Code No: **R31021** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, May - 2017

COMPLEX VARIABLEDS AND STATISTICAL METHODS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) If $f(z) = u + iv$ is an analytic function of z, prove that [7M]

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^p = p^2|f(z)|^{p-2}|f'(z)|^2$$

b) Prove that $u = e^{-x}[(x^2 - y^2)\cos y + 2xy \sin y]$ is harmonic and find the analytic function whose real part is u. [8M]

2 a) Evaluate $\int_C (x-2y)\,dx + (y^2 - x^2)\,dy$ where C is the boundary of the first quadrant of the circle $x^2 + y^2 = 4$. [7M]

b) Evaluate $\int_c \frac{e^{2z}}{(z+1)^4} dz$ *where* $c: |Z-1| = 1$ [8M]

3 a) Determine the poles of the function $(i)\frac{z}{\cos z}$ $(ii)\cot z$ [7M]

b) Evaluate $\int_0^\infty \frac{dx}{(x^2+9)(x^2+4)^2}$ using residue theorem. [8M]

4 a) Find the image of the unit circle $|Z| = 1$ under the transformation $w = \frac{4}{(Z+1)^2}$. [7M]

b) Under the transformation $w = \frac{z-i}{1-iz}$, find the image of the circle $|Z| = 1$ in the w-plane. [8M]

5 a) Out of 800 families with 5 children each, how many would you expect to have (**a**)3 boys (**b**) 5 girls (**c**) either 2 or 3 boys (**d**) at least one boy? (assume equal probabilities for boys and girls). [7M]

b) If X is a normal variate, find the area A i)to the left of z=-1.78 ii) to the right of z=-1.45 iii)corresponding to $-0.8 \le z \le 0.53$ iv) to the left of z=-2.52 and to right of z=1.83. [8M]

6 a) Find the probabilities that a random variable having the standard normal distribution will take on a value (**i**) between 0.87 and 1.28 (**ii**) between -0.14 and 0.44. [7M]

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b) A population consist of five numbers 2, 3, 6, 8, 11.consider all possible distinct samples of size 2 with replacement. Find [8M]
i) Population standard deviation
ii) Sampling distribution of means
iii) Mean of the sampling distributation of means
iv) Standard deviation of the sampling distributation of means.

7 a) A social worker believes that fewer than 25% of the couples in a certain area have ever used any form of birth control. A random sample of 120 couples was contacted. Twenty of them said that they have used. Test the belief of the social worker at 0.05 level. [7M]

b) A machine produced 25 defective articles from a batch of 1000 articles. Experience shows that the average diameter of the articles is equal to 0.254 with a s.d is 0.048. Find 95% confidence interval for the average of this batch of 1000 articles [8M]

8 A manager of a Merchandizing firm wishes to test whether its three salesmen A, B ,C tend to make sales of the same size or whether they differ in their selling abilities. During a week there have been 14 sale calls; A made 5 calls, B made 4 calls and C made 5 calls. Following are the weekly sales record (in Rs.) of the three salesmen: [15M]

A	50	40	70	80	60
B	30	70	40	60	-
C	50	30	50	40	30

Perform the analysis of variance and draw your conclusion

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