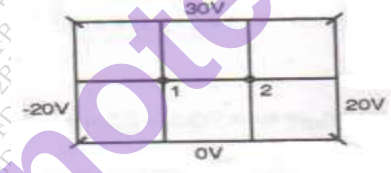
Time: 3 Hours **[Total Marks: 80]**

Note: (1) Question No.1 is compulsory.
(2) Solves any three out of remaining question.
(3) Assume suitable data if necessary.
(4) Figures to the right indicate full marks.

Q.1	Attempt **any Four**		
	(a)	Derive Poisson's and Laplace equation.	**05**
	(b)	Explain boundary conditions of E and H fields for two media.	**05**
	(c)	Define Skin Depth, and calculate it for a wave travelling in a conductor ($\sigma = 3.5X10^7$ S/m), with a frequency of 100Mhz, $\epsilon_r = 1.2$, $\mu_r = 1$	**05**
	(d)	Explain the radiation resistance, directivity, Beam-width and directive gain of the antenna.	**05**
	(e)	What is polarization? Explain all the types of polarization.	**05**
Q.2	**(a)**	Derive Maxwell's equations in integral and point form for static field.	**10**
	(b)	State and Explain Poynting vector using modified Ampere's law, derive the pointing theorem and describe the significance of each of its terms.	**10**
Q.3	**(a)**	Find the directive gain and directivity if $U(\theta, \phi) = 10\sin\theta\sin^2\phi$, $0<\theta<\pi$, $0<\phi<2\pi$;	**05**
	(b)	Derive an expression for reflection and transmission coefficient for normal incidence in case of reflection from perfect dielectric.	**05**
	(c)	Using finite difference method calculate the potential at node 1 and 2 shown in the figure	**10**



Q.4	**(a)**	Drive the expression for radiation resistance in far field region of an Infinitesimal dipole antenna.	**10**
	(b)	Compare different methods used for computational electromagnetic.	**05**
	(c)	Explain the Mechanism of ionospheric propagation with its structure.	**05**
Q.5	**(a)**	What is UPW? Derive wave equation and its solution for free space.	**10**
	(b)	Classify and Explain different types of wave Propagation and define the terms Critical frequency ,Virtual height , Maximum unstable frequency and skip distance	**10**
Q.6	**(a)**	A transmission line having $Z_o=50\Omega$, length d= 0.15λ, is terminated by a load of $Z_L= (25 - j30)\Omega$. Calculate r_o, S and $Z_{in}(d)$.	**05**
	(b)	Derive an expression for transmission line equation.	**05**
	(c)	Calculate the SWR, reflection coefficient and admittance (Y) and Smith chart both for transmission line having $Z_o=50\ \Omega$, Load impedance $Z_L = 100+j150\Omega$.	**10**