MATHS 2A

THE CAREER STACK

Long Questions

1. If 'n' is positive integer, show that $(1+i)^n + (1-i)^n = 2^{\frac{n+2}{2}} \cos\frac{n\pi}{4}$

2. Solve $8x^3 - 36x^2 - 18x + 81 = 0$ given that roots of the equation are in AP.

3. If $x + iy = \frac{1}{1+\cos\theta+i\sin\theta}$ then show that $4x^2 - 1 = 0$.

4. Resolve $\frac{x^2+5x+7}{(x-3)^2}$ in to partial Fractions.

5. If 'n' is a positive integer show that $(1+i)^n + (1-i)^n = 2^{n+2/2} \cos(n\pi/4)$.

6. If 'x' is real $\frac{x-p}{x^2-3x+2}$ takes all real values for $x \in R$, then Find the bonds for 'p'

7. Solve the equation $x^2 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$

8. If the letter of word 'PRISON' are permuted in all possible ways and the words thus formed are arranged in dictionary order find the rank of the word 'PRISON'.

9. Find the numerically great term in the expansion of $(4+3x)^{17}$ where $x = \frac{7}{2}$.

10. If 'n' is an integer show that $(1+i)^{2n} + (i-1)^{2n} = 2^{n+1} \cos\left(\frac{n\pi}{2}\right)$

11. If 'x' is real prove that $\frac{x}{x^2 - 5x + 9}$ lies between $\frac{-1}{11}$ and 1.

12. Find the polynomial equation whose roots are the translates of those of the equation $x^5 - 4x^4 + 3x^2 - 4x + 6 = 0$ by -3.

13. Solve the equation $3x^3 - 26x^2 + 52x - 24 = 0$ if its roots are in GP

14. Find the Rank of ~~Rnis~~ PRISON.

15. Calculate the variance and standard deviation for the following discrete Freauency distribution

x_i	4	8	11	17	20	24	32
f_i	3	5	9	5	4	3	1

16. State and prove Bayes theorem

17. The probability distribution of a random variable x is given below.

$x = x_i$	1	2	3	4	5
$P(X = x_i)$	k	2k	3k	4k	5k

Find the value of 'k' and the mean variance of x.

18. Find the numerically greatest term in the expansion $(4 + 3x)$ when $x = \frac{7}{2}$.

19. A cubical dice is thrown. Find the mean and variance of X giving the number on the face that shows up.

20. State and prove addition theorem on probability.

21. If A, B, C are three independent events such that $P(A^c B^c C^c) = \frac{1}{4}$, $P(A^c B^c C^c) = \frac{1}{8}$, $P(A^c B^c C^c) = \frac{1}{4}$ then Find $P(A)$, $P(B)$, $P(C)$.

22. probability distribution of a random variable of 'x' is

$X = x$	1	2	3	4	5
$P(X=x)$	K	2k	3k	4k	5k

Find the value of 'k' mean and varience of 'x'.

23.

23. If the difference between the mean and varience of a binomial variate is $\frac{5}{9}$, then Find the probability for the event of '2' Sucess when the experiment is Conducted five times.

Short Questions

1. Resolve $\frac{2x^2+3x+4}{(x-1)(x^2+2)}$ in to partial Fractions.

2. Resolve $\frac{x^3}{(x-a)(x-b)(x-c)}$ in to partial Fraction.

3. Suppose 'A' and 'B' are events with $P(A)=0.5$ $P(B)=0.4$ and $P(A \cap B)=0.3$ Find the probability that

(i) Adoesnot occur (ii) neither A nor B occurs.

