

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE II SEMESTER EXAMINATION IN MARINE ENGINEERING JUNE 2020

19-208-0201 ENGINEERING MATHEMATICS II (2019 Scheme)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet]
per module

Max. Marks: 10 per module

INSTRUCTIONS

1. You have to be available in Google Meet on demand by the faculty.
2. You have to share your 'live location' to the faculty before uploading the answer sheet.
3. You have to answer only one question per module.
4. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
5. If at all an answer goes beyond one page, (due to your handwriting) another page can also be used. In such a situation, the page number should be given as 1/2, 2/2.
6. You have to put dated signature along with Register Number, Subject Code, Module/Group Number (as given in the Question Paper) in each page.
7. You have to put the Question Number correctly.
8. After answering the question, you have to scan and upload the answer page.

MODULE - I

(Answer *ANY ONE* question)

- I(1). (a) Reduce to the normal form and solve (5)
 $2x+3y+5z = 2$
 $4x-3y+z = 4$
 $x+3y-2z = 7$
- (b) Using Cayley Hamilton theorem find A^{-1} for (5)

$$A = \begin{bmatrix} 0 & 2 & 3 \\ 0 & -1 & 4 \\ 3 & 4 & 5 \end{bmatrix}$$

OR

- I(2). (a) Use LU decomposition to solve the following system of equations (5)
 $x + 2y + 3z = 3$
 $2x - y + z = 1$
 $x + y + 2z = 2$
- (b) Use Gauss Siedel method to solve the following (5)
 $x_1 - 0.25x_2 - 0.25x_3 = 50$
 $-0.25x_1 + x_2 - 0.25x_4 = 50$
 $-0.25x_1 + x_3 - 0.25x_4 = 25$
 $-0.25x_2 - 0.25x_3 + x_4 = 25$

MODULE - II
(Answer *ANY ONE* question)

II(1). (a) Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$. (5)

(b) Solve $(x + y + 1)^2 \frac{dy}{dx} = 1$ (5)

OR

II(2). (a) Solve completely (5)

$$(D^2 + 2)y = e^x \cos x$$

(b) Solve the system of equations (5)

$$\frac{dx}{dt} + 4x + 3y = t; \quad \frac{dy}{dt} + 2x + 5y = e^t$$

MODULE - III(Answer **ANY ONE** question)

III(1). (a) Find the Fourier series for the function (5)

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

(b) Find the half range cosine series expansion of $f(x) = x - x^2$ in $0 < x < 1$. (5)

OR

III(2). (a) Represent the following function as Fourier cosine integral (5)

$$f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x > 1 \end{cases}$$

(b) Evaluate $\int_0^{\infty} e^{-ax} x^{m-1} \sin bx \, dx$ in terms of Gamma function. (5)

MODULE - IV(Answer **ANY ONE** question)

IV(1). (a) Obtain the Laplace transform of $t^2 e^t \sin 4t$. (5)

(b) Evaluate $\int_0^{\infty} \frac{e^{-at} - e^{-bt}}{t} dt$. (5)

OR

IV(2). (a) Solve the initial value problem (5)

$$y'' + y' - 6y = 1; y(0) = 0, y'(0) = 1,$$

(b) Using convolution property find $L^{-1}\left\{\frac{s}{(s^2 + 4)^2}\right\}$. (5)

MODULE - V(Answer **ANY ONE** question)

- V(1). (a) A husband and wife appear in an interview for two vacancies in the same post. (5)
 The probability of husband's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$.
 What is the probability that
 (i) Both will be selected.
 (ii) Only one will be selected
 (iii) None of them will be selected.
- (b) A variable X has the following probability distribution (5)
- | | | | |
|----------|---------------|---------------|---------------|
| $X:$ | -3 | 6 | 9 |
| $P(X=x)$ | $\frac{1}{6}$ | $\frac{1}{2}$ | $\frac{1}{3}$ |
- Find Var (X) and Var (Y) where $Y = 2X - 1$.

OR

- (5)
- V(2). (a) If mean and variance of a binomial distribution are 4 and 2 respectively, find the probability of
 (i) exactly 2 successes
 (ii) Less than 2 successes
 (iii) At least 2 successes
- (b) In a factory producing cycle tyres, there is a small chance of 1 in 500 tyres to be defective. The tyres are supplied in lots of 10. Using Poisson distribution calculate the approximate number of lots containing no defective, one defective and two defective tyres respectively in a consignment of 10,000 lots. (5)
