ROLL NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 % Max Marks: 40 Max Time: 1 hr. Tuesday, 25th September, 2018

TEST – 1

Odd Semester 2018-19 Course: **EEE 204 Electromagnetic Theory** III Sem. EEE / ECE

Instruction:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) Scientific and Non-programmable calculators are permitted.

Part A

(3 Q x 4 M = 12 Marks)

1. Define: a. Coulombs law b. Electric flux density.
2. What are the properties of conductors and dielectrics in static electric fields?
3. If a point charge 3 nC is located at the origin find the potential at (-1, 5, 2) assuming zero potential at infinity.

Part B

(2 Q x 8 M = 16 Marks)

4. Point charges 5 nC and -2 nC are located at (2, 0, 4) and (-3, 0, 5), respectively.

   (a) Determine the force on a 1-nC point charge located at (1, -3, 7).

   (b) Find the electric field E at (1, -3, 7).

5. State and write the equations of Gauss's Law. Derive the expression of flux density for an infinite surface charge distribution using Gauss's law.

Part C

(1 Q x 12 M = 12 Marks)

6. Derive the boundary relations for static electric fields in the general form across a common boundary separated by two different perfect dielectric media.

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TEST 2

Odd Semester: 2018-19 | **Date**: 28 November 2018

Course Code: EEE 204 | **Time**: 1 Hour

Course Name: Electromagnetic Theory | **Max Marks**: 40

Branch & Sem: EEE/ECE & III Sem | **Weightage**: 20%

Instructions:

(i) *Read the question properly and answer accordingly.*

(ii) *Question paper consists of 3 parts.*

(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3x4=12)

1. Describe briefly the principle of image method.
2. Prove that the divergence of steady current density is zero.
3. Determine which of the following potential field distribution satisfies Laplace's equation

   a. $V = 2x^2 + 3y^2 - 5z^2 + 10$ b. $V = 6x^2 + 2y^2 - 3z^2 + 8$.

Part B

Answer **all** the Questions. **Each** question carries **eight** marks. (2x8=16)

4. Determine the capacitance of coaxial capacitor with necessary diagram and equations using Gauss's law.
5. Calculate the capacitance, energy stored and energy density in a parallel plate capacitor which consists of two metal plates of area 60 cm^2 separated by a dielectric of 1.5 mm thickness and $\varepsilon_r = 3.5$. If a voltage of 1000 V is applied across it.

Part C

Answer the Question. Question carries **twelve** marks. (1x12=12)

6. The region between concentric spherical conducting shells r = 0.5 m and r = 1 m is charge free. If V(r = 0.5) = - 50 V and V(r = 1) = 50 V, determine the potential distribution, the electric field strength and electric flux density in the region between the shells.

Roll No.												

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Odd Semester: 2018-19 | **Date**: 31 December 2018

Course Code: EEE 204 | **Time**: 2 Hours

Course Name: Electromagnetic Theory | **Max Marks**: 80

Programme & Sem: EEE/ECE & III Sem | **Weightage**: 40%

Instructions:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **five** marks. (4Qx5M=20)

1. Do the fields $E = E_m \, sinx \, sint \, a_y$ V/m and $H = (E_m/\mu_o)(cosx \, cost)a_z$ A/m satisfy Maxwell's equation? Justify your answer.
2. If vector magnetic potential $A = (3y - z)a_x + 2xz \, a_y$ Wb/m in a Cartesian regions of free space.
   a. Show that $\nabla . A = 0$
   b. Find magnetic flux density B and magnetic field intensity H at point P (2, -1, 3).
3. Write the differences between Electric field and magnetic field.
4. State and explain Ampere's circuital law and hence derive the corresponding Maxwell's equation.

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (3Qx10M=30)

5. Sea water plays a vital role in the study of submarine communications. Assuming that for sea water, conductivity(σ) = 4 S/m, ε_r = 80, μ_r = 1, and f = 100 MHz, calculate: (a) the phase velocity, (b) the wavelength, (c) the skin depth, (d) the intrinsic impedance and (e) attenuation constant.
6. Derive the boundary conditions at the interface between two magnetic materials of different permeabilities.
7. Determine the field 'H' due to a straight current carrying conductor of finite length AB by using Biot-Savart's law.

Part C

Answer **both** the Questions. **Each** question carries **fifteen** marks. (2Qx15M=30)

8. A point charge of Q =18 nC has a velocity of 5 x 10^6 m/sec in the direction of $0.6a_x+0.75a_y+0.3a_z$. Find the magnitude of force exerted on the charge if
   a. $E = -3a_x + 4a_y + 6a_z$ kv/m
   b. $B = -3a_x + 4a_y + 6a_z$ mWb/m^2.
   c. Both E and B.

9. a. Derive the General three dimensional wave equation for Electric field in free space.
   b. Show that E/H is a constant for free space and find its value.