4. State and prove the Multiplication therom of probability.

5. Find the sum of all Four digited numbers that can be Formed using the digits 1, 2, 4, 5, 6 with -out repetition.

6. Simpilify $C_5 + \sum_{r=0}^{4} {}^{(38-r)}C_4$

7. Resolve $\frac{5x+1}{(x+2)(x-1)}$ in to partial Fraction.

8. Resolve $\frac{x^2-3}{(x+2)(x^2+1)}$ in to partial Fractions.

9. The probability for a Contractor to get a road Contract is $\frac{2}{3}$ and to get a building Contract is $\frac{5}{9}$ the probability to get at least one Contract is $\frac{5}{9}\ \frac{4}{5}$. Find the probability than he gets both Contracts.

10. if A, B are independent events of a random experiment. Show that $\bar{A}, \bar{B}$ are also independent.

11. if $z = 3 - 5i$ then show that $z^3 - 10z^2 + 58z - 136 = 0$

12. Find the value of $\left(\frac{\sqrt{3}}{2} + \frac{1}{2}\right)^5 - \left(\frac{\sqrt{3}}{2} + \frac{1}{2}\right)^5$

13. if $x^2 - 6x + 5 = 0$ and $x^2 - 12x + P = 0$ have a Common root, then Find P.

14. Solve $x^3 - 3x^2 - 16x + 48 = 0$ given that the sum of two roots is zero.

15. if $x + iy = \frac{1}{1 + \cos\theta + i\sin\theta}$ then show that $ux^2 - 1 = 0$

16. if x is real, prove that $\frac{x}{x^2 - 5x + 9}$ lies between $\frac{-1}{11}$ and 1

17. In how many ways 9 mathematics papers can be arranged so that the best and worst

(i) May come together

(ii) may not come together.

18. Simplify ${}^{34}C_5 + \sum_{r=0}^{4} {}^{(38-r)}C_4$.

19. Resolve $\frac{x^2-3}{(x+2)(x^2+1)}$ in to partial fractions.

20. Show that $\frac{2-i}{(1-2i)}$ and $\frac{-2-11i}{2T}$ are conjugate to each other.

21. If $Z = 3-5i$, then show that $Z = 10Z^2 + 58Z - 136 = 0$

22. prove that $\frac{1}{3x+1} + \frac{1}{x+1} - \frac{1}{(3x+1)(x+1)}$ does not lie between '1' and '4' if 'x' is real.

23. Solve the equation $x^2 - 6x^3 + 11x^2 - 10x + 2 = 0$ given that $2+\sqrt{3}$ is a root of the equation

24. Find the sum of all 4 digited numbers that can be Formed using the digits 1, 2, 4, 5, 6 without repetition.

25. Find the number of coays of selection 11 members cricket team from '7' batsman, 6 bowlers and 2 wicket-keepers, so that team contains 2 Wicket keepers and at least 4 bowlers.

26.

Very short Questions

1. Find the Square root of a complex number $7+24i$.
2. Find the least positive integer 'n' satisfying $\left(\frac{1+i}{1}\right)^n = 1$
3. If $1, \omega, \omega^2$ are the cube roots of unity show that $(2-\omega)(2-\omega^2)(2-\omega^{11})$
4. If α, β are the roots of equation $ax^2+bx+c=0$, Find the value of $\frac{1}{\alpha^2}+\frac{1}{\beta^2}$
5. Find the polynoma equation whose roots are the reciprocals of the roots of $x^4-3x^3+7x^2+5x-2=$
6. If $(\sqrt{3}+i)^{100} = 2^{99}(a+ib)$ then Show that $a^2+b^2=4$.
7. If $z=2-3i$ then show that $z^2-4z+13=0$
8. If $1, \omega, \omega^2$ are the cube roots of units, the find the value of $(1-\omega+\omega^2)^5+(1+\omega-\omega^2)^5$.

9. For what values of 'x' the expression $x^2 - 5x - 14$ is positive.

10. If $-1, 2\alpha$ are the roots of $2x^3 + x^2 - 7x + 6 = 0$ then Find α.

11. Write the Complex number $(2 - 3i)(3 + 4i)$ in the form $A + iB$.

12. If $Z = (\cos\theta, \sin\theta)$, then Find $Z = \frac{1}{Z}$.

13. If A, B, C are the angles of a triangle and $x = \text{CisA}$, $y = \text{CisB}$, $z = \text{CisC}$, then find the value of xyz.

