BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - II ELECTRICAL :SUMMER- 2022
SUBJECT : MATHEMATICS FOR ELECTRICAL ENGINEERING

Day : Tuesday

Date : 26-07-2022   **S-24077-2022**

Time : 10:00 AM-01:00 PM

Max. Marks : 60

N.B.

    1)   All questions are **COMPULSORY**.

    2)   Figures to the **RIGHT** indicate **FULL** marks.

    3)   Use of non-programmable calculator is **allowed**.

    4)   Assume suitable data **WHEREVER** necessary.

    5)   Draw neat diagram **WHEREVER** necessary.

Q.1 Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.   **(10)**

OR

Q.1 For what values of 'a'   **(10)**

$$x + y + z = 1$$
$$x + 2y + 4z = a$$
$$x + 4y + 10z = a^2$$

the system is consistent. Hence solve the equation.

Q.2 Obtain Fourier expansion for function $f(x) = \left(\dfrac{x - \pi}{2} \right)^2$, $0 \le x \le 2\pi$ and   **(10)**

$f(x + 2\pi) = f(x)$.

OR

Q.2 Find the Fourier series to represent e^{ax} $(-\pi < x < \pi)$ **(10)**

Q.3 Find the Fourier cosine transform of $f(x) = e^{-x^2}$.   **(10)**

OR

Q.3 Find the Fourier sine transform of $\dfrac{e^{-bx}}{x}$.   **(10)**

Q.4 Solve $V_{xx} + V_{yy} = 0$ with conditions   **(10)**

    i) $v(x,y) = 0$ when $y \to \infty$.

    ii) $v(0,y) = 0$

    iii) $v(l,y) = 0$

    iv) $v(x,0) = x(1-x)$, $0 < x < 1$.

OR

Q.4 Solve $u_t = k u_{xx}$ subject to the conditions   **(10)**

$u(0,t)=0$, $u(\pi, t)=0$, $u(x,0)=x$, $0 < x < \pi$

Q.5 The sum of the mean and variance of a binomial distribution for 7 trials is 2.8. Find the distribution.   **(10)**

OR

Q.5 There are three bags : first containing 1 white, 2 red, 3 green balls ; second 2 white, 3 red, 1 green balls and third 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are formed to be one white and one red. Find the probability that the balls so drawn came from the second bag.   **(10)**

PTO

Q.6 Find the shortest path between a and z in the graph shown below : **(10)**
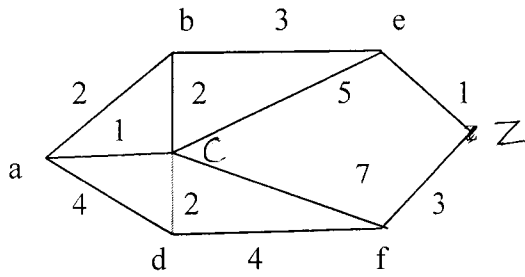
OR

Q.6 Draw the directed graph whose adjacency matrix is **(10)**

$$M_A = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} .$$

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