

**COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**B.TECH. DEGREE I & II SEMESTER SUPPLEMENTARY EXAMINATION IN  
MARINE ENGINEERING JUNE 2020**

**MRE 1102 ENGINEERING MATHEMATICS II**  
(2013 Scheme)

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

Max. Marks: 14

**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.
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). Find the eigen values and eigen vectors of  $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ . (14)

**OR**

I(2). State and prove the necessary and sufficient conditions for a function to be analytic. (14)

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**MODULE - II**

(Answer *ANY ONE* question)

II(1). Solve (i)  $xy(1 + xy^2)\frac{dy}{dx} = 1$ . (7)  
(ii)  $y \log y dx + (x - \log y)dy = 0$  (7)

**OR**

II(2). (a) Solve by the method of variation of parameters  $\frac{d^2y}{dx^2} + 4y = \tan 2x$ . (7)  
(b) Solve  $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8x^2e^{2x}\sin 2x$ . (7)

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**MODULE - III**

(Answer *ANY ONE* question)

- III(1). Obtain Fourier series for the function  $f(x)$  given by (14)  
$$f(x) = 1 + 2x/\pi, -\pi \leq x \leq 0$$
$$1 - 2x/\pi, 0 \leq x \leq \pi$$

Deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$

**OR**

- III(2). (a) Find the half range cosine series for  $\sin x$  in  $0 < x < \pi$ . (7)  
(b) Prove that  $\beta(m, n) = \frac{\Gamma m \Gamma n}{\Gamma m+n}$ . (7)

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**MODULE - IV**

(Answer *ANY ONE* question)

- IV(1). (a) Find the Laplace transform of (i)  $t \cos at$  (ii)  $t^3 e^{-3t}$ . (7)
- (b) Derive the Laplace transform of periodic function. (7)

**OR**

- IV(2). (a) Solve by the method of transforms  $y'' - 3y' + 2y = 4t + e^{3t}$ ,  $y(0) = 1$ ,  $y'(0) = -1$ . (8)
- (b) Find the inverse transform of (i)  $\frac{s^2 - 3s + 4}{s^3}$  (ii)  $\frac{s + 2}{s^2 - 4s + 13}$  (6)

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**MODULE - V**

(Answer *ANY ONE* question)

V(1). State Baye's theorem .There are two bags .one of which contains 2 white and 4 black balls other contains 4 white and 3 black balls. A ball is drawn from one of the bags and it turns out to be white. What is the probability that it comes from the first bag. (14)

**OR**

V(2). If the probability of a bad reaction from certain injection is 0.001.Determine the chance that out of 2000 individuals more than two will get a bad reaction. (14)

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