M.Sc.(Physics) (CBCS Pattern) Semester - I

PSCPHYT02 - Core Paper-II : Complex Analysis and Numerical Methods

P. Pages : 2 **GUG/S/23/11180**

Time : Three Hours * 1 3 5 8 * Max. Marks : 80

Either:

1. a) Find the modulus and argument of the following complex numbers. **8**

i) $\dfrac{1+2i}{1-(1-i)^2}$ ii) $\dfrac{(1+i)^2}{1-i}$

b) Prove that modulus of the sum of two complex numbers does not exceed the sum of their moduli. **8**

OR

e) State and prove Cauchy theorem. **8**

f) State and prove Cauchy integral formula. **8**

Either:

2. a) Determine the poles and the residue at each pole of the function. **8**

i) $f(z)=\dfrac{z^2}{(z-1)^2(z+2)}$ ii) $f(z)=\cot z$

b) Define singular point. Differentiate between isolated and non isolated singularity. **8**

OR

e) How one can find the residue. **8**
i) At simple pole
ii) At pole of order n

f) Evaluate the following integral using residue theorem: **8**

i) $\int_c \dfrac{1+z}{z(2-z)}dz$, where C Is circle $|z|=1$.

ii) $\int_c \dfrac{z^2e^{zt}}{z^2+1}dz$, where $c:|z|=2$

Either:

3. a) Explain Bisection method for determination of zero. **8**

b) Obtain the secant general formula for finding the root of the equation. **8**

OR

e) Find the root of the given equation using false position method. **8**
$f(x) = x^3 - x - 4 = 0$

f) Define finite difference explain the different types of finite difference. **8**

Either:

4. a) Discuss Lagrange's interpolation formula. **8**

b) Obtain the formula for trapezoidal rule. **8**

OR

e) Explain Simpson's 1/3rd rule and obtain formula for it. **8**

f) Deduce the formula for Linear least squares. **8**

5. Answer **all** the followings.

a) Explain complex numbers. **4**

b) Explain branch points. **4**

c) Explain Newton-Raphson method. **4**

d) Write Simpson's 3/8th rule. **4**

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