SAMPLE QUESTION PAPER

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: TE Semester V

Course Code: ELX 503 and Course Name: Engineering Electromagnetics

Time: 2 hour Max. Marks: 80

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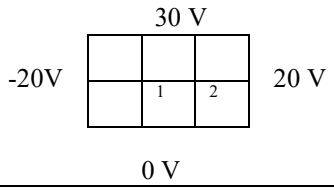
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The divergence of an incompressible liquid is----------.
Option A:	zero
Option B:	negative
Option C:	positive
Option D:	infinite
2.	A scalar function, V is given by $V = xyz^2$. Find the gradient of V.
Option A:	$\boldsymbol{yz^2a_x + xz^2a_y + 2xyza_z}$
Option B:	0
Option C:	$\boldsymbol{y}a_x + \boldsymbol{x}a_y + \boldsymbol{yz}a_z$
Option D:	*34*
3.	A Laplace equation has
Option A:	two solution
Option B:	infinite solution
Option C:	one solution
Option D:	no solution
4.	Poynting vector gives
Option A:	rate of energy flow
Option B:	direction of polarisation
Option C:	electric field
Option D:	magnetic field
5.	Given H= 0.5 $e^{-0.1x}\sin(10^6t - 2x)\ a_z$ A/m, the value of β
Option A:	β = 3 rad/m
Option B:	β = -2 rad/m
Option C:	β = 0.3 rad/m
Option D:	β = 0.2 rad/m
6.	If **E** is a vector, then $\nabla.\nabla \times \mathbf{E}$ is
Option A:	0
Option B:	1
Option C:	does not exist
Option D:	-1

7.	The velocity of an EM wave is
Option A:	inversely proportional to β
Option B:	inversely proportional to α
Option C:	directly proportional to β
Option D:	directly proportional to α
8.	Finite boundary is used for
Option A:	Finite Difference Method
Option B:	Finite Element Method
Option C:	Moment Method
Option D:	Both a and b
9.	For the Band Matrix Method , [A][V]=[B], where [A] is a
Option A:	column matrix formed by known potential at fixed point
Option B:	column matrix formed by known potential at free nodes
Option C:	sparse and Banded matrix
Option D:	column matrix formed by known potential at free and fixed nodes
10.	Using Finite Difference Method, potential at nodes1 and 2. 
Option A:	V_1=4V, V_2=16 V
Option B:	V_1=14V, V_2=6 V
Option C:	V_1=16V, V_2=14 V
Option D:	V_1=6V, V_2=14 V
11.	The radiation resistance of half wavelength dipole antenna is
Option A:	73 Ω
Option B:	75 Ω
Option C:	77 Ω
Option D:	74 Ω
12.	The directivity of an antenna is 30 and it operates at a frequency of 100 MHz. Find its maximum effective aperture :
Option A:	21.48 m^2
Option B:	31.48 m^2
Option C:	41.48 m^2
Option D:	11.48 m^2
13.	If half wave dipole is operating at one wavelength, its effective area is
Option A:	0.13 m^2
Option B:	1.2 m^2
Option C:	0.012 m^2
Option D:	120 m^2

14.	The directivity of an Isotropic antenna is
Option A:	10
Option B:	0.5
Option C:	0
Option D:	1
15.	Find the critical frequency of the E layer where N= 2 x 10^{12} electrons/m^3
Option A:	2.27x 10^7
Option B:	1.27x 10^7
Option C:	12.27x 10^7
Option D:	14.27x 10^7
16.	When the critical frequency is 60MHz and the angle of incidence is 60°, MUF is
Option A:	150 MHz
Option B:	170 MHz
Option C:	190 MHz
Option D:	120 MHz
17.	The wave that is reflected from Ionosphere is called
Option A:	Hop or skip
Option B:	Faded waves
Option C:	virtual height
Option D:	actual height
18.	Smith chart is based on the polar plot of:
Option A:	Reactance
Option B:	Voltage
Option C:	Current
Option D:	Voltage reflection coefficient
19.	To get an admittance chart from an impedance chart:
Option A:	Smith chart has to be rotated by 90º
Option B:	Smith chart has to be rotated by 180º
Option C:	Smith chart has to be rotated by 270º
Option D:	Admittance chart cannot be obtained from the impedance chart
20.	A 100 km long transmission line has an inductance of 27 mH. Its distributed inductance per metre is
Option A:	27 mH
Option B:	2.7 mH
Option C:	0.27 μH
Option D:	27 μH

Q2 **(20 Marks Each)**	
A	**Solve any Two 5 marks each**
i.	State and explain Biot Savart's Law
ii.	Derive wave equations for time varying Harmonic fields.
iii.	Derive Laplace's Equations
B	**Solve any One** **10 marks each**
i.	State Poynting Theorem. Derive an expression for Poynting Vector with significance of each terms.
ii.	Derive the expression of reflection and transmission coefficient in case of reflection from perfect dielectric in case of Normal Incidence

Q3. **(20 Marks Each)**	***Please delete the instruction shown in front of every sub question***
A	**Solve any Two 5 marks each**
i.	Compare MoM, FDM and FEM
ii.	Define Critical frequency and Virtual Height
iii.	Define Gain and Directivity of an antenna
B	**Solve any One** **10 marks each**
i.	Derive the radiation resistance of a half wave dipole antenna.
ii.	Explain the factors affecting the field strength of a space wave signal.