

B.Tech III Year I Semester (R09) Supplementary Examinations December 2015

MATHEMATICS FOR AEROSPACE ENGINEERS

(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Evaluate $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}} dx$ using $\beta - T$ functions.
(b) Show that $(1 - 2xt + t^2)^{-1/2} = \sum_{n=0}^\infty P_n(x) t^n$.
- 2 (a) Show that for the function $f(Z) = \begin{cases} \frac{xy^2(x+iy)}{x^2+y^4} & \text{if } z \neq 0 \\ 0 & \text{if } z = 0 \end{cases}$, is not analytic at $z = 0$ although Cauchy – Riemann equations are satisfied at the origin.
(b) Find an analytic function whose real part is $\frac{\sin 2x}{\cos 2y - \cos 2x}$.
- 3 (a) Evaluate $\int_{1-i}^{2+i} (2x + 1 + iy) dz$ along $(1 - i)$ to $(2 + i)$.
(b) Evaluate using Cauchy's integral formula $\int_C \frac{(Z+1)}{(Z^2+2Z+4)} dz$ where $C: |Z + 1 + i| = 2$.
- 4 (a) Explain $f(z) = \frac{z}{(z-1)(z-2)}$ in a Laurent's series for $1 < |Z| < 2$.
(b) Evaluate $\int_C \frac{Ze^2}{z^2+9} dz$ where C is $|Z| = 5$ by Cauchy residue theorem.
- 5 (a) Find the image and draw a rough sketch of the mapping of the region $1 \leq x \leq 2, 2 \leq y \leq 3$ under the transformation $W = e^z$.
(b) Find the bilinear transformation which maps the points $Z = 1, i, -1$, into the points $W = i, 0, -i$ respectively. Hence find the image of $|Z| < 1$.
- 6 Define fundamental tensor. Determine the components of the fundamental tensor in cylindrical co-ordinates.
- 7 (a) Define independent events. Prove that, if A and B are independent events then A^c and B^c are also independent.
(b) Two ordinary six faced dice are thrown. Give the sum of two numbers are 8, find the conditional probability that the number noted on the first dice is larger than the number noted on the second dice.
- 8 (a) Fit a Poisson distribution to the following data:

x	0	1	2	3	4
f	46	38	22	9	1

(b) The weekly wages of 1000 workers are normally distributed with a mean of Rs 70/- and S.D Rs 5/-. Estimate the number of workers whose weekly wages will be:
(i) more than Rs 80 (ii) less than Rs 50 (iii) between Rs 69 and Rs 72.
