Dr Naveen Jaglan.

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- Feb 2019

B.Tech 4th Semester

COURSE CODE: 17B11EC411

COURSE NAME: Electromagnetic Engineering

MAX. MARKS: 15

COURSE CREDITS: 4

MAX. TIME: 1 Hr.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. If $G(r) = 10e^{-2z}(\rho a_\rho + a_z)$, determine the flux of G out of the entire surface of cylinder $\rho = 1$, $0 \le z \le 1$. Confirm the results using the divergence theorem.

   [CO-1; 3 Marks]

2. The temperature in an auditorium is given by $T = x^2 + y^2 - z$. A mosquito located at (1, 1, 2) in the auditorium desires to fly in such a direction that it will get warm as soon as possible. In what direction must it fly?

   [CO-1; 2 Marks]

3. Express the vector $B = \frac{10}{r}a_r + r\cos\theta a_\theta + a_\phi$ in Cartesian coordinate system and find $B(-3,4,0)$.

   [CO-1; 2 Marks]

4. Find the length of a path from $P_1(4,0°,0)$ to $P_2(4,30°,0)$.

   [CO-1; 2 Marks]

5. Let $A = ya_x + za_y + xa_z$. Find the flux of A through surface y=1, $0 < x < 1$, $0 < z < 2$.

   [CO-1; 1 Marks]

6. Derive the expression for E field due to infinite line charge and confirm the results using Gauss's law.

   [CO-2; 3 Marks]

7. Consider the following vector fields:

   (a) $B = 2\rho\cos\varphi a_\rho - 4\rho\sin\varphi a_\varphi + 3a_z$

   (b) $C = \sin\theta a_r + r\sin\theta a\varphi$

   Which of these fields are (a) Solenoidal, and (b) irrotational?

   [CO-1; 2 Marks]