NDA MATHEMATICS MODEL TEST PAPER-2023

Timing: 120 minutes

M.M: 300

INSTRUCTION:- *Read questions carefully. For each wrong answer, one-third (0.883) of the marks assigned to that question will be deducted. Each question contains (2.5) marks.* / ç'uksa dks /;kuiwoZd if<+,A çR;sd xyr mRrj ds fy,] fn, x, vadksa esa ls ,d&frgkbZ ¼0-883½ vad dkVs tk;saxsA çR;sd ç'u ¼2-5½ vad dk gSA

1. ;fn lehdj.k $x^2 - bx + c = 0$ ds ewy nks dzekxr la[;k,W gksa rks $b^2 - 4c$ dk eku crkvksA / If the roots of equation $x^2 - bx + c = 0$ are two consecutive numbers then find the value of $b^2 - 4c$

(a) 1 (b) 2

(c) 3 (d) 4

2. ;fn $(3 + kx)^9$ ds izlkj esa x^2dk xq.kkad rFkk x^3dk x.kkad cjkcj gS rks (k)dk eku crkvksA / If the coefficient of $x^2$and $x^3$and in the expansion of $(3 + kx)^9$are equal, then find the value of (k)

(a) $\frac{7}{9}$ (b) -$\frac{9}{8}$

(c) $\frac{9}{7}$ (d) $\frac{7}{9}$

3. (k) ds fdl eku ds fy, lehdj.kks $x + y + z = 2\,, 2x + y - z = 3$ rFkk $3x + 2y + kz = 4$ dk ,d vkf}rh; gy gSA / For what values of (k) , the system of equations $x + y + z = 2\,, 2x + y - z = 3$ and $3x + 2y + kz = 4$ has a unique solution.

(a) $k \neq 0$ (b) $-1 < k < 1$

(c) $-2 < k < 2$ (d) $k = 0$

4. ;fn$\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ rks $\frac{tanx}{tany}$ dk eku crkvksA / If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$ then find the value of $\frac{tanx}{tany}$.

(a) $a + b$ (b) ab

(b) (c) $\frac{a}{b}$ (d) $\frac{b}{a}$

5. ;fn$x = acos^3t\,, y = asin^3t$ ds fy, t ij Li'khZ dk lehdj.k crkvksA / Find the equation of the tangent to the curve$x = acos^3t\,, y = asin^3t$ at t.

(a) $x\ sec\ t - y\ cosec\ t = a$

(b) $x \sec t + y\ coses\ t = a$

(c) $x\ cosec\ t + y \sec t = a$

(d) $x \operatorname{cosec} t - y\ sec\ t = a$

6. ;fn $|\vec{a}| = |\vec{b}| = |\vec{a} + \vec{b}| = 1$ rks $|\vec{a} - \vec{b}|$dk eku crkvksA / If $|\vec{a}| = |\vec{b}| = |\vec{a} + \vec{b}| = 1$then find the value of $|\vec{a} - \vec{b}|$

(a) 1 (b) $\sqrt{3}$

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

7. x ds /kukRed eku ds fy, x^xdk U;wure eku crkvksA / Find the minimum value of x^x, for positive value of x

(a) $\frac{1}{e}$ (b) e^e

(c) $e^{1/e}$ (d) $e^{-1/e}$

8. vPNh rjg ls QsVsa gq, 52 rk'k ds iRrksa dh xM~Mh esa ls ,d iRrk fudkyk tkrk gSA fudkys x;s iRrs dh jkuh ;k gqdqe ds gksus dh izkf;drk Kkr djsaA A card is drawn from a well shuffled pack of 52 cards. Find the probability of its being a spade or a queen.

