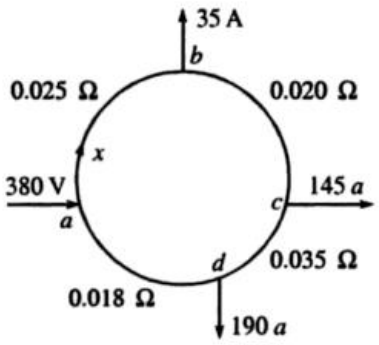

1. Discuss about design features of distribution system.
2. A 2-wire dc distributor cable AB is 2km long and supplied loads of 100A, 150A,200A,and 50A situated 500m,1000m,1600m and 2000m from the feeding point A. each conductor has a resistance of 0.01 Ω per 1000m. calculate the voltage at each point if a voltage of 300V is maintained at point A.
3. Compare the advantages and disadvantages of using over-head and under ground distribution systems.
4. A 2-wire distributor fed at F1 and F2 at 230V and 220V respectively. Loads of 130A and 110A are taken at points P and Q . resistance of both the conductors between F1 and P is 0.03 ohm, between P and Q is 0.05 ohms. Determine the current in each section of the distributor and voltage at each load point.

Code No: R18A0207 **R18**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Supplementary Examinations, February 2022

Power Systems-I

(EEE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a) Explain the various components and its functions in Thermal Power Station with a neat line diagram **[7M]**

b) Explain the procedure of nuclear waste disposal mechanism in a nuclear power plant. **[7M]**

OR

2 a) Explain the principle of operation of nuclear reactor with neat diagram. **[7M]**

b) What are the factors of selection of the site for thermal power plant **[7M]**

SECTION-II

3 Explain the function of following components of Hydro electric Power Plant. 1) Dam 2) Reservoir 3) Trash Rack 4) Forebay 5) Surge Tank 6) Spillway 7)Penstock **[14M]**

OR

4 a) Write a brief note on the concept of pumped storage and comment on their storage requirements **[7M]**

b) What is a mass curve, Explain its significance in estimation of power developed from a given catchment area? **[7M]**

SECTION-III

5 a) What do you understand by transposition of lines? What is its effect on the performance of the line? **[7M]**

b) Calculate the capacitance per phase of a three phase three wire transposed system when the conductors are arranged at the corners of a triangle having sides of 1.0 m, 1.5 m and 2.0 m. Diameter of each conductor is 1.2 cm. **[7M]**

OR

6 a) Explain with reason why the Bundled - Conductor lines have lower inductance than Single- conductor lines of the same area of Cross section **[7M]**

b) The conductors in a Single – phase transmission line are 6m above the ground. Each conductor is 15 mm diameter and spacing between them is 2.5 m. Calculate i) the capacitance per Km of the line neglecting the effect of Ground. ii) the capacitance per Km of the line taking in to the effect of ground, and iii) percentage increase in capacitance due to the presence of ground. **[7M]**

SECTION-IV

7 a) Draw the vector diagrams of nominal T model of medium transmission line. Derive the expression for voltage regulation of both the models **[7M]**

An overhead single phase delivers 1.1MW at 33 kV at 0.9 power factor lagging.

b) The total resistance of the line is 10Ω and the total inductive reactance is 15Ω. Determine (i) %voltage regulation (ii) sending end power factor (iii) transmission efficiency **[7M]**

OR

8 a) Explain the equivalent π method of solution for the performance of long transmission lines? Draw a phasor diagram with the receiving end voltage as reference **[7M]**

b) Fine the network constants of a long transmission line 3 phase, 50 Hz and 150 km long whose resistance per km is 0.2 Ω and inductance per km is 1.5 mH and capacitance per km is 0.008 μF. Neglect the conductance of the line. **[7M]**

SECTION-V

9 a) Discuss why receiving end voltage of an unloaded long line may be more than the sending end voltage. **[7M]**

b) Find the disruptive critical voltage and visual corona voltage for a grid of line operating at 132 kV. The line consisting of 1.96 cm diameter conductors spaced 3.81 meters apart. The following data can be considered. Temperature 440 c, barometric Pressure 73.7 cm of mercury, conductor surface factor 0.84, fine weather 0.8, rough weather 0.66. **[7M]**

OR

10 a) Explain in detail about the Surge impedance loading of Long transmission lines **[14M]**

b) Discuss the effect of charging current in the Ferranti effect using the necessary expressions

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

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UG Model question paper

POWER SYSTEM-I

II YEAR II SEMESER

EEE- MODEL PAPER-1

Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question fromeach section and each question carries 14 marks.