14. If $-1, 2$ and α are the roots of $2x + x - 7x - 6 = 0$ then find α.

15. Find the number of ways of arranging the letters of the word INTERMEDIATE

16. If ${}^nC_5 = {}^nC_6$ then find ${}^{13}C_n$

17. Find the number of terms in the expansion of $(2x + 3y + z)^7$

18. The mean and variance of a binomial distribution are 4 and 3 respectively, Fix the distribution and Find $P(x \geq 1)$

19. if ${}^{n}P_3 = 1320$ Find 'n'

20. if ${}^{12}C_{r+1} = {}^{12}C = 5$ therol Find r"

21 Find the number of terms in the expansion of $(2x+3y+z)^7$

22. Find the mean deviation about the mean For the Followoing data 3, 6, 10, 4, 9, 10

23. if the mean and variance of a binomial Varrence X are 2, 4, and 1.44 respectively Find $P(1 < x < 4)$

24. if $z_1 = (2, -1)$, $z_2 = (6, 3)$ then find $z_1 - z_2$.

Maths 2B

Long questions

1. If $(2,0), (0,1), (4,5), (0,c)$ are Concyclic the find c.

2. Find the equations of transverse common tangent to the circles $x^2+y^2-4x-10y+28=0$,

$x^2+y^2+4x-6y+4=0$

3. Find the equations of parabola whose axis in parallel x-axis and which passes through $(-2,1)$ $(1,2)$, $(-1,3)$.

4. Evaluate $\int (6x+5)\sqrt{6-2x^2+x}\,dx$

5. If $I_n = \cos^n x\,dx$ then prove that $I_n = \frac{\cos^{n-1}x \sin x}{n} + \frac{n-1}{n} I_n$ and deduce $\int \cos^5 x\,dx$.

6. Show that $\int_0^{\pi/2} \frac{x}{\sin x + \cos x}\,dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2}+1)$

7. Solve $(x^2+y^2)\,dy = 2xy\,dx$.

8. Find the equation of the circle whose center has on x-axis and passing through (-2, 3) and (4, 5)

9. Show that the circles $x^2+y^2-4x-6y-12=0$ & $5(x^2+y^2)-8x-14y-32=0$ touch each other and Find their point of Contact.

10. Find the equation of the circle passing through the three points (3, -4) (1, 2, 1) (5, 6).

11. Show that the circles $x^2+y^2-6x-9y+13=0$, $x^2+y^2-2x-16y=0$ touch each other, Find the point of contact and the equation of Common tangent at their point of Contact.

12. Find the equation of the parabola whose focus is S(3, 5) and vertex is A(1, 3)

13. Evaluate $\int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x}\, dx$.

14. Obtain the reduction formula for $I_n = \int \sin^n x\, dx$ ($n \in N.\ n \geq 2$) and deduce $\int \sin^4 x\, dx$.

15. Evaluate $\int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x}\, dx$

16. Solve $(x^2y - 2y^2)\, dx = (x^3 - 3x^2y)\, dy$.

17 Find the equation of the parabola whose axis is parallel x-axis and which passes through the points $(-2, 1)$. $(1, 2)$ and $(-1, 3)$.

