

AR16

CODE: 16BS1002

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech. II Semester Supplementary Examinations, August-2018

ENGINEERING MATHEMATICS – II (Common to All Branches)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a Find a real root of the equation , $\log x = \cos x$ using Regula – Falsi method 7M
b Using Newton's forward interpolation formula, and given table of values 7M

| | | | | | |
|------|------|------|------|------|------|
| x | 1.1 | 1.3 | 1.5 | 1.7 | 1.9 |
| f(x) | 0.21 | 0.69 | 1.25 | 1.89 | 2.61 |

Obtain the value of f(x), when $x = 1.4$

(OR)

2. Given that $y(3) = 6$, $y(5) = 24$, $y(7) = 58$, $y(9) = 108$, $y(11) = 174$, find y when $x = 8$ by using Lagrange's formula 14M

UNIT-II

3. Evaluate $\int_0^6 \frac{1}{1+x} dx$ 14M

(i) by Simpson's 1/3 rule (ii) by Simpson's 3/8 rule and compare the result with actual value

(OR)

4. a Find the value of y for $x = 0.1$ by Picard's method , 7M
given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$.
b Find the value of y at $x = 0.1$ to five places of decimals 7M
from $\frac{dy}{dx} = x^2 y - 1$, $y(0) = 1$ by Taylor's series method.

UNIT-III

5. a Find the Laplace transforms of $\frac{e^{-at} - e^{-bt}}{t}$ 7M

b Find the inverse Laplace transforms of $\left[\frac{s^2}{(s+1)(s+2)(s+3)} \right]$ 7M

(OR)

6. Solve the initial value problem by using Laplace transforms 14M
 $4y'' + \pi^2 y = 0$ with the given conditions $y(0) = 2$, $y'(0) = 0$

UNIT-IV

7. a Express $f(x) = x - \pi$ as a Fourier series in $-\pi < x < \pi$ 7M

b Find the Fourier series to represent $(1-x^2)$ in the interval $-1 \leq x \leq 1$ 7M

(OR)

8. a Develop $F(x)$ as Fourier series in $(-2, 2)$ if $f(x) = \begin{cases} 0, & -2 < x < -1 \\ k, & -1 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$ 7M

b Find half-range Fourier sine series for $f(x) = ax + b$, in $0 < x < 1$ 7M

UNIT-V

9. a Solve $x(y-z)p + y(z-x)q = z(x-y)$ 7M

b Solve $y^3 \frac{\partial z}{\partial x} + x^2 \frac{\partial z}{\partial y} = 0$ by separation of variables. 7M

(OR)

10. Solve by the method of separation of variables $4u_x + u_y = 3u$ 14M
and $u(0, y) = 3e^{-y} - e^{-5y}$.

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CODE: 16CE1001

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, August-2018

**BUILDING MATERIALS AND CONSTRUCTION
(Civil Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- | | | | |
|-------------|---|---|---|
| 1. | a | Discuss the geological classification of rocks | 6 |
| | b | What is texture of a rock? Enumerate its various types? | 8 |
| (OR) | | | |
| 2. | a | How is artificial stone prepared? What are its different forms? | 8 |
| | b | Mention the advantages of artificial stones. | 6 |

UNIT-II

- | | | | |
|-------------|---|---|---|
| 3. | a | State the raw materials required in the manufacture of different types of glass | 7 |
| | b | Give the chemical formula for each category of glass? | 7 |
| (OR) | | | |
| 4. | a | Discuss the applications and advantages of Fiber reinforced plastics. | 7 |
| | b | What are the properties of glass reinforced plastics? | 7 |

UNIT-III

- | | | | |
|-------------|---|---|---|
| 5. | a | What are the characteristics of clay for the manufacture of quality bricks? | 7 |
| | b | How does the composition of clay affect the quality of brick? | 7 |
| (OR) | | | |
| 6. | a | Briefly describe the functioning of advanced water proofing systems. | 7 |
| | b | What are the uses of Water Proofing and Damp Proofing Material? | 7 |

