B.Tech I Year (R07) Supplementary Examinations December/January 2015/2016
MATHEMATICAL METHODS
(Common to EEE, ECE, ME, CSE, EIE, IT, E.Con.E, ECC & CSS)
(For 2008 Regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1 Investigate for what value of λ and μ the system of simultaneous equations: $x + y + z = 6$; $x + 2y + 3z = 10$; $x + 2y + \lambda z = \mu$ has:
 (a) No solution.
 (b) A unique solution.
 (c) An infinite number of solutions.

2 Show that the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$
 (a) Satisfies its characteristic equation
 (b) Find A^{-1}.

3 Let the matrix $A = \begin{bmatrix} 2 & 3 + 4i \\ 3 - 4i & 2 \end{bmatrix}$ then:
 (a) Show that 'A' is hermitian.
 (b) Find its Eigen vectors.

4 (a) Evaluate the root of equation $e^x = 4x$, which is approximately 2 correct to three decimal places.
 (b) Given $f(x) = 168, 192, 336$ at $x = 1, 7, 15$ respectively use Lagrange's formula and find the value of $f(10)$.

5 (a) Fit a second degree parabola to the following data:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

 (b) Calculate the value $\int_0^6 \frac{x}{1+x} dx$ correct up to three significant figures taking six intervals by trapezoidal rule.

6 (a) Given $\frac{dy}{dx} = x^3 + y$, $y(0) = 1$ compute $y(0.2)$ by Euler's method taking $h = 0.01$.
 (b) Given $\frac{dy}{dx} = 1 + xy$, with the initial condition that $y = 1$ when $x = 0$ compute $y(0.1)$ correct to four places of decimal by using Taylor's series method.

7 Obtain Fourier series expansion for the function $f(x)$ given by $f(x) = 1 + \frac{2x}{\pi}$, $-\pi \leq x \leq 0$
 Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots\cdots = \frac{\pi^2}{8}$.

8 (a) Form a partial differential equation by eliminating the arbitrary ϕ from $z = x^2\phi(x - y)$.
 (b) If $Z[\{f(n)\}] = \frac{3z^2 - 4z + 7}{(z-1)^3}$. Find the values of $f(0), f(1), f(2)$ and $f(3)$.

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