BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2023)

CLASS: BTECH **SEMESTER: VII**
BRANCH: EEE **SESSION: MO/2023**

SUBJECT: EE531 EHV AC POWER TRANSMISSION

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Prove that - $R_{eq} = (N.r.R^{N-1})^{\frac{1}{N}}$,Where R_{eq} is the Geometrical Mean radius for bundle of N sub-conductors having bundle radius R and bundle spacing B.	[2]	CO1	BL2
Q.1(b)	Consider a matrix [A] given below: $[A] = \begin{pmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{pmatrix}$ Calculate the **(1)** Model Matrix [M], Where M is the Eigen vectors of matrix [A]. & **(2)** diagonalize the matrix [A].	[3]	CO1	BL3
Q.2(a)	A point charge Q = $8x10^{-6}$ Coulomb is kept on the surface of a conducting sphere of radius r =1 cm, which can be considered as a point charge located at the centre of the sphere. Calculate the field strength and potential at a distance of 1 cm from the surface of the sphere. Also find the capacitance of the sphere.Take Ɛr =2.	[2]	CO2	BL3
Q.2(b)	Derive Markt-Mengele formulae for the outer phases and centre phases in case of 3-phase ac line with horizontal configuration of phase. Discuss about gradient factor and their use.	[3]	CO2	BL4
Q.3(a)	Explain in brief about neutral grounding system and methods of reduction for corona loss.	[2]	CO1	BL2
Q.3(b)	A single conductor e.h.v. transmission line strung above ground is used for experimental purposes to investigate high voltage effects. The conductor is expanded ACSR with diameter of 0.0635 m and the line height is 21 meters above the ground. Calculate the **(1)** voltage to ground which will makes its surface voltage gradient equal to corona-inception gradient given by Peek's Formula: $E_{or} = \frac{30}{\sqrt{2m^2}}(1+\frac{0.301}{\sqrt{r}})$, KV/cm , r.m.s. , where m= 1.3 required for stranding effect, and the conductor radius is in cm. **(2)** Charging current and MVAR of the single phase transformer for exciting the 100 Km length of experimental line,if C_g (capacitance to ground)=7.747 nF/Km.	[3]	CO2	BL3
Q.4(a)	Explain about the term 'Maxwel Coefficient with their expression.	[2]	CO1	BL2
Q.4(b)	Explain and correlate the zero, positive & negative sequence inductance and capacitance with the help of relevant mathematical expressions.	[3]	CO1	BL4
Q.5(a)	Explain about surface voltage gradient and effects of high electrostatic fields on human beings, animals, and plants.	[2]	CO2	BL2
Q.5(b)	Discuss about the factors which affect the power handling capacity of a EHV lines. Describe about series compensation in transmission line.	[3]	CO3	BL3

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