Code: 20A02501 **R20**

B.Tech III Year I Semester (R20) Supplementary Examinations August 2023

POWER SYSTEM ARCHITECTURE

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is Nuclear Fission? 2M

(b) Define Solar Radiation and Irradiation. 2M

(c) What is a Proximity Effect? 2M

(d) What are the advantages of bundled conductors? 2M

(e) Define about Surge Impedance. 2M

(f) What is Ferranti Effect? 2M

(g) What is Capacitance Grading? 2M

(h) Write any two factors affecting Corona. 2M

(i) Write any two advantages of Overhead Distribution when compare with Under Ground Distribution. 2M

(j) Compare and discuss briefly about Indoor and Outdoor Substations. 2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2 (a) Briefly discuss about Impulse Turbine. 5M

(b) What is the purpose of Coal Pulverization and its storage? Explain. 5M

OR

3 (a) Draw and explain the block diagram of Hydroelectric Power Station. 5M

(b) Write short notes on Pressurised Water Reactor. 5M

4 (a) Write short notes on GMR and GMD. 5M

(b) For single phase symmetrical circuit, calculate the capacitance. 5M

OR

5 (a) Derive and discuss about the Inductance of a single phase symmetrical conductor configuration with and without Transposition. 5M

(b) Derive and discuss about the Inductance of a single phase asymmetrical conductor configuration with and without Transposition. 5M

6 (a) Deduce equations for ABCD constants of a long line in terms of its parameters. 5M

(b) An 11 KV, 3–phase transmission line has a resistance of 1.5 Ω and reactance of 4 Ω per phase. Calculate the percentage regulation and efficiency of the line when a total load of 5000 KVA at 0.8 lagging p.f is supplied at 11 KV at the distant end. 5M

OR

7 (a) Discuss the purpose of an overhead transmission line. How are these lines classified? 5M

(b) Write short notes on Attenuation, Distortion, Reflection and Refraction Coefficients. 5M

Contd. in page 2

8	(a)	Briefly discuss about Sag and Tension calculates with equal and unequal heights of towers.	5M
	(b)	What is a String Efficiency? Also discuss any one method to improve String Efficiency.	5M
		OR	
9	(a)	Briefly explain about Belted cables and Screened cables.	5M
	(b)	Discuss briefly about Intersheath Grading and also write its disadvantages.	5M
10	(a)	Explain in detail Air insulated substations.	5M
	(b)	What is a Primary feeder? Also discuss about the benefits derive through optimal location of Substation.	5M
		OR	
11	(a)	Explain about Voltage and Power Loss calculations in DC Radial Distributors fed at equal Voltages at both the ends with uniform loading.	5M
	(b)	Explain the substation layout showing the location of all the substation equipment.	5M

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Code: 20A02501

R20

B.Tech III Year I Semester (R20) Regular & Supplementary Examinations January 2024

POWER SYSTEM ARCHITECTURE

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) State the need of an economiser and air preheater in thermal power plant. 2M

(b) Write the importance of pitch and Yaw control in wind energy conversion system. 2M

(c) What is the capacitance of each conductor to neutral, if the capacitance between two conductors of a 3-phase line is 9 µF? 2M

(d) What is a bundle conductor? Write the advantages of bundled conductors for over-head transmission lines. 2M

(e) Write the expressions for ABCD constants of a medium transmission line with T-configuration. 2M

(f) State Ferranti effect. 2M

(g) For a 33 V single core cable has a conductor diameter of 2 cm and as heath of inside diameter 3 cm, find the maximum and minimum stress in the insulation. 2M

(h) Define critical disruptive voltage and visual critical voltage. 2M

(i) What are the various types of substation according to its service requirements? 2M

(j) How does A.C. distribution differ from D.C. distribution? 2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2 (a) Describe the functioning of fore bay, penstock and surge tank in hydropower plant. 5M

(b) Explain the shielding and safety precautions to be considered in nuclear power plant. 5M

OR

3 (a) Explain the I-V characteristic of PV solar cell with neat sketch. 5M

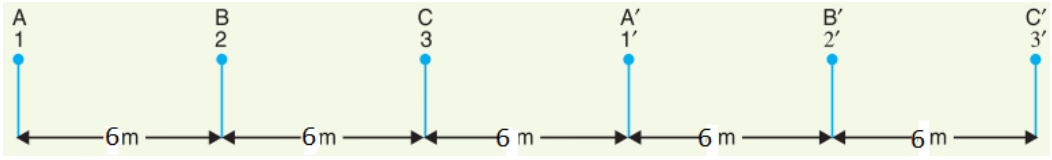
(b) Derive an expression for wind power. 5M

4 For a three-phase double-circuit line whose phase conductors have a radius of 5·5 cm with the horizontal conductor arrangement as shown in below figure. Calculate the following: 10M

(i) Equivalent self-GMD per phase,

(ii) Equivalent mutual-GMD,

(iii) Inductance per phase per metre.



OR

5 (a) Deduce an expression for line to neutral capacitance for a 3-phase overhead transmission line when the conductors are un symmetrically placed but transposed. 6M

(b) State Skin effect. How does skin effect vary with conductor material? 4M

Contd. in Page 2

6		Discuss how the regulation and transmission efficiency are determined for short transmission line. Write the effects of load power factor on regulation of transmission line.	10M
		OR	
7		Using rigorous method, derive an expression for sending end voltage and current for a long transmission line.	10M
8	(a)	An overhead line has a span of 330 m. The line is supported at a water crossing, from two towers whose heights are 33 m and 28 m above water level. The weight of conductor is 8.2 N/m and tension in the conductor is not to exceed 3.21×10^4 N. Find (i) clearance between the lower point on the conductor and water, (ii) horizontal distance of this point form the lower support.	6M
	(b)	Discuss how the corona considerations affect the design of a transmission line.	4M
		OR	
9	(a)	Explain the necessity of a stringing chart for a transmission line and show how such a chart can be constructed.	6M
	(b)	If the voltage across the units in a 2-unit suspension insulator are 40% and 60% of line voltage, find the ratio of capacitance of insulator to that of its capacitance to earth.	4M
10		Discuss the design of primary distribution system with resect to following: Selection of voltage, choice of scheme, and size of feeders.	10M
		OR	
11	(a)	Briefly discuss & derive about the voltage drop and power loss in A.D Distributors.	5M
	(b)	List out the rules that should be followed in deciding the location of a Substation.	5M

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