18. Evaluate $\int \frac{x^2}{\sqrt{x+5}}\, dx$

19. Evaluate $\int \frac{dx}{\sqrt{5 - 2x^2 + 4x}}$

20. Evaluate $\int \frac{dx}{4 + 5\sin x}$

21. Evaluate $\int_0^{\pi} \frac{x\sin x}{1 + \cos^2 x}\, dx$

22. Solve $(x^2 - y^2)\, dx - xy\, dy = 0$

23. Show that the points $(1, 1)$. $(-6, 0)$. $(-2, 2)$ and $(-2, -8)$ are Concyclic.

24. Shoco that the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$ touch each other. also Find the point of Contact & Common tangent at this point

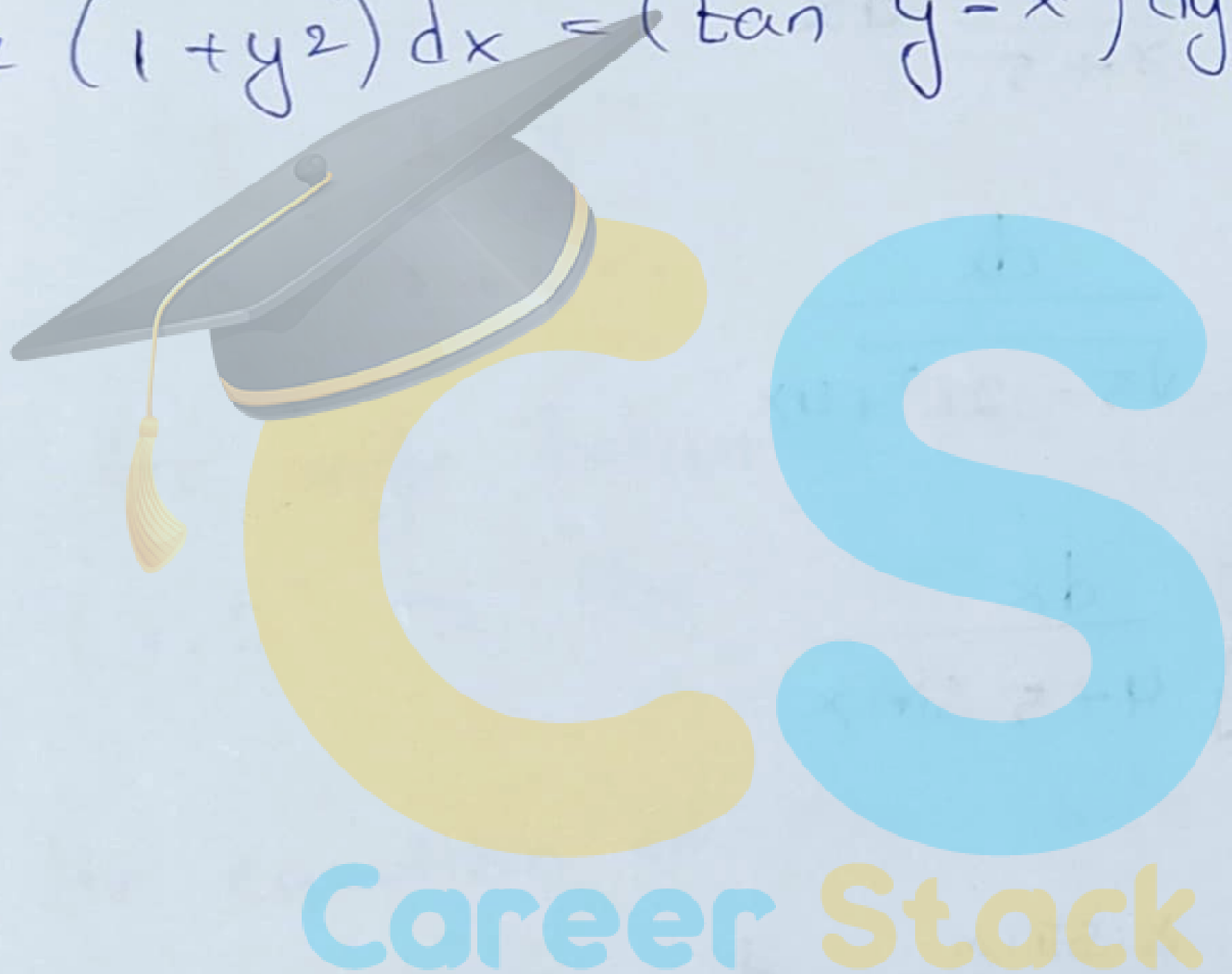
25. Evaluate $\int \frac{1}{3\cos x + 4\sin x + 6} dx$