UNIT-IV

- | | | | |
|-------------|---|--|---|
| 7. | a | Distinguish between the windows and ventilators | 6 |
| | b | Write about the parameters influencing the selection of the floors and flooring. | 8 |
| (OR) | | | |
| 8. | a | Distinguish between the Hollow Block and Ferro Cement Constructions. Give suitable examples. | 8 |
| | b | What are the requirements of a good staircase? | 6 |

UNIT-V

- | | | | |
|-------------|---|---|---|
| 9. | a | What are the ingredients of an oil borne paint? | 6 |
| | b | Mention the usual defects which are found in the painting work | 8 |
| (OR) | | | |
| 10. | a | Give a brief description of the process of painting on different surfaces | 6 |
| | b | Discuss the following | 8 |
| | | i) Distempering ii) Under Pinning | |

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) If the rank of the matrix $\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 3 \\ 2 & k & 0 \end{bmatrix}$ is 2 find the value of k
- b) Reduce the matrix $\begin{bmatrix} 2 & -1 & 2 \\ -2 & 0 & 1 \\ 1 & 2 & 1 \end{bmatrix}$ to normal form
- c) State Cayley – Hamilton theorem
- d) If 1, 1, -2 are the eigen values of the matrix of the quadratic form $2x_1x_2 + 2x_1x_3 - 2x_2x_3$, then find the nature of the same quadratic form
- e) Write Dirichlet's conditions for Fourier series expansion of a function
- f) Write the Fourier series for $f(x)$ in the interval $\alpha < x < \alpha + 2\pi$
- g) Determine the Z-transform of n^2
- h) State final value theorem for Z-transform
- i) Compute the value of $\beta(2,3)$
- j) Compute $\int_0^{\frac{\pi}{2}} \sin^2 \theta \cos^2 \theta d\theta$ using Beta and Gamma functions

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Reduce the matrix $\begin{bmatrix} 1 & 3 & -1 & 2 \\ 0 & 11 & -5 & 3 \\ 2 & -5 & 3 & 1 \\ 4 & 1 & 1 & 5 \end{bmatrix}$ to echelon form and hence find its rank **6M**
 - b) Solve $x+2y+3z=0$, $3x+4y+4z=0$, $7x+10y+12z=0$ **6M**
- (OR)**
3. a) Solve the following system of equations by Gauss-Jordan method **6M**
 $2x + y + z = 10, 3x + 2y + 3z = 18, x + 4y + 9z = 16$
 - b) Solve $x + y + z = 6, 3x + 3y + 4z = 20, 2x + y + 3z = 13$ by Gauss elimination method **6M**

4. a) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ **6M**
- b) Verify Cayley – Hamilton theorem for $A = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}$ **6M**
- (OR)**
5. Reduce the Quadratic form $2x_1x_2 + 2x_1x_3 - 2x_2x_3$ to a canonical form by an orthogonal reduction. **12M**

UNIT-III

6. a) Find the Fourier series of $f(x) = 1 + \sin x$, $-1 < x < 1$ **6M**
- b) Find the Fourier cosine transform of $f(x) = e^{-x^2}$ **6M**
- (OR)**
7. a) Find the half-range cosine series for $f(x) = x^2$, in $0 < x < \pi$ **6M**
- b) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2 & \text{if } |x| \leq 1 \\ 0 & \text{if } |x| > 1 \end{cases}$ **6M**

UNIT-IV

8. a) Find $Z[\sin(3n+5)]$ **6M**
- b) If $\bar{f}(z) = \frac{7z^2 + 2z + 10}{(z-2)^4}$, find the values of $f(2)$ and $f(3)$ by Initial value theorem **6M**
- (OR)**
9. a) Determine the inverse Z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$ **6M**
- b) Using Z – transform, solve $u_{n+2} + 6u_{n+1} + 9u_n = 2^n$ with $u_0 = 0, u_1 = 0$ **6M**

UNIT-V

10. a) Show that $\beta\left(m, \frac{1}{2}\right) = 2^{2m-1} \beta(m, m)$ for suitable value of m **6M**
- b) Evaluate $\int_0^\infty 3^{-4x^2} dx$ using Beta and Gamma functions **6M**
- (OR)**
11. Prove that $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^4}} \times \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$ using Beta and Gamma functions **12M**