

International Islamic University Chittagong (IIUC)
Department of Electronic and Telecommunication Engineering
Mid-Term Examination

Program: B.Sc. (Engg.)
 Course Code: ETE-3507
 Total Marks: 30

Semester: Spring 2022
 Course Title: Electromagnetic Fields and Waves
 Time-1.5 Hours

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| 1. a) Interpret your understanding on “co-ordinate system” and its types. | 2 | U | CO1 |
| b) Describe the “spherical co-ordinate system” in details with appropriate figure. | 5 | R, U | CO1 |
| c) Illustrate the unit vectors $d\mathbf{L}$, $d\mathbf{S}$ and $d\mathbf{v}$ in all the coordinate systems. | 3 | An | CO2 |
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| 2. a) Categorize Coulomb’s law in different forms. | 2 | U | CO1 |
| b) Derive an expression for electric field strength due to an infinite line charge. | 6 | An | CO1 |
| c) An infinite sheet in x-y plane extending from $-\infty$ to $+\infty$ in both directions has a uniform charge density 15nC/m^2 . Estimate the electric field. | 2 | E, Ap | CO2 |
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| 3. a) Present “electric flux density” in terms of all possible forms. | 2 | R, U | CO1 |
| b) Analyze “Gauss’s law for electric charge distributed on arbitrary surface. | 5 | An | CO1 |
| c) A point charge, $Q = 10\text{ nC}$ is at the origin in free space. Determine the electric field at P (1,0,2). Also, find the electric flux density at P. | 3 | E, Ap | CO2 |
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| 4. a) Compose the necessity of Biot-Savart law in case of steady magnetic field. | 3 | C | CO3 |
| b) Derive the expression $\oint \mathbf{H} \cdot d\mathbf{L} = I_{enc}$, where the symbols have their usual meanings. | 4 | An | CO1 |
| c) Determine the magnetic field intensity, \mathbf{H} at the center of a square current element. The length of each side is 1.5m and the current, $I = 1$ Ampere. | 3 | Ap | CO2 |