CBCS SCHEME

15MATDIP41

Fourth Semester ME, Degree Examination, Dee.2019/Jan.2020

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 by

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

b. Find the inverse of the matrix $\begin{vmatrix} 1 & 4 \\ & 3 \end{vmatrix}$ using Caylery-Hamilton theorem. **(05 Marks)**

c. Solve the following system of equations by Gauss elimination method.
$+ y + 4z = 12$, $4x+ 11 - z = 33$, $8x\ 3y + 2z\ 20$ **(05 Marks)**

OR

2 a. Find the rank of the matrix $\begin{vmatrix} -1 & -3 & -1 \\ 2 & 3 & -1 \\ 0 & 1 & 1 \\ 1 & 1 & -1 \end{vmatrix}$ by reducing it to echelon form. **(06 Marks)**

b. Find the eigen values of $A = \begin{vmatrix} 7 & -1 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{vmatrix}$ **(05 Marks)**

c. Solve by Gauss elimination method: $x + y + z = 9$, $x\ \ 2y + 3z = 8$, $2x$ -4- $y - z = 3$ (05 marks)

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3 a. Solve $\frac{d'y}{dx} + 6\frac{d'y}{dx^2} + 11\frac{dy}{dx} + 6y = 0$ **(05 Marks)**

b. Solve $y''\ \ 4y' + 13y = \cos 2x$ **(05 Marks)**

c. Solve by the method of undetermined coefficients $y'' + 3y' + 2y = 12x^2$ **(06 Marks)**

OR

4 a. Solve $\frac{d'y}{dx^2} + 5\frac{dy}{dx} + oy =$ **(05 Marks)**

b. Solve $y'' + 4y' - 12y = e^{2'} - 3\sin 2x$ **(05 Marks)**

c Solve by the method of variation of parameter $\frac{d\ y}{dx} + y = \tan x$ **(06 Marks)**

Module-3

5 a. Find the Laplace transform of
i) $e^{-2}\sin h\, 4t$ ii) $e^{-2}'(2\cos 5t - \sin 5t)$ **(06 Marks)**

b. Find the Laplace transform of $fit) = t^2$ $0 < t < 2$ and $f(t + 2) = f(t)$ for $t > 2$. **(05 Marks)**

c. Express $f(t) = \begin{cases} t & 0<t<4 \\ 5 & t>4 \end{cases}$ interms of unit step function and hence find L[f(t)]. (05 Marks)

OR

6 a. Find the Laplace transform of i) t cosat ii) $\frac{\cos at - \cos bt}{t}$ (06 Marks)

b. Given $f(t) = \begin{cases} E & 0<t<a/2 \\ -E & a/2<t<a \end{cases}$ where f(t +) = f(t). Show that L[f(t)] = $\frac{E}{s}\tanh\left(\frac{as}{4}\right)$ (05 Marks)

c. Express $f(t) = \begin{cases} & 0<t<1 \\ & 1<t<2 \\ & t>2 \end{cases}$ interms of unit step function and hence find L[f(t)]. (05 Marks)

Module-4

7 a. Find the inverse Laplace transform or i) $\frac{2s-1}{s^2+4s+29}$ ii) $\frac{s+2}{s^2+36} + \frac{4s-1}{s^2+25}$ (06 Marks)

b. Find the inverse Laplace transform of log $\frac{s^2+1}{s^2+4}$ (05 Marks)

c. Solve by using Laplace transforms y" + 4y' + 4y = given that y(0) = 0, y'(0) = 0. (05 Marks)

OR

8 a. Find the inverse Laplace transformof $\frac{1}{(s+\ )(s+2)(5+\ )}$ (06 Marks)

b. Find the inverse Laplace transthrm of $\cot^{-1}\left(\frac{5+a}{b}\right)$ (05 Marks)

C. Using Laplace transforms solve the differential equation $y''' + 2y'' - - 2y = 0$ given y(0) = y'(0) = 0 and y"(0) = 6. (05 Marks)

Module-5

9 a. State and prove Baye's theorem. (06 Marks)

b. The machines A, B and C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentage 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)

e. The probability that a team wins a match is 3/5. If this team play 3 matches in a tournament, what is the probability that i) win all the matches ii) lose all the matches. (05 Marks)

OR

10 a. If A and B are any two events of S. which are not mutually exclusive then P(Au B) = P(A) + P(B) — P(AnB). (06 Marks)

b. If A and B are events with `P(AnB) = 7/8, P(AnB) = 1/4, P(g„)= 5/8. Find P(A), P(B) and P(A nii). (05 Marks)

C. The probability that 4: person A solves the problem is 1/3, that of B is 1/2 and that of C is 3/5. If the problem is simultaneously assigned to all of them what is the probability that the problem is solved? (05 Marks)