

Code No: 09A30201

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, June/July-2014

MATHEMATICS-III

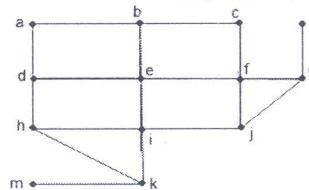
(Common to EEE, ECE, EIE, ETM, ECOMPE, ICE, AGE)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Using Beta and Gamma function, evaluate the integral $\int_{-1}^1 (1-x^2)^n dx$ where n is a positive integer.
- b) If $n > -1$, prove that $\int_0^x x^{-n} J_{n+1}(x) dx = \frac{1}{2^n \Gamma(n+1)} - x^{-n} J_n(x)$.
- 2.a) If $f(x) = 0$, if $-1 < x < 0$
 $= 1$, if $0 < x < 1$
then show that $f(x) = \frac{1}{2} P_0(x) + \frac{3}{4} P_1(x) - \frac{7}{16} P_3(x) + \dots$
- b) Prove that $T_5(x) = 16x^5 - 20x^3 + 5x$, where T_n is the Chebshev polynomial of first kind.
- 3.a) Show that the function $f(z) = z$ is not analytic at $z = \infty$.
- b) Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies Laplace's equation and determine the corresponding analytic function.
- 4.a) State and prove Cauchy integral formula.
- b) Integrate z^2 along the straight line OB and along the path OAB consisting of two straight line segments OA and AB, where O is the origin, A is the point $z = 3$ and B is $z = 3+i$.
- 5.a) Let a be an isolated singularity of $f(z)$ and if $|f(z)|$ is bounded on some neighborhood of a , then, Prove that a is a removable singularity.
- b) If $0 < |z-1| < 2$ then express $f(z) = \frac{z}{(z-1)(z-3)}$ in a series of positive and negative powers of $(z-1)$.
6. Evaluate $\int_{-\infty}^{\infty} \frac{z^2 - z + 2}{z^4 + 10z^2 + 9} dz$.
- 7.a) Show that every bilinear transformation maps the circles in the z -plane onto the circles in the w -plane.
- b) Find the bilinear transformation that maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$.
- 8.a) Explain the procedure for finding a spanning tree of graph G using Depth-First Search method.
- b) Find the spanning tree for the following graph by applying BFS Algorithm.



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