

Code No. 4009/N

FACULTY OF ENGINEERING

B.E. 2/4 I-Sem (New) (Common to all Branches Except- IT)

Suppl. Examination

May /June - 2008

Subject : Mathematics-III

Time : 3 hours]

[Max. Marks : 75

Note : Answer *all* questions of Part A.
Answer *five* questions from Part B

PART - A (25 marks)

1. Eliminating the arbitrary constants a and b from $z = ax + by + a^2b^2$, obtain the partial differential equation. 2
2. Find the complete integral of the partial differential equation $p^2q^2(px + qy - z) = 2$ 2
3. Find the Fourier Series expansion of $f(x) = x, -\pi \leq x \leq \pi,$
 $f(x+2\pi) = f(x).$ 3
4. Fourier cosine series of $f(x) = 1, 0 \leq x \leq 2,$ is _____ 2
5. Give dimensional wave equation is _____ 2
6. Explain the method of separation of variables. 3
7. Contain the z transform of $f_n = \text{Cos } h(n\theta)$ 2
8. Find the inverse z-transform of $F(z) = \frac{z}{(z-1)(z-2)}$ 3
9. Derive Newton's forward Interpolation formula. 3
10. Evaluate : $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ formula with $n = 10.$ 3

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PART - B (5×10=50 marks)

11. (a) Solve : $z(z^2 + xy)(px - qy) = x^4$ 5
(b) Solve : $z pq = p + q$ 5
12. (a) Find Fourier Series of $f(x) = x^3$ in $(-\pi, \pi)$ 5
(b) Find the Fourier Sine and Cosine series of
$$f(x) = \begin{cases} x, & \text{when } 0 < x < \frac{\pi}{2} \\ 0, & \text{when } \frac{\pi}{2} < x < \pi \end{cases}$$
 5
13. Find the temperature in a thin metal rod of length L , with both the ends insulated and with initial temperature $\text{Sin}\left(\frac{\pi x}{L}\right)$ in the rod. 10
14. (a) Find the z transform of $\text{Cos}(n + 1)\theta$. 5
(b) State and prove convolution theorem of z -transform. 5
15. (a) Use Lagrange's interpolation formula to fit a polynomial to the following data. Hence find $y(-2)$, $y(1)$ and $y(4)$.
x : -1 0 2 3
y : -8 3 1 2 5
(b) Using fourth order Runge-Kutta method find the solution of
 $\frac{dy}{dx} = y - x$, with initial condition $y(0) = 1.5$ on $[0, 1]$ 5
16. Solve $(e^x - 1)(qr - ps) = pqe^x$, by using Monge's method. 10
17. Solve the following system of equations by Gauss elimination method.
 $4x - 3y - 9z + 6w = 0$
 $2x + 3y + 3z + 6w = 6$
 $4x - 21y - 39z - 6w = -24.$ 10