SARDAR PATEL UNIVERSITY
III Semester
Wednesday, Date: 27/11/2019
Electronics and Communication
Session: .... Time: 2:00 to 5:00 pm
Evening
Course Code: U S 0 3 C E L C 0 1

Subject Title: Electronics and Communication

Total Marks: 70
10

Q-1 Multiple choice questions

1. Curl F is
   (i) Scalar quantity
   (ii) Vector quantity
   (iii) Tensor quantity
   (iv) None of the above

2. $\vec{A} \cdot \vec{B} =$
   (i) $ab\cos\vartheta$
   (ii) $ab\sin\vartheta$
   (iii) $ab\tan\vartheta$
   (iv) None of the above

3. Gradient is
   (i) A vector normal to the surface
   (ii) A vector parallel to surface
   (iii) Both (i) and (ii)
   (iv) None of the above

4. Sin $n\pi =$
   (i) $-n$
   (ii) $(-1)^n$
   (iii) 0
   (iv) 1

5. Cos $n\pi =$
   (i) $-n$
   (ii) $(-1)^n$
   (iii) 0
   (iv) 1

6. Odd function is symmetrical about
   (i) X-axis
   (ii) Y- axis
   (iii) Origin
   (iv) Z axis

7. The Laplace transform of $e^{at} t^n$ is given by

(P.T.O)

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(i) $\dfrac{n!}{S^{n+1}}$

(ii) $\dfrac{n!}{(S-a)^{n+1}}$

(iii) $\dfrac{\Gamma(n+1)}{S^{n+1}}$

(iv) $\dfrac{n!}{(S-a)^{n-1}}$

8. 2Sin A CosB=
   (i) Sin (A+B) +(Sin (A-B)
   (ii) Sin (A+B) -(Sin (A-B)
   (iii) Cos(A-B)- Cos(A+B)
   (iv) Cos(A+B) +Cos(A-B)

9. $e^{i\theta} - e^{i\theta} =$
   (i) 2isinθ
   (ii) 2icosθ
   (iii) 2itanθ
   (iv) 2isecθ

10. $e^{i\theta} + e^{i\theta} =$
   (i) 2isinθ
   (ii) 2icosθ
   (iii) 2itanθ
   (iv) 2isecθ

Q-2   Answer any **ten** questions in brief.   **20**
1. Give geometrical interpretation of DOT product
2. Give physical interpretation of gradient.
3. Define compressible fluid
4. Find a_0 for the Fourier series to represent x^2 in the interval ($-\pi$ to π)
5. Give expressions for a_0, a_n and b_n for a Fourier series.
6. Define Even and Odd function.
7. Find Laplace transform of $1+ 2\sqrt{t}$
8. $e^{2t}+4t^3-2$ Sin 3t+3 Cos 3t
9. Find Laplace transform of t $-$Sinh2t
10. Define Inverse Fourier Transform
11. Give expression for Fourier Cosine transform of the function f(x).
12. Define Fourier Transform

Q-3 A. A= 4i + 3j +k
                                                              5
   B = 2i $-$j + 2k then find $\vec{A}\bullet\vec{B}$ and $\vec{A}X\vec{B}$

B. A particle moves along the curve, $x = 2t^2$, $y = t^2 - 4t$ and $z = 3t - 5$ where t denotes time. Find the component of velocity and acceleration at t=1 in the direction i+j+3k.

                                              OR   **5**
Q-3   Evaluate div $\vec{F}$ and curl $\vec{F}$ at a point (1, 2, 3) for
                                                              10

(i) $\vec{F} = grad[x^3 y + y^3 z + z^3 x - x^2 y^2 z^2]$.

(ii) $\vec{F} = x^2 y\ zi + xy^2 zj + xyz^2 k$

Q-4 Find the Fourier series expansion of $f(x) = e^{-ax}$ in the interval $0<x<2\pi$.   10

OR

Q-4 Prove that $x^2 = \dfrac{\pi^3}{3} + 4\sum_{n=1}^{4}(-1)^n \dfrac{Cosnx}{n^2}$ 10

Q-5 Find Laplace Transform of

    (i)   sinatsinbt

    (ii) $e^{-3t}(2\cos5t-3\sin5t)$

OR

Q-5 Find Laplace Transform of (i) $t^2\sin at$

    (ii) $\dfrac{Cos2t - Cos3t}{t}$ 10

Q-6 Find the fourier transform of $f(x) = \begin{cases} 1 & for\ |x|<1 \\ 0 & for\ |x|>1 \end{cases}$ 10

Hence evaluate $\displaystyle\int_0^\infty \dfrac{Sinx}{x}dx$

OR

Q-6 Find the fourier transform $f(x) = \begin{cases} 1-x^2 & for\ |x|\le 1 \\ 0 & for\ |x|>1 \end{cases}$ of   10

Hence evaluate $\displaystyle\int_0^\infty \dfrac{xCosx - Sinx}{x^3} Cos\dfrac{x}{2}dx$

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