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R-13

Code: 1GC31

II B.Tech. I Semester Supplementary Examinations August 2021

Mathematics-II

(Common to CE & ME)

Max. Marks: 70

Time: 03 Hours

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

- Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. 14M
- Find the half-range Fourier sine series for $f(x) = ax+b$ in $0 < x < 1$. 14M
- Solve the by the method of separation of variables
 $4u_x + u_y = 3u$ and $u(0, y) = e^{-5y}$. 14M
- Determine the root of $x^3 - 4x + 1 = 0$ by method of false position. 7M
 - Find a root of the equation $x^3 - 4x - 9 = 0$ using Bisection method. 7M
- Obtain Picard's second approximate solution of the initial value problem
 $\frac{dy}{dx} = \frac{x^2}{y^2 + 1}$, $y(0) = 0$. Find $y(1)$. 7M
 - Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$, $y(1) = 1$. Find $y(2)$ in steps of **0.2** using the Euler's method. 7M
- Determine $\frac{dy}{dx}$ at $x = 0$ from the following data 14M

x	0	1	2	3	4	5
y	4	8	15	7	6	2
- If u is a harmonic function, show that $w = z^2$ is not a harmonic function unless u is a constant. 7M
 - Find the analytic function whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$. 7M
- Use Cauchy's integral formula to evaluate $\int_C \frac{\sin f z^2 + \cos f z^2}{(z-1)(z-2)} dz$ where C is the circle $|z| = 3$. 14M

Hall Ticket Number :

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R-13

Code: 1G631

II B.Tech. I Semester Supplementary Examinations August 2021

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. A steel rod is of 3m long and 55mm in diameter. An axial pull of 120 KN is suddenly applied to the rod. Calculate the instantaneous stress induced and also the instantaneous elongation produced in the rod. Take $E = 2 \times 10^5 \text{ N/mm}^2$. 14M
2. Derive an expression for S.F and B.M for a Simply supported beam subjected to a point load at mid point and also draw the Shear Force and Bending Moment Diagrams. 14M
3. A beam is simply supported and carries a uniformly distributed load of 50KN/m run over the whole span. The section of the beam is rectangular having a depth of 600mm. If the maximum stress in the material of the beam is 135 N/mm^2 and moment of inertia of the section is $7 \times 10^8 \text{ mm}^4$, find the span of the beam. 14M
4. A rectangular beam of 150mm wide and 300mm deep is subjected to a maximum shear force of 60KN. Determine (i) Average shear stress, (ii) Maximum shear stress and (iii) Shear stress at a distance of 25mm above neutral axis. 14M
5. A beam of uniform rectangular section 200mm wide and 300mm deep is simply supported at its ends. It carries a uniformly distributed load of 9KN/m run over the entire span of 5m. If the value of E is $1 \times 10^4 \text{ N/mm}^2$, find (i) Slope at the supports and (ii) Maximum deflection. 14M
6. Derive Slope and Deflection of a simply supported beam carrying a uniformly distributed load at the centre by Mohr's theorem. 14M
7. Find the diameter of a circular bar which is subjected to an axial pull of 160KN if the maximum allowable shear stress on any section is 85 N/mm^2 . 14M
8. Explain briefly about Maximum shear stress theory of failure. 14M
