Manuscript

Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)
Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – June / July 2021
II Semester

Class : I UG **Time : 3 Hours**
Major : Chemistry **Max. Marks : 100**

18BCHI03 DSE - II Classical Mathematics

Part A **10 x 1 = 10**
Choose the Correct Answer

1. If P is lower degree than Q then $\frac{P}{Q}$ is called CO2 K1
   a. fraction b. improper fraction
   c. proper fraction d. rational

2. An expression of the of the form $\frac{P}{Q}$ where P and Q are polynomials in x is called CO1 K1
   a. decimals b. fraction
   c. rational fraction d. irrational

3. $(1-x)^{-1}$ = CO3 K3
   a. $1+x+x^2+x^3+\ldots\ldots\ldots$ b. $1-x+x^2-x^3+\ldots\ldots\ldots$
   c. e d. $1-x+x^2-x^3+\ldots..+(-1)^r x^r$

4. The Eigen values of a matrix A are ---------- CO1 K1
   a. natural numbers b. complex
   c. real d. rational

5. e^x = CO3 K4
   a. $1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots$ b. $1+x+x^2+\frac{x^2}{2!}-\frac{x^3}{3!}+\ldots\ldots$
   c. $1-x-x^2+\frac{x^2}{2!}-\frac{x^3}{3!}-\ldots$ d. $1.x.x^2.\frac{x^2}{2!}.\frac{x^3}{3!}\ldots\ldots\ldots$

6. Characteristic roots of the matrix A = $\begin{bmatrix}5 & 3\\ 1 & 3\end{bmatrix}$ are CO1 K1
   a. 5, 3 b. 5,1
   c. 3, 1 d. 6, 2

7. If y = sin hy then $\frac{dy}{dx}$ CO1 K1
   a. sin hx b. cos h x – k sin x
   c. cos h x d. – cos h x

8. $\int xe^x\, d^x$ =_____ CO3 K4
   a. $x+2^x$ b. $(x-1)e^x$
   c. $(x+1)e^x$ d. $x-2^x$

9. $\frac{d}{dx}$ (cos x) = CO3 K4

a. – sinx b. sec x
c. tanx d. cos x

10. $\frac{d}{dx}$ (cosecx) = CO3 K4

a. –cot x b. sec x
c. –cot x cosec x d. cos x

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Resolve $\frac{5x^2+18x+22}{(x-1)(x+2)(2x+3)}$ into partial fractions. CO3 K4

(or)

11.b. Find the coefficient of x^n in the expansion of $\frac{2+x+x^2}{(1-x)^3}$. CO4 K5

12.a. Sum the series $\frac{1}{10} + \frac{1.4}{10.\ 20} + \frac{1.4.7}{10.\ 20.30} + \ldots\ldots$ CO3 K4

(or)

12.b. Find the coefficient of x^n in the expansion of : $\frac{1+x+x^2}{e^x}$. CO3 K4

13.a. Explain different types of matrices. CO1 K3

(or)

13.b. Calculate A^4 $when\ A = \begin{bmatrix} -1 & 3 \\ -1 & 4 \end{bmatrix}$ CO3 K5

14.a. Evaluate $\int x^3 \cos 2x\ dx$. CO3 K4

(or)

14.b. Evaluate $\iint xy\ dx\ dy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$ CO2 K2

15.a. Solve : ($Y = 2px + y^2p^3$ (using clairut's form) CO3 K4

(or)

15.b. Find the coefficient of x^2 log x CO3 K4

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Resolve $\frac{6x^3+5x^2-7}{3x^2-2x-1}$ into partial fractions. CO4 K5

(or)

16.b. Find the coefficient of x^{2n} and x^{2n+1} in the expansion of $\frac{1-x}{(1-2x^2)(1-2x)}$ In ascending powers of x and state for what ranges of values of x the Expansion is valid. CO4 K4

17.a. If $\log_e \frac{1}{1-x-x^2+x^3}$ be expanded in a series of ascending powers of x, show that the coefficient of x^n is $\frac{3}{n}$ or $\frac{1}{n}$ according as n is even or odd. CO4 K5

(or)

17.b. Sum the series to infinity : $\frac{1^3}{2!} + \frac{2^3}{3!} + \frac{1^3}{4!} +$ …….. CO4 K5

18.a. Calculate the transpose ,adjoint and the inverse A = $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ CO4 K3

(or)

18.b. State and prove Cayley Hamilton Theorem . CO2 K3

19.a. Design $\frac{dy}{dx}$: if $y = \sqrt{(\sin x + \sqrt{\sin x + \sqrt{\sin x \ldots \ldots . to\ infinity}}}$ CO4 K5

(or)

19.b. (i) Find the n th differential coefficient of cos x . cos 2x . cos 3x CO4 K5

20.a. If $y = \sin(m\ \sin^{-1} x)$ prove that $(1-x^2)y_2 - xy_1 + m^2 y = 0$ and

$(1-x^2)\ y_n + 2 - (2n+1)\ xy_n + 1 + (m^2 - n^2)\ y_n = 0.$ CO3 K4

(or)

20.b. Find the n th differential coefficient of cos $^5\ \theta$ sin $^7\ \theta$. CO3 K4

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