Reg. No.															

B.Tech. DEGREE EXAMINATION, DECEMBER 2022

Third Semester

18ECC105T – ELECTROMAGNETIC AND TRANSMISSION LINES

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

(Smith chart should be distributed to all the students)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

PART – B (5 × 10 = 50 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
26. a.	Examine the electric field intensity due to infinite sheet of charge having uniform density of $\rho_c c/m^2$.	10	4	1	1
	(OR)				
b.	A charge Q_2 of $8.854\times10^{-9}C$ is located in vacuum at $P_2\left(2,3,1\right\}$ The force on Q_2 due to a charge Q_1 of $4\pi\times10^{-3}C$ at $P_1\left(2,2,1\right\}$ (all the coordinates are measured in meters).	10	3	1	2
27. a.	Investigate the magnetic field intensity at various regions of infinitely long coaxial cable.	10	3	2	2
	(OR)				
b.	Illustrate the Maxwell's equations for time varying fields in point and integral form.	10	4	2	1
28. a.	An electric field in free space is given by $E=50\cos\left(10^8 t+\beta_x\right)ayV/m.$	10	3	3	2
	(i) Find the direction of wave propagation.				
	(ii) Determine β and the time it takes to travel a distance of $\frac{\lambda}{2}$.				
	(iii) Sketch the wave at $t=0,\frac{T}{4}$ and $\frac{T}{2}$.				
	(OR)				
b.i.	Mention the field equations rectangular waveguide in TE mode.	5	4	3	1

ii. In a rectangular waveguide for which a =1.5 cm, b =0.8 cm, $\sigma = 0$, $\mu = \mu_0$ and $\varepsilon = 4\varepsilon_0$. Determine the mode of operation, cut off frequency and phase constant for the field

$$H_x = 2\sin\left(\frac{\pi x}{a}\right)\cos\left(\frac{3\pi y}{6}\right)\sin\left(\pi \times 10^{11} t - \beta z\right) A/m.$$

29. a.	Construct the input and transfer impedance of a transmission line and illustrate.	10	4	4	1

(OR)

b.	Examine the input impedance of eighth wave line, quarter wave line and half wave line and elucidate.	10	3	4	2

30. a.	A load of $100 + j150\Omega$ is connected to a 75 Ω lossless line. Calculate (i) Refraction coefficient (Γ) (ii) VSWR(S) (iii) Load admittance (Y_L) (iv) Z_{in} at 0.4 λ from load (v) The location of $V_{\max}$ and $V_{\min}$ with respect to the load if the line is 0.6λ long (vi) Z_{in} at the generator using smith chart	10	3	5	2

(OR)

b.	Describe any two applications of transmission lines.	10	4	5	1

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