(a) $\frac{1}{13}$ (b) $\frac{1}{4}$

(c) $\frac{17}{52}$ (d) $\frac{4}{13}$

9. ;fn ω,1 dk ?kuewy gks rks$\frac{1+2\omega+3\omega^2}{2+3\omega+\omega^2} + \frac{2+3\omega+3\omega^2}{3+3\omega+2\omega^2}$ dk eku crkvksA / If ω is the cube root of unity then find the value of $\frac{1+2\omega+3\omega^2}{2+3\omega+\omega^2} + \frac{2+3\omega+3\omega^2}{3+3\omega+2\omega^2}$

(a) -1 (b) 2 ω

(b) (c) 0 (d) -2 ω

10. $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix} = ?$

(a) $\log_y z$ (b) $\log_z y$

(c) $\log_x z$ (d) 0

11. vodyu lehdj.k$\frac{dx}{dy} + \frac{x}{y} - y^2 = 0$ dk gy crkvksA / What is the solution of the differential equation $\frac{dx}{dy} + \frac{x}{y} - y^2 = 0$

(a) $xy = x^4 + c$ (b) $xy = y^4 + c$

(c) $4xy = y^4 + c$ (d) $3xy = y^3 + c$

12. ;fn $z = fof(x)$tgk¡ ij $f(x) = x^2$ rks $\frac{dz}{dx}$dk eku crkvksA / If $z = fof(x)$ Where$f(x) = x^2$, then what is $\frac{dz}{dx}$ equal to?

(a) x^3 (b) $2x^3$

(c) $4x^2$ (d) $4x^3$

13. ml o`r dk lehdj.k crkvks tks nksuksa v{kks dks Nwrk gS rFkk ftldk dsUnz

js[kk $x+y=4$ ij fLFkr gSA / Find the equation of the circle which touches both the axes and has centre on the line $x+y=4$
(a) $x^2+y^2-4x+4y+4=0$
(b) $x^2+y^2-4x-4y+4=0$
(c) $x^2+y^2+4x-4y-4=0$
(d) $x^2+y^2+4x+4y-4=0$

14. ;fn $\lim_{x\to\infty}\left(\frac{2+x^2}{1+x}-Ax-B\right)=3$ rks A dk eku crkvksA / If $\lim_{x\to\infty}\left(\frac{2+x^2}{1+x}-Ax-B\right)=3$ then find the value of A
(a) -1 (b) 1
(b) (c) 2 (d) 3

15. unh ds rV ij [kM+k dksbZ O;fDr ;g izs{k.k djrk gS fd rV ds nwljs fdukjs ij ,d o`{k dk mUu;u dks.k 60°gSA t cog O;fDr rV ls 40 eh ihNs pyk tkrk gS] rks ikrk gS fd og dks.k 30° dk gSA unh dh pkSM+kbZ D;k gS\ / A man standing on the bank of river finds that angle of elevation of a tree on the other bank is 60°. When this man moves 40 m away from the bank then he founds the angle of elevation is 30°. Find the width of the river.
(a) 60 m (b) 10 m
(c) 15 m (d) $20\sqrt{3}m$

16. ,d laxBu ds 10 deZpkfj;ksa dks NqV~Vh ;k=k ds 3 fVdV nsus ds rjhdksa dh la[;k D;k gS] ;fn izR;sd deZpkjh ,d ;k ,d ls vf/kd fVdV ds ik= gSA / Find the number of ways of giving 3 tickets of holiday travel to 10 employees of an organization in such a manner that each employee can get one or more than one ticket?
(a) 60 (b) 500
(c) 1000 (d) 120

17. $\int\frac{dx}{4\sin^2x+5\cos^2x}$dk eku gSA / Value of $\oint\frac{dx}{4\sin^2x+5\cos^2x}$ is
(a) $\frac{1}{2}\tan^{-1}(2\tan x)+c$
(b) $\frac{1}{2\sqrt{5}}\tan^{-1}\left(\frac{2\tan x}{\sqrt{5}}\right)+c$
(c) $\frac{1}{\sqrt{5}}\tan^{-1}\left(\frac{\tan x}{\sqrt{5}}\right)+c$
(d) $\frac{1}{2\sqrt{5}}\tan^{-1}(2\tan x)+c$

