Program: BE Electronics Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester V

Course Code and Course Name: EXC503 Electromagnetic Engineering

Time: 1 hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

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| Q1.  | The electric field strength at distant point, P, due to a point charge, +q, located at the origin, is 100 μ V/m. If the point charge is now enclosed by a perfectly conducting metal sheet sphere whose center is at the origin, then the electric field strength at the point, P, outside the sphere, becomes |
| Option A: | Zero |
| Option B: | –100 μV/m |
| Option C: | 100 μV/m |
| Option D:  | 50 μV/m |
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| Q2. | A metal sphere with 1 m radius and surface charge density of 10 Coulombs / m2is enclosed in a cube of 10 m side. The total outward electric displacement normal to the surface of the cube is |
| Option A: | 40 π Coulombs |
| Option B: | 10 π Coulombs |
| Option C: | 5 π Coulombs |
| Option D: | 4 π Coulombs |
|  |  |
| Q3. | The Maxwell’s equation, is based on |
| Option A: | Ampere’s law |
| Option B: | Gauss’s law |
| Option C: | Faraday’s law |
| Option D: | Coulomb’s law |
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| Q4. | A loop is rotating about the y –axis in a magnetic field .The voltage in the loop is |
| Option A: | zero  |
| Option B: | due to rotation only  |
| Option C: | due to transformer action only  |
| Option D: | due to both rotation and transformer action  |
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| Q5. | An electric field on a plane is described by its potential  where r is the distance from the source. The field is due to  |
| Option A: | a monopole  |
| Option B: | a dipole  |
| Option C: | both a monopole and a dipole  |
| Option D:  | a quadrupole  |
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| Q6. | Identify which one of the following will NOT satisfy the wave equation.  |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D:  |  |
|  |  |
| Q7.  | The unit of ∇ × H is  |
| Option A: | Ampere  |
| Option B: | Ampere/sq meter |
| Option C: | Ampere/meter  |
| Option D:  | Ampere-meter  |
|  |  |
| Q8.  | ∇ × ∇ × P, where P is a vector, is equal to  |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D:  |  |
|  |  |
| Q9. |  |
| Option A: |  |
| Option B: |  |
| Option C: |  |
| Option D:  |  |
|  |  |
| Q10.  | The electric field component of a time harmonic plane EM wavetraveling in a non-magnetic lossless dielectric medium has amplitude of 1V/m. If the relative permittivity of the medium is 4, the magnitude of thetime-average power density vector (in W/m2) is  |
| Option A: | 1/30π |
| Option B: | 1/60π |
| Option C: | 1/120π |
| Option D:  | 1/240π |
|  |  |
| Q11.  | Consider a closed surface S surrounding a volume V. If r’ is the positionvector of a point inside S, with n’ the unit normal on S, the value of theintegral ∮ 5 r. n ds is  |
| Option A: | 3V |
| Option B: | 5V |
| Option C: | 10V |
| Option D:  | 15V |
|  |  |
| Q12.  | With respect to FEM identify the wrong statement |
| Option A: | The distribution of the primary unknown quantity inside an element is interpolated basedon the values at the nodes, provided nodal elements are used. |
| Option B: | The number of interpolation functions to be used per element should be equal to thenumber of nodes that belong to the element. |
| Option C: | The interpolating polynomials may not be continuous within the element |
| Option D: | The interpolating polynomials should be complete such that they must consist of thelower order terms. |
|  |  |
| Q13. | Which consequence/s is/are likely to occur due to polarization? |
| Option A: | Increase in electric flux density |
| Option B: | Decrease in electric flux density |
| Option C: | Stability in electric flux density |
| Option D:  | No change happens |
|  |  |
| Q14.  |  Poisson's equation is derived from \_\_\_\_\_\_\_\_ |
| Option A: | Laplace equation  |
| Option B: | Gauss law |
| Option C: | Thevenin's theorem |
| Option D:  | Kirchoff's law |
|  |  |
| Q15. | Which nature of applied voltage results in the flow of conduction current in the displacement current concept? |
| Option A: | Constant |
| Option B: | Variable |
| Option C: | Constant and Variable |
| Option D:  | Neither Constant nor Variable |
|  |  |
| Q16.  |  Which form of Maxwell's equation specifies the fundamental relationship between the electric and magnetic fields in time varying field? |
| Option A: | Point form |
| Option B: | Integral form |
| Option C: | Exponential form  |
| Option D:  | Harmonic from |
|  |  |
| Q17. | If the rate of attenuation is high for good conductors at radio frequency, where does an input wave get reduced to? |
| Option A: | Zero |
| Option B: | Infinity |
| Option C: | Minor proportion of its initial strength value |
| Option D: | Major proportion of its final strength value |
|  |  |
| Q18. | By which name/s is an ionospheric propagation, also known as? |
| Option A: | Sea wave propagation |
| Option B: | Ground wave propagation |
| Option C: | Sky wave propagation |
| Option D:  | Troposcatter propagation |
|  |  |
| Q19.  |  The line – of – sight communication requires the transmit and receive antennas to face each other. If the transmit antenna is vertically polarized for best reception the receiver antenna should be |
| Option A: |  Horizontally polarized  |
| Option B: | Vertically polarized  |
| Option C: | At 450 with respect to horizontal polarization  |
| Option D:  | At 450 with respect to vertical polarization |
|  |  |
| Q20. | Consider a wireless communication link between a transmitter and a receiver located in free space, with finite and strictly positive capacity. If the effective areas of the transmitter and the receiver antennas, and the distance between them are all doubled, and everything else remains unchanged, the maximum capacity of the wireless link \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Option A: | increasing by a factor of 2 |
| Option B: | decreasing by a factor of 2 |
| Option C: | remains unchanged |
| Option D: | increasing by a factor of 4 |
|  |  |
| Q21. | Which ionization layer exists during day time & usually vanishes at night due to highest recombination rate? |
| Option A: | D-region |
| Option B: | Normal E-region |
| Option C: | Sporadic E-region |
| Option D:  | Appleton region |
|  |  |
| Q22.  | What is the possible range of height for the occurrence of sporadic E-region with respect to normal E-region? |
| Option A: | 20 km – 50 km |
| Option B: | 45 km – 85 km |
| Option C: | 90 km – 130 km |
| Option D:  | 140 km – 200 km |
|  |  |
| Q23. | The knowledge of which parameter is sufficient for deriving the time varying electromagnetic field? |
| Option A: | Electric field intensity |
| Option B: | Magnetic field intensity |
| Option C: | Current density |
| Option D:  |  Power density |
|  |  |
| Q24.  |  If an observation point is closely located to the source, then the field is termed as \_\_\_\_\_\_\_\_ |
| Option A: | Induced |
| Option B: |  Radiated |
| Option C: | Reflected |
| Option D:  | Far-field |
|  |  |
| Q25. | How are the infinitesimal dipoles represented in terms of antenna length and signal wavelength? |
| Option A: | l ≤ (λ /50) |
| Option B: | (λ/50 ) < l ≤ (λ /10) |
| Option C: | l = λ/2 |
| Option D:  | l = λ/4 |