R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT
(An Autonomous Institute U/s UGC Act 1956)

B.Tech. SEMESTER-III, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1EL302   **DATE: 18-12-2025**

SUBJECT NAME: POWER SYSTEM - I

TIME: 11:00 AM to 01:30 PM   **TOTAL MARKS: 70**

Instructions

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

			Marks	BL	CO
Q.1	**(a)**	What is the effect of earth on Transmission line capacitance?	03	R	3
	(b)	Derive expression for capacitance for single core cable.	04	U	3
Q.2	**(a)**	Explain the advantages of high transmission line.	03	R	1
	(b)	Compare overhead transmission line v/s underground transmission line.	04	U	1
	(c)	Define and explain primary and secondary distribution system with single line diagram.	07	U	1
		OR			
Q.2	**(a)**	What are the advantages of AC transmission System?	03	R	1
	(b)	What are the requirements of a well-designed distribution system?	04	U	1
	(c)	Explain the following distribution system with figures. (A)Radial system (b)Parallel feeder system (c) Ring main System	07	U	1
Q.3	**(a)**	Define: Transposition of conductor & list out its advantages.	03	R	2
	(b)	Give the concept of GMR and GMD.	04	U	2
	(c)	Derive the relation of inductance of 3-phase with symmetrical spacing	07	U	2
		OR			

Q.3	(a)	What do you mean by transposition of line? What is its effect on the performance of the line?	03	U	2
	(b)	Derive an expression for the loop inductance of a single-phase line	04	U	2
	(c)	Consider a single infinitely long conductor whose external inductance is to be computed using basic principles of electromagnetism. Show that its external inductance is given by, L= 2 x 10-7 ln(D2/D1) henry per metre, where D1 and D2 are the distances from centre of the conductor to two external points P1 & P2 in the space. Note D2 > D1 > radius of the conductor.	07	U	2

SECTION B

			Marks	BL	CO
Q.4	(a)	Define power factor. List out causes of low power factor.	03	A	6
	(b)	Enlist the power factor improvement methods and describe any one method.	04	U	6
Q.5	(a)	Explain desirable characteristics of insulating materials used in cables.	03	R	4
	(b)	Explain neat sketch of construction of cable.	04	U	4
	(c)	What do you understand by grading of underground cables? List the methods of grading and explain any one of them in detail.	07	N	4

OR

Q.5	(a)	Explain insulation resistance of a cable.	03	R	4
	(b)	Comparison between underground & overhead system.	04	U	4
	(c)	Derive equation of capacitance of three core cable.	07	N	4
Q.6	(a)	Compare indoor substation with outdoor substation.	03	A	5
	(b)	Define and explain string efficiency. What are the various methods of improving it?	04	R	5
	(c)	Name the different types of insulators used in transmission system. Explain any one.	07	E	5

OR

Q.6	(a)	What is neutral grounding? List the advantages of Neutral grounding	03	A	5
	(b)	Why is earthing necessary in power system? How can it be classified?	04	R	5
	(c)	Explain pole mounted substation with suitable figure.	07	E	5

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