18. ijoy; $y^2=4bx$ dk] mlds ukfHkyEc ls ifjc) {ks=Qy D;k gS\ / Find the area bounded by the parabola $y^2=4bx$ and its latus rectum.
(a) $\frac{2b^2}{3}$ oxZ bdkbZ / $\frac{2b^2}{3}$ sq.unit
(b) $\frac{4b^2}{3}$ oxZ bdkbZ / $\frac{4b^2}{3}$ sq.unit
(c) b^2 oxZ bdkbZ / b^2 sq.unit
(d) $\frac{8b^2}{3}$ oxZ bdkbZ / $\frac{8b^2}{3}$ sq.unit

19. ;fnΔABC es]$1+\cos 2A+\cos 2B+\cos 2C=0$ gS] rks f=Hkqt gksxk / If in ΔABC]$1+\cos 2A+\cos 2B+\cos 2C=0$ then triangle is
(a) leckgq f=Hkqt / equilateral triangle.
(b) lef}ckgq f=Hkqt / isosceles triangle.
(c) ledks.k f=Hkqt / right angled triangle.
(d) vf/kd dks.k f=Hkqt / obtuse angled triangle.

20. ,d f=Hkqt dk] ftlds 'kh"kZ ¼3] 4½]¼5] 2½ vkSj js[kkvksa $\boldsymbol{x=a}$ rFkk $\boldsymbol{y=5}$ dk izfrPNsnu fcUnq gS] {ks=Qy **3** oxZ bdkbZ gSA $\boldsymbol{a}$ dk eku crkvksA / The area of triangle, whose vertices are (3, 4) (5, 2) and intersection poin of lines $\boldsymbol{x=a}$ and y = **5** , is 3 square units. Find the value of a.
(a) 2 (b) 3
(c) 4 (d) 5

21. Qyu $f(x)=\cos 2x-\sin 2x$ dk ifjlj Kkr djs / Find the range of the function $f(x)=\cos 2x-\sin 2x$
(a) $[2,4]$ (b) $[-1,1]$
(c) $[-\sqrt{2},\sqrt{2}]$ (d) $(-\sqrt{2},\sqrt{2})$

22. ;fn $E(\theta)=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ rks $E(\alpha)E(\beta)$cjkcj gS& / If $E(\theta)=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ then $E(\alpha).E(\beta)$ is equal to
(a) $E(\alpha\beta)$ (b) $E(\alpha-\beta)$
(c) $E(\alpha+\beta)$ (d) $-E(\alpha+\beta)$

23. $\frac{\cot x+\operatorname{cosec} x-1}{\cot x-\operatorname{cosec} x+1}=?$
(a) $\cos 2x$ (b) $\frac{1-\cos x}{\sin x}$
(c) $\frac{1+\cos x}{\sin x}$ (d) $\frac{\sin x}{1+\cos x}$

24. ml lery dk lehdj.k D;k gS] tks fcUnq $(1,-1,-1)$ls xqtjrk gS vkSj $x-2y-8z=0$,oa $2x+5y-z=0$ leryksa esa ls izR;sd ij yEc gSA / Find the equation of the plane passing through the point $(1,-1,-1)$and perpendicular to each of plane $x-2y-8z=0$ and $2x+5y-z=0$
(a) $7x-3y+2z=14$ (b) $2x+5y-3z=12$
(c) $x-7y+3z=4$ (d) $14x-5y+3z=16$

25. ;fn $y=\cot^{-1}\left[\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]\right]$] tgk¡ $0<x<\frac{\pi}{2}$] rks $\frac{dy}{dx}$ fdlds cjkcj gSA / If = $\cot^{-1}\left[\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]\right]$, where $0<x<\frac{\pi}{2}$, then$\frac{dy}{dx}$ is equal to
(a) -$\frac{1}{2}$ (b) 2
(c) $\sin x+\cos x$ (d) $\sin x-\cos x$

26. $\cos^2\left(\frac{\pi}{6}+\theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)$ dk eku crkvksA Find the value of $\cos^2\left(\frac{\pi}{6}+\theta\right)-\sin^2\left(\frac{\pi}{6}-\theta\right)$
(a)$\frac{1}{2}\cos 2\theta$ (b) 0
(c) $-\frac{1}{2}\cos 2\theta$ (d) $\frac{1}{2}$

27. ;fn a,b,c /kukRed okLrfod la[;k,¡ gks rks lehdj.kksa$\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$,$\frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ rFkk $-\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$dk

Defence Guru TM

Let a, b, c be positive real numbers. The following system of equations $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$, $\frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ and $-\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ will have

(a) dksbZ gy ugh gSA / no solution.