SECTION-I			
1.	a)	With neat sketch ,enumerate & explain about the essential components of hydro electric plant.	7M
	b)	Discuss merits and de-merits of of a hydro-electric plant.	7M
(OR)			
2.	a)	If the catchment area of a reservoir is 50km^2 and average rainfall id 150 cm/year , find the power in KW for which station having mean head of 40m should be designed. Only 75% of rainfall is utilized and expected load factor of station is 75%. Assume the turbine and generator efficiency are 88% and 93% respectively.	7M
	b)	What are the factors of selection of the site for hydro electric power stations	7M
SECTION-II			
3.	a)	Define the following terms i) Connected load ii) maximum demand iii) demand factor iV) load factor vi) Diversity factor vii) load duration curve.	7M
	b)	**1.** Explain base load and peak load plants.	7M
(OR)			
4.	a)	**1.** Define i) fixed-cost ii) running cost iii) Tariff.	7M
	b)	**2.** The annual working cost of a power station is represented by the formula Rs(a+bkw+ckwh) where the various terms have their usual meaning. Determine the values of a, b and c for a 60 MW station operating at annual load factor of 50% from data: (i) Capital cost of building and equipment is Rs 5 X 10^6 (ii) the annual cost fuel ,oil, taxation and wages of operating staff is Rs 9,00,000. (iii) The interest and depreciation on building and equipment are 10% per annum (iv) Annual cost of organization and interest on cost of site etc.is Rs 5,00,000.	7M

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UG Model question paper

POWER SYSTEM-I

II YEAR II SEMESER

EEE- MODEL PAPER-1

Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question fromeach section and each question carries 14 marks.

		SECTION-III	
5.	a)	Explain what do you understand by GMR and GMD of a transmission line and derive inductance of single phase line in GMR.	7M
	b)	Explain what do you understand by GMR and GMD of a transmission line and derive inductance of single phase line in GMR.	7M
		(OR)	
6.	a)	Derive inductance of a group of a parallel wires carrying current.	7M
	b)	Calculate a inductance of a conductor per phase of a three phase, three wire system, three wire system. When the conductors are arranged at the corners of an equilateral triangle of 3.5 m sides and the diameter of each conductor is 2 cm.	7M
		SECTION-IV	
7.	a)	Analyze in detail nominal T and nominal π circuits ?	7M
	b)	Derive the expression for the ABCD constants for the nominal- π & nominal-T circuit of a medium transmission line.	7M
		(OR)	
8.	a)	Explain the classification of lines based on their length of transmission .	7M
	b)	Determine the sending end voltage, current power factor of a 1-phase 50 Hz, 76.2 kV transmission delivering a load of 12 MW at 0.8 pf . the line constatnts are R= 25 ohms, inductance 200 mH and caplacitance between lines 2.5 µF. Also determine the regulation and η of transmission . Use nominal – π method.	7M
		SECTION-V	
9.	a)	What ate the types of insulators used in overhead transmission lines.	7M
	b)	Explain potential distribution over a string of suspension insulators and write important observations.	7M
		(OR)	

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II YEAR II SEMESER

EEE- MODEL PAPER-1

Time: 3 hours **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question fromeach section and each question carries 14 marks.

10.	a)	Define string efficiency and discuss how to calculate string efficiency.	7M
	b)	In a transmission line ,each conductor is at 20 kv and is supported by a string of 3 suspension insulators. The air capacitance between each cap-pin junction and tower is one fifth of the capacitance of each insulator unit. A guard ring , effective only over the line-end insulator unit is fitted, so that the voltages on 2 units nearest the line end are equal. Calculate: i) the voltage on the line end unit. ii) the voltage capacitance required between the line and pin.	7M