

Unit-I

2. (a) Evaluate $\iint \frac{(x-y)^2}{x^2+y^2} dx dy$, over the circle $x^2 + y^2 \leq 1$. 7.5

(b) By changing the order evaluate the integral

$$\int_0^3 \int_1^{\sqrt{4-y}} (x+y) dx dy. \quad 7.5$$

3. Verify Stoke's Theorem for $\vec{f} = x^2\hat{i} + xy\hat{j}$, integrated around the square in the plane $z=0$, whose sides are along the lines $x=0$, $x=a$, $y=0$ and $y=a$. 15

Unit-II

4. (a) Solve the equation $\frac{d^2y}{dx^2} + y \operatorname{cosec} x$ by using method of variation of parameters. 7.5

(b) Solve Cauchy-Euler equation:

$$x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \log x \sin (\log x). \quad 7.5$$

5. (a) Express the polynomial x^3+2x^2-x-3 in terms of Legendre's polynomials. 7

(b) Find the power series solution about $x=0$, of $(1-x^2) y'' - 2xy' + 2y = 0$. 8

Unit-III

6. State and prove necessary and sufficient conditions for $f(z)$ to be analytic. 15

7. (a) Show that the function $u=e^{-2xy} \sin (x^2-y^2)$ is harmonic. Find the conjugate function v and express $u + iv$ as an analytic function of z . 8

(b) Determine the analytic function whose real part is $(e^x \cos y - e^y \sin y)$. 7

Unit-IV

8. (a) Expand $\frac{e^{2z}}{(z-1)^3}$ in Laurent's series about its singularity. 7.5

(b) Evaluate the residues of $\frac{z^2}{(z-1)(z-2)(z-3)}$ at $z=1, 2, 3$ and ∞ , also determine their sum. 7.5

9. (a) Verify Cauchy's integral theorem by integrating e^{iz} along the boundary of the triangle with vertices at the points $1+i$, $-1+i$ and $-1-i$. 8

(b) Use Cauchy's integral formula to evaluate

$$\oint_C \frac{e^{2z}}{(z+1)^4(z+5)} dz, \text{ where } C \text{ is the circle } |z|=2. \quad 7$$

24005

B.Tech. 2nd Semester F-Scheme
(Common for All Branches) Examination,
May-2019

ENGINEERING CHEMISTRY

Paper-CH-101-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in all selecting at least one question from each section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Define degree of freedom.
- (b) What is triple point ?
- (c) What is temporary hardness and why is it caused ?
- (d) What do you mean by screening and sedimentation point ?
- (e) Define flash point and fire point.
- (f) Distinguish between tinning and galvanization.
- (g) What is the principle of flame photometry ?
- (h) What are polymeric composites ? $8 \times 2.5 = 20$

Section-A

2. (a) Discuss the application of phase rule to Pb-Ag system. What are the characteristics of the eutectic point ? 15
- (b) Write short note on Homogeneous catalysis. 5

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[P. T. O.]