(b) ,d vkf}rh; gy gSA / a unique solution.

(c) vUkUr gy gSA /infinitely many solution.

(d) cgqr lkjs lhfer gy gSA / finitely many solution.

28. ;fn fcUnq A, B, C rFkk D ds funsZ'kkad Øe'k% $\vec{a}, \vec{b}, \vec{c}$ rFkk $\vec{d}$ bl izdkj gS fd muesa ls dksbZ Hkh rhu lajs[kh; ugha gSA rFkk $\vec{a}+\vec{c}=\vec{b}+\vec{d}$ rks $ABCD$,d / If $\vec{a}, \vec{b}, \vec{c}$ and $\vec{d}$ are the positive vectors of $\vec{A}, \vec{B}, \vec{C}$ and $\vec{D}$ respectively such that no three of them are collinear and $\vec{a}+\vec{c}=\vec{b}+\vec{d}$ then $ABCD$ is a

(a) leprqHkqZt gSA / rhombus.

(b) vk;r gSA / rectangle.

(c) oxZ gSA / square.

(d) lkekUrj prqHkqZt gSA / parallelogram.

29. $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = ?$

(a) $4abc$ (b) $4a^2bc$

(c) $4a^2b^2c^2$ (d) $-4a^2b^2c^2$

30. ;fn $y=(cosx)^{cosx^{(cosx)^{\cdots\cdots\infty}}}$ rks $\frac{dy}{dx}$ dk eku crkvksA

If $y=(cosx)^{cosx^{(cosx)^{\cdots\cdots\infty}}}$ then find the value of $\frac{dy}{dx}$

(a) $\frac{-y^2 tanx}{1-y\,log(cosx)}$ (b) $\frac{y^2 tanx}{1-y\,log(cosx)}$

(c) $\frac{y^2 tanx}{1-y\,log(sinx)}$ (d) $\frac{y^2 sinx}{1-y\,log(sinx)}$

31. $\lim_{x\to 0}\frac{\cos(ax)-\cos(bx)}{x^2}=?$

(a) $a-b$ (b) $a+b$

(c) $\frac{b^2-a^2}{2}$ (d) $\frac{b^2+a^2}{2}$

32. Ekku yhft, $-1\le x\le 1$;fn $\cos(\sin^{-1}x)=\frac{1}{2}$ rks $\tan(\cos^{-1}x)$ ds fdrus eku gks ldrs gS\

Let $-1\le x\le 1$ / If $\cos(\sin^{-1}x)=\frac{1}{2}$ then how many values can $\tan(\cos^{-1}x)$ have?

(a) 1 (b) 2

(c) 3 (d) 4

33. nks Nk= X rFkk Y fdlh ijh{kk esa 'kkfey gksrs gSA X dh ijh{kk dks mRrh.kZ djus dh izkf;drk 0-05 rFkk Y dh ijh{kk dks mRrh.kZ djus dh izkf;drk 0-10 gSA ;fn X rFkk Y nksuks dh ijh{kk dks mRrh.kZ djus dh izkf;drk 0-02 gks rks Kkr dhft, nksuksa esa ls flQZ fdlh ,d dh ijh{kk dks mRrh.kZ djus dh izkf;drk D;k gS\

Two students X and Y appeared in an examination. The probability that X will quality the exam is 0.05 and Y will qualify the exam is 0.10. The probability that both will qualify the exam is 0.02. What is the probability that only of them will qualify the exam?