26. obtain the reduction Formulae For $I_n = \int \tan^n x \, dx$
For $n \in N$, $n \geq 2$ and deduce that $\tan^6 x \, dx$

27. Find the area bounded between the curves y^2
$= 4ax$, $x^2 = 4by$ $(a > 0, b > 0)$

28. Solve $(1+y^2)\,dx = (\tan^{-1}y - x)\,dy$.

29.



Short Questions

1. Evaluate $\int_0^2 \sqrt{4-x^2}\,dx$.

2. Evaluate $\int_0^{\pi/2} \frac{\cos^{5/2} x}{\sin^{5/2} x + \cos^{5/2} x}\,dx$.

3. Solve $\frac{dy}{dx} = e^x + y$

4. Solve $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$

5. Find the angle between the tangents drawn from $(3,2)$ to the circle $x^2+y^2-6x+4y-2=0$

6. Find the equation of the circle passing through the point of intersection of the circles $x^2+y^2-8x-6y+21=0$, $x^2+y^2-2x-15=0$ and $(1,2)$

7. Find the equation of the elips reffered to its Major axes as the Coordinate axes x, y Respectively with latus rectum of length 4 and distance between foci $4\sqrt{2}$.

8. Find the centre. ecentricity. Foci length of latus rectum For the hyperbola $4x^2-9y^2-8x-32=0$

9. Evaluate $\int_{x/2}^{x/2} \frac{\cos x}{1+e^x}\,dx$.

10. Solve $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$

11. Find the centre eccentricity foci and length of latus rectum of the elipse $4x^2+y^2-8x+2y+1=0$

12. Find the equaetion of tangent to the clipse $2x^2+y^2=8$ which are
   i) parallel to $x-2y-4=0$
   ii) perpendicular $x+y+2=0$

13. Tangents to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ make angles θ_1, θ_2 with transverse axis of a hyperbola show that point of Intersection of these tangents lies on the curve $2xy=k(x^2-a^2)$ when $\tan\theta_1+\tan\theta_2=k$

14. Solve the differential equation $\frac{dy}{dx}+\frac{4x}{1+x^2}=\frac{1}{(1+x^2)^2}$

15. If a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $(a>b)$ meets its major and minor axis at M.N Respectively. then prove that $\frac{a^2}{(CM)^2} + \frac{b^2}{(CN)^2} = 1$ where C is the centre of the elipse.

16 Solve $\frac{dy}{dx} + y \tan x = \cos^3 x$

17. Evaluate $\int_6^4 (16 - x^2)^{-1/2} \, dx$.

18. Find the centre. Foci, eccentricity. equations of directrics and length of the hyperbola $x^2 - 4y^2 = 4$.

19. Find the equation of circle centre lies on the x-axis and passing through $(-2, 3)$ and $(4, 5)$

20. Find the radical center of three circles $x^2 + y^2 - 4x - 6y + 5 = 0$, $x^2 + y^2 - 2x - 4y - 1 = 0$ and $x^2 + y^2 - 6x - 2y = 0$

21. Find the equation of tangent and normal at $(3, 2)$ of the circle $x^2 + y^2 - 3y - 4 = 0$

22. Find the equation of the circle passing through the point of intersection of the circles $x^2+y^2-8x-6y+21=0$, $x^2+y^2-2x-15=0$ and $(1,2)$.

23 Find the length of the chord intercepted by the cycle which passes through $(0,0)$ and Interests the circles $x^2+y^2-4x+6y+10=0$ and $x^2+y^2+12y+6=0$ orthogonally.

24. Find the equation of the elipse in the standard Form whose distance between foci is 2 and the length of latus return is $\frac{15}{2}$.