KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(3 Pages) **Reg. No:……**

Question Code: 26E00205 **Course Code: 24UFMA11**

UG Degree -First Semester Examinations, April 2026

First Semester

B.Sc., MATHEMATICS

Bridge Mathematics

(For those who joined in July 2024 onwards)

Time : 3Hours **Maximum: 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

CO:1 K:1 1. ${}^{1}C_{1}$ = _____.

(a) 0 (b) 1

(c) 2 (d) None of the above

CO:1 K:1 2. The coefficient of x^5 in the expansion of $(1+x)^{10}$ is _____.

(a) 0 (b) 10

(c) 50 (d) 252

CO:2 K:2 3. When $[\,|x|<1]$, $\sum_{n=0}^{\infty} x^n$ =_____.

(a) $(1+x)^{-1}$ (b) $(1-x)^{-2}$

(c) $(1-x)^{-1}$ (d) $1+x)^{-2}$

CO:2 K:2 4. The geometric mean of the numbers 9, 24, 125 is _____.

(a) 30 (b) 24

(c) 50 (d) 60

CO:3 K:2 5. np_{n-1} = _____.

(a) (n -1)! (b) n!

(c) N (d) n – 1

CO: 3 K:2 6. ${}^{5}P_{3}$ = _____.

(a) 16 (b) 61

(c) 60 (d) 160

CO:4 K:1 7. $\sin 765^{\circ}$ = _____.

(a) 0 (b) 1

(c) $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

CO:4 K:1 8. $\sin 18°$ = _____.

(a) $\cos 18°$ (b) $\cos 36°$

(c) $\cos 72°$ (d) $\sin 54°$

CO:5 K:1 9. $\lim_{\theta \to 0} \frac{\sin \theta}{\theta}$ = _____.

(a) 0 (b) 1

(c) -1 (d) ∞

CO:5 K:1 10. $\lim_{x \to 0} |x|$ = _____.

(a) ∞ (b) x

(c) $-x$ (d) 0

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

CO:1 K:3 11. (a) Prove that ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$.

(OR)

(b) Expand $(2x + 3)^5$.

CO:2 K:3 12. (a) Prove that $\frac{(2n)!}{n!} = 2^n(1.3.5 \ldots . (2n-1))$.

(OR)

(b) Prove that $\frac{e+e^{-1}}{2} = 1+\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + - - - -$

CO:3 K:3 13. (a) If ${}^{n+2}P_4 = 42 \times {}^{n}P_2$, find n.

(OR)

(b) Find (i) ${}^{5}P_3$ (ii) ${}^{8}P_4$ (iii) ${}^{6}P_5$

CO:4 K:3 14. (a) Prove that $\cos\left(\frac{3\pi}{4} + x\right)$ - $\cos\left(\frac{3\pi}{4} - x\right)$ = - $\sqrt{2}\sin x$.

(OR)

(b) Prove that sin 4A = $4\sin A cos^3 A - 4 cos A sin^3 A$.

CO:5 K:3 15. (a) Find $\frac{d}{dx}(2^x)$.

K:4

(OR)

(b) Find y''' if y = $\frac{1}{x}$.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 500 words.

CO:1 16. (a) Find the last two digits of the number 7^{400}.

K:4

(OR)

(b) Compute 98^4.

CO:2 17. (a) If the 5^{th} *and* 9^{th} terms of a harmonic progression are $\frac{1}{19}$ and $\frac{1}{35}$, find the 12^{th} term of the sequence.

K:4

(OR)

(b) Evaluate $\frac{n!}{r!(n-r)!}$ When

(i) n = 7, r = 5

(ii) n =50, r =47

(iii) For any n, with r = 3.

CO:3 18. (a) Prove that $^{10}C_2 + 2 \times {}^{10}C_3 + {}^{10}C_4 = {}^{12}C_4$.

K:4

(OR)

(b) If $^{10}P_r = {}^{7}P_{r+2}$, find r.

CO:4 19. (a) Find tan(A+B+C).

K:5

(OR)

(b) Prove that

(i) $\cos 2A = cos^2A - sin^2A$.

(ii) $\tan 2A = \frac{2tanA}{1-tan^2A}$.

(III) $\sin 2A = \frac{2tanA}{1+tan^2A}$.

CO:5 20. (a) If y = $tan^{-1}\left(\frac{1+x}{1-x}\right)$, find y'.

K:5

(OR)

(b) Evaluate $\int \log x \ dx$. (using integration by parts).