

University of Mumbai
Examination 2022 under Cluster
(Lead College:)

Examinations Commencing from 17th May 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev-2019

Examination: **T.E. Semester VI**

Course Code: **ELC602**

Course Name: **Electromagnetic Engineering**

Time: 2:30-hour

Max. Marks: 80

N.B. Use Smith Chart to solve transmission line Problem

| Q1 | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks (20 Marks) |
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| 1. | Find the force in N between $Q1 = 2C$ and $Q2 = -1C$ separated by a distance 1m in air. |
| Option A: | $18 \times 10^6 \text{ N}$ |
| Option B: | $-18 \times 10^6 \text{ N}$ |
| Option C: | $18 \times 10^{-6} \text{ N}$ |
| Option D: | $-18 \times 10^{-6} \text{ N}$ |
| 2. | Gauss's law is true only if force due to a charge varies as |
| Option A: | r^{-1} |
| Option B: | r^{-3} |
| Option C: | r^{-2} |
| Option D: | r^{-4} |
| 3. | Find the displacement current when the flux density is given by t^3 at 2 seconds |
| Option A: | 12 |
| Option B: | 6 |
| Option C: | 3 |
| Option D: | 27 |
| 4. | The magnetic vector potential for a line current will be inversely proportional to |
| Option A: | dl |
| Option B: | I |
| Option C: | J |
| Option D: | R |
| 5. | Displacement current depends on |
| Option A: | Moving Charges |
| Option B: | Change in time |
| Option C: | Moving Charges and Change in time |
| Option D: | Differential Moving Charges and cumulative time period |
| 6. | The inductance of single-phase, two-wire transmission line per kilometer gets doubled when the |
| Option A: | Distance between the wires is increased as square of original distance |

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| Option B: | Distance between the wires is doubled |
| Option C: | Distance between the wires is increased four fold |
| Option D: | Radius of the wire is doubled |
| 7. | The characteristic impedance of a transmission line with impedance and admittance of 16Ω and 9 S respectively is |
| Option A: | 0.75 |
| Option B: | 1.33 |
| Option C: | 7 |
| Option D: | 25 |
| 8. | The ratio of radiation intensity in a given direction from antenna to the radiation intensity over all directions is called as |
| Option A: | Gain of antenna |
| Option B: | Radiation power density |
| Option C: | Array Factor |
| Option D: | Directivity |
| 9. | In which of the following the power is radiated through a complete spherical surface |
| Option A: | Half-wave dipole |
| Option B: | Quarter-wave Monopole |
| Option C: | Both Half-wave dipole & Quarter-wave Monopole |
| Option D: | Full wave dipole |
| 10. | The effects of EMI can be reduced by |
| Option A: | Suppressing emissions |
| Option B: | Reducing the efficiency of the coupling path |
| Option C: | Suppressing emissions, Reducing the efficiency of the coupling path and Reducing the susceptibility of the receptor |
| Option D: | Increasing the efficiency of the coupling path and emissions |

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| Q2. | Solve any Two of the Following | 20 Marks |
| A | Derive an expression of Electric Field Intensity due to infinite line charge at any point P on z-axis. | |
| B | A lossless transmission line with $Z_0 = 50 \Omega$ is 30 m long and operates at 2 MHz. The line is terminated with a load $Z_L = 60 + j40 \Omega$. If $u = 0.6c$ on the line, where c is velocity of light. Use Smith Chart to find (a) The reflection coefficient Γ (b) The standing wave ratio s (c) The input impedance Z_i | |
| C | Write Maxwell's equations in time harmonic field form | |

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| Q3. | Solve any Two of the Following | 20 Marks |
| A | State and explain Maxwell's equations for differential and integral form for static field. | |
| B | State Poynting theorem and derive an expression for the Poynting vector. Explain the power terms mentioned in the derivation | |

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| C | Derive an expression for transmission line equation for two wire line problem. |
| Q4. | Solve any Two of the Following 20 Marks |
| A | Explain the terms radiation pattern, directivity, Beam-width and directive gain of the antenna. |
| B | Explain in detail the sources and the characteristics of EMI. EMI control techniques. |
| C | Write Short Notes on: (1) Horn Antenna (2) Microstrip Antenna |