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By K B Hemanth Raj

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CBCS SCHEME

USN | | | | | | | | | | | | | | | **15MATDIP41**

Fourth Semester B.E. Degree Examination, June/July 2019
Additional Mathematics – II

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1. a. Find the rank of the matrix

    $A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ by elementary row operation.   **(06 Marks)**

    b. Find the inverse of the matrix $\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$ using Cayley - Hamilton theorem.   **(05 Marks)**

    c. Find all eigen values of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ **(05 Marks)**

OR

2. a. Solve the system of equation by Gauss - Elimination method.

    $x + y + z = 9$
    $x - 2y + 3z = 8$
    $2x + y - z = 3$ **(06 Marks)**

    b. Using Cayley – Hamilton theorem find A^{-1}, given $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ **(05 Marks)**

    c. Reduce the matrix $A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ into row echelon form and hence find its rank.   **(05 Marks)**

Module-2

3. a. Solve by the method of undetermined co-efficient $y'' - 4y' + 4y = e^x$.   **(06 Marks)**
    b. Solve $(D^3 + 6D^2 + 11D + 6)y = 0$.   **(05 Marks)**
    c. Solve $y'' + 2y' + y = 2x$.   **(05 Marks)**

OR

4. a. Solve by the method of variation of parameter $y'' + a^2 y = \sec ax$.   **(06 Marks)**
    b. Solve $y'' - 4y' + 13y = \cos 2x$.   **(05 Marks)**
    c. Solve $(D^2 - 1)y = e^{2x}$.   **(05 Marks)**

Module-3

5   a. If $f(t) = t^2$, $0 < t < 2$ and $f(t+2) = f(t)$ for $t > 2$, find $L[f(t)]$. (06 Marks)
    b. Find $L[\cos t . \cos 2t . \cos 3t]$ (05 Marks)
    c. Find $L[e^{-2t}(2\cos 5t - \sin 5t)]$ (05 Marks)

OR
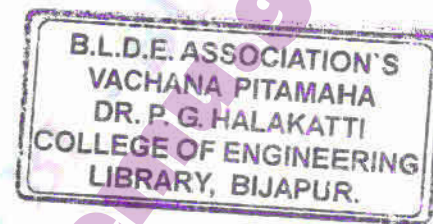
6   a. Find $L[e^{-t} . \cos^2 3t]$ (06 Marks)
    b. Express the following function into unit step function and hence find $L[f(t)]$ given

$$f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$$

(05 Marks)

    c. Find $L[t . \cos at]$ (05 Marks)

Module-4

7   a. Using Laplace transforms solve the differential equation $y'' + 4y' + 4y = e^{-t}$ given $y(0) = 0$, $y'(0) = 0$. (06 Marks)
    b. Find $L^{-1}\left[\dfrac{2s-5}{4s^2+25}\right] + L^{-1}\left[\dfrac{8-6s}{16s^2+9}\right]$ (05 Marks)
    c. Find $L^{-1}\left[\dfrac{1}{s(s+1)(s+2)(s+3)}\right]$ (05 Marks)

OR

8   a. Employ Laplace transform to solve the equation
$$y'' + 5y' + 6y = 5e^{2x}, \quad y(0) = 2, \quad y'(0) = 1.$$
(06 Marks)

    b. Find $L^{-1}\left[\dfrac{s+5}{s^2-6s+13}\right]$ (05 Marks)
    c. Find $L^{-1}\left[\log\left(\dfrac{s+a}{s+b}\right)\right]$ (05 Marks)

Module-5

9   a. If A and B are any two mutually exclusive events of S, then show that
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
(06 Marks)

    b. Prove the following :
       (i) $P(\phi) = 0$ (ii) $P(\overline{A}) = 1 - P(A)$ (05 Marks)
    c. Three machines A, B and C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentages of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C. (05 Marks)

OR

10   a. State and prove Bay's theorem. (06 Marks)
     b. If A and B are events with $P(A \cup B) = \dfrac{7}{8}$, $P(A \cap B) = \dfrac{1}{4}$ and $P(\overline{A}) = \dfrac{5}{8}$ find $P(A)$, $P(B)$ and $P(A \cap \overline{B})$. (05 Marks)
     c. A shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out of 3 shots. Find the probability that the target is being hit.
        (i) when both of them try   (ii) by only one shooter. (05 Marks)

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