BME-015

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

December, 2015

BME-015 : ENGINEERING MATHEMATICS – II

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of calculator is permitted.*

1. Test the following series for convergence and absolute convergence :

$$x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots$$ *10*

2. Find the radius of convergence of the series

$$\sum_{n=1}^{\infty} \frac{x^n}{n!}$$ *10*

3. Find the Fourier series to represent e^{ax} from $x = -\pi$ to $x = \pi$.   *10*

4. If $2 \cos \alpha = x + \dfrac{1}{x}$, $2 \cos \beta = y + \dfrac{1}{y}$, prove that

one of the values of

$x^m y^n + \dfrac{1}{x^m y^n}$ is $2 \cos (m\alpha + n\beta)$.   **10**

5. Show that the following function is harmonic and find its conjugate function :

$$u = 2x - 3x^3 + 9xy^2.$$ **10**

6. If 'C' is a circle of radius 'r' and centre z_0 and if 'n' is an integer, evaluate :

$$\oint_C \frac{dz}{(z - z_0)^{n+1}}.$$ **10**

7. Find the nature of singularities of the following functions :

(a) $\dfrac{z - \sin z}{z^2}$

(b) $\dfrac{(z + 1)}{\sin (z - 2)}$ **10**

8. Evaluate :

$$\int_0^{2\pi} \frac{d\theta}{1 - 2a \cos\theta + a^2}, \quad a^2 < 1.$$ **10**

9. Use the method of variation of parameters to solve the following equation :

$$y'' + y = \cos x.$$ *10*

10. Solve the following :

$$(y^2 + z^2 - x^2)\,p - 2xy\,q + 2xz = 0.$$ *10*

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