Code No. 2004/BL

FACULTY OF ENGINEERING

B.E. I-Year (Backlog) Examination, October 2020

Subject : Engineering Chemistry

Time : 2 Hours **Max. Marks: 75**

Note: Answer any five questions from Part-A & any four questions from Part-B.

PART – A (7X3 = 21 Marks)

1 Write the Nernst's equation and label it.
2 Explain the principle involved in potentiometry.
3 What are various units to measure Hardness of water?
4 What do you understand by waterline corrosion?
5 Define homomer, Heteromer and co-polymer.
6 Write any three applications of conducting polymers.
7 What is trans esterification? Give its significance.
8 Write fer important characteristics of good propellant.
9 Define saponification value. Give its importance.
10 Define Lyotropic liquid crystals. Give examples.

PART – B (3X18= 54 Marks)

11 (a) Give the electrochemical series with reference to its significance.
(b) What are conductometric titrations? Explain strong acid-strong base condcutometric titration.

12 (a) Discuss the various factors effecting the rate of corrosion.
(b) Explain the principle involved in electroplating. Explain the electroplating of nickel.

13 (a) What is Hardness of water? Explain the determination of Hardness of water by EDTA method.
(b) What do you understand by Disinfection of water? How would you achieve it by chlorination and ionization?

14 (a) Discuss the preparation, properties and industrial applications of Teflon and Bakelite.
(b) What are conducting polymers? Discuss their applications.

15 (a) How Biodiesel is prepared? Give the properties and importance of it.
(b) A fuel is containing C = 10% ; CH_4 = 30% ; C_2H_2 = 15% ; C_2H_6 = 20% by volume was burnt in 10% excess of air by mass required for combustion. Calculate the composition of dry products of combustion.

16 (a) Explain the important characteristics of nematic, cholesteric and sematic liquid crystals.
(b) Discuss the application of phase rule to water system.

17 (a) Explain the composition and uses of LPG and CNG.
(b) Discuss the construction and working of Glass electrode.

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Code No. 2505/CBCS/BL

FACULTY OF ENGINEERING

B.E. I-Semester (CBCS)(Backlog) Examination, October 2020

Subject : Engineering Mathematics – I

Time : 2 Hours **Max. Marks: 70**

Note: Answer any five questions from Part-A & any four questions from Part-B.

PART – A (5X2 = 10 Marks)

1 Find the rank of the matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 4 & 3 \end{pmatrix}$.

2 Find the eigen values of the matrix $A = \begin{pmatrix} 1 & 4 \\ 3 & 2 \end{pmatrix}$.

3 Discuss the convergence of geometric series Tests.

4 State Cauchy's nth root test.

5 Obtain the Taylor's series for f(x) = sin x about the point $x = \frac{\pi}{4}$.

6 Find the curvature and radius of curvature of $x^2 + y^2 = a^2$ at (x , y).

7 If u = f(x – y, y – z, z – x) then prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.

8 Find the Jacobian for $u = \frac{x + y}{1 - xy}, v = Tan^{-1}x + Tan^{-1}y$ with respect to x, y.

9 Show that the vector $\vec{F} = (2x + 3y)\,\vec{i} + (x - y)\,\vec{j} - (x + b + z)\,\vec{k}$ is solenoidal.

10 Find the directional derivative of f(x, y, z) = x^2y – y^{2}z – $x$yz at the point (1, -1, 0) is the direction of i – j + 2k.

PART – B (4X15= 60 Marks)

11 (a) Determine the values of k for which the system of equations

$x - ky + z = 0;\ Kx = 3y - Kz = 0;\ 3x + y - z = 0$ has

(i) only trivial solution (ii) non-trivial solution.

(b) Verify Cayley-Hamilton theorem for the matrix.

$$A = \begin{pmatrix} 1 & 2 & 0 \\ -1 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix}$$

12 (a) Discuss the convergence of the series $\sum \left(1 + \frac{1}{\sqrt{n}}\right)^{-n^{3/2}}$.

(b) Prove that the series $\sum (-1)^{n+1}\frac{1}{n}$ is conditionally convergent.

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13 (a) Using the Lagrange's mean value theorem, show that

$|\cos b - \cos a| \leq |b - a|$

(b) Find the equation of the envelope of the family of straight lines $y = cx + x^2$, where c is a parameter.

14 (a) Show that the function

$$f(x,y) = \begin{cases} \dfrac{xy}{x^2 + 2y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$$

is not continuous at (0, 0) but its partial derivatives f_x and f_y exists at (0, 0).

(b) Find the maximum and minimum values of the function

$f(x,y) = 2(x^2 - y^2) - x^4 + y^4$

15 (a) Show that the vector field $\vec{V} = (y^2 - x^2 +, y)i + x(2y + 1)j$ is irrotational and find scalar function $f(x,y,z)$ such that V = gradf.

(b) Use divergence theorem, to evaluate $\iint_S \vec{V} \cdot \vec{n} \; ds$ where $\vec{V} = x^2 zi + yj - xz^2 K$ and S is the boundary of the region bounded by the parabola $z = x^2 + y^2$ and the plane z = 4y.

16 (a) Find the asymptotes of the curve $y = \dfrac{x}{x^2 - 4}$.

(b) Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form and specify the matrix transformation.

17 (a) Apply Stoke's theorem to evaluate

$\int_C (ydx + zdy + xdz)$ Where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.

(b) Expand $e^x \log(1+y)$ is powers of x and y upto terms of third degree.

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