

Subject Code: R13207/R13
Set No - 1
I B. Tech II Semester Supplementary Examinations April/May - 2017
MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E, Textile Engg.)

Time: 3 hours
Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**
 Answering the question in **Part-A** is Compulsory,
 Three Questions should be answered from **Part-B**

PART-A

1. (a) Write the working rule to find the root of the equation $y = f(x)$ by False position method.
- (b) Prove that $(1 + \nabla)(1 - \nabla) = 1$
- (c) By RK method of second order find $y(0.3)$ given that $\frac{dy}{dx} = x - y$, $y(0) = 1$
- (d) Expand $f(x) = \begin{cases} x, & 0 < x < \pi \\ 0, & \pi < x < 2\pi \end{cases}$ as Fourier series.
- (e) If $F_s(p)$ is Fourier sine transform of $f(x)$. Then prove that

$$F_s[f(x) \cos ax] = \frac{1}{2} [F_s(p+a) + F_s(p-a)]$$
- (f) Find $Z[a^n]$.

[3+3+4+4+4+4]

PART-B

2. (a) Find the root of the equation $x^3 - 9x + 1 = 0$ by using Newton Raphson method.
 - (b) Find the root of the equation $xe^x = 1$ by using bisection method.
- [8+8]
3. (a) Find $f(2.5)$ using Newton's forward formula for the following table
- | | | | | | | | |
|--------|---|---|----|----|-----|-----|------|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y=f(x) | 0 | 1 | 16 | 81 | 256 | 625 | 1296 |
- (b) Find the Lagrange's polynomial for the following data
- | | | | | |
|---|-----|-----|-----|-----|
| x | 0 | 2 | 3 | 6 |
| y | 648 | 704 | 729 | 792 |
- [8+8]
4. (a) By modified Euler's method find $y(0.2)$, $y(0.4)$ given that $\frac{dy}{dx} = y^2 - x$, $y(0) = 1$
 - (b) Obtain Picard's expansion for $\frac{dy}{dx} = x + y$, $y(0) = 1$, hence evaluate $y(0.1)$.
- [8+8]
5. (a) Find the half-range sine series for the function $f(x) = x^2$ in the range $0 < x < 2$.
 - (b) Find the Fourier expansion for $f(x) = \sin x$ in $[0, \pi]$.
- [8+8]

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6. (a) Find the Fourier transform of $f(x)$ defined by $f(x) = 1 - x^2 - 1 < x < 1$
(b) Find the Fourier cosine transform of e^{-ax} , $a > 0$ and hence deduce the inversion formula
$$\int_0^{\infty} \frac{\cos px}{a^2 + p^2} dp$$
[8+8]
7. (a) Find the inverse Z – transform of $\left[\frac{z}{z^2 + 11z + 24} \right]$
(b) Using Z – transforms, solve $y_{n+2} - 6y_{n+1} + 9y_n = 3^n$ with $y_0 = 0$ and $y_1 = 1$.[8+8]

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