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SVS-N-338 B-18
B.Sc. Vth Semester Degree Examination
MATHEMATICS
(Trigonometry and Complex Analysis)
Paper -5.1
(NEW)

Time : 3 Hours

Maximum Marks : 80

Instruction to Candidates:

Answer ALL sections.

SECTION - A

I. Answer any TEN of the following.

(10×2=20)

1. Find the real and imaginary part of $\cos(x+iy)$.
2. Find the value of $\text{Log}(1-i)$.
3. If $Z = 5+3i$ find the value of $(Z + \bar{Z}) - (Z - \bar{Z})^2$
4. Express the polar form of $(1-i)$.
5. Write Cauchy- Riemann Equations in polar form.
6. Show that $f(z) = 2x + ixy^2$ is not analytic function.
7. Define conformal mapping.
8. Define critical points.
9. Define simple and closed curve.

10. Evaluate $\int_L \frac{dz}{z-a}$ where L represents a circle $|z-a|=r$.

11. Define singularities of an analytic function.
12. State Cauchy's residue theorem.

SECTION - B

II. Answer any FIVE of the following.

(5×6=30)

13. Expand $\frac{\cos 7\theta}{\cos \theta}$ in terms of $\cos \theta$.
14. Expand $\sin^9 \theta$ in a series of sines of multiple of θ .
15. Find the locus of a point Z satisfying the equation $\text{amp} \left(\frac{\bar{z}}{z} \right) = \frac{\pi}{2}$.
16. Find the equation of straight line joining the points Z_1 and Z_2 in the complex plane.
17. Derive the sufficient condition for $f(z)$ is to be analytic.
18. Derive Cauchy-Reimann equations in polar form.
19. Show that the product of two bilinear transformations is a bilinear transformation.
20. Find the bilinear transformation which maps the points $2, 1, 0$ into $1, 0, i$ respectively.

SECTION - C

III. Answer any FIVE of the following.

(5×6=30)

21. Show that the elementary mapping of $W = \cos z$ is a hyperbola in the W -Plane.
22. Show that the transformation $W = \left(\frac{z-ic}{z+ic} \right)^2$ transforms the interior of a certain semicircle in Z -plane into the upper half of the W -plane.
23. Evaluate $\int_C (z^2 + 3z) dz$ along the circle $|z|=2$ from $(2,0)$ to $(0,2)$
24. State and prove Cauchy's integral theorem.

25. Show that $\log z = (z-1) - \frac{(z-1)^2}{2} + \frac{(z-1)^3}{3} - \dots$ where $|z-1| < 1$.
26. Find Taylor's Series expansion of $f(z) = \frac{z}{z^4+9}$ around $z=0$. and find radius of convergence.
27. State and Prove Cauchy's residue theorem.
28. Evaluate $\int_0^\pi \frac{1+2\cos\theta}{5+4\cos\theta}$ using theory of residues.
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