(a) 0.15 (b) 0.14

(c) 0.12 ¼d½ 0.11

34. fn, x, oØ $x=e^x y$ dk mfPp"B eku fcaUnq ij gksxk\

The point at which the cruve $x=e^x y$ has maximum value is

(a) $(1, e)$ (b) $(1, e^{-1})$

(c) $(e, 1)$ (d) $(e^{-1}, 1)$

35. 'kCn GLOOMY ds v{kjksa dks fdrus izdkj ls O;ofLFkr fd;k tk ldrk gS rkfd nksuksa O dHkh Hkh lkFk&lkFk u vk,A

In how many ways can letters of the word 'GLOOMY' be arranged so that the two O's should not be together?

(a) 240 (b) 480

(c) 600 (d) 720

36. ${}^{47}C_4 + {}^{51}C_3 + \sum_{j=2}^{5} 52-j_{C_3}$

(a) ${}^{52}C_4$ (b) ${}^{51}C_5$

(c) ${}^{53}C_4$ (d) ${}^{52}C_5$

37. 4,7,8,9,10,12,13 ,oa17 vk¡dMksa dk e/; ls e/; fopyu D;k gS\

What is the mean deviation from mean for the data 4,7,8,9,10,12,13 and 17.

(a) 2.5 (b) 3

(c) 3.5 (d) 4

38. vody lehdj.k $\frac{dy}{dx}=\sqrt{1-x^2-y^2+x^2y^2}$ dk gy D;k gS\ / What is the solution of the differential equation $\frac{dy}{dx}=\sqrt{1-x^2-y^2+x^2y^2}$

(a) $\sin^{-1}y=\sin^{-1}x+c$

(b) $2\sin^{-1}y=\sqrt{1-x^2}+\sin^{-1}x+c$

(c) $2\sin^{-1}y=x\sqrt{1-x^2}+\sin^{-1}x+c$

(d) $2\sin^{-1}y=x\sqrt{1-x^2}+\cos^{-1}x+c$

39. $(\pm 5,0)$ ij 'kh"kZ ,oa $(\pm 4,0)$ ukfHk;ksa okys nh?kZo`Rr dk lehdj.k D;k gS\ / What is equation of the ellipse whose vertices are at $(\pm 5,0)$ and $(\pm 4,0)$

(a) $\frac{x^2}{25}+\frac{y^2}{9}=1$ (b) $\frac{x^2}{9}+\frac{y^2}{25}=1$

(c) $\frac{x^2}{16}+\frac{y^2}{25}=1$ (d) $\frac{x^2}{25}+\frac{y^2}{16}=1$

40. lehdj.k $2a^2x^2-2abx+b^2=0$ tc $a<0$ vkSj $b>0$ ds ewy fdl izdkj ds gSa\

The roots of equation $2a^2x^2-2abx+b^2=0$, where $a<0$ and $b>0$ are

(a) dHkh&dHkh lfEeJ/ sometimes complex.

(b) lnSo vifjes; / always irrational.

(c) lnSo lfEeJ / always complex.

(d) lnSo okLrfod / always real.

Defence Guru TM

41. nks la[;kvksa dk gjkRed ek/; 4 gSA rFkk muds lekUrj ek/; A vkSj xq.kksRrj ek/; G] lehdj.k $2A+G^2=27$ dks lUrq"V djrs gS] rc os nksuks la[;k,¡ Øe'k% D;k gS\

The harmonic mean of two numbers is 4. If their arithmetic mean A and G satisfy the equation $2A+G^2=27$, then what will the numbers?

(a) 6, 3 (b) 9, 5

(c) 12, 7 (d) 3, 1

42. ;fn α rFkk β bdkbZ ds dkYifud ?kuewy gS] vkSj $x=a+b, y=a\alpha+b\beta, z=a\beta+b\alpha$ rc xyz dk eku crkvksA

If α and β are the imaginary roots of unity and $x=a+b, y=a\alpha+b\beta, z=a\beta+b\alpha$ then find the value of xyz.

(a) $(a+b)^3$ (b) a^3+b^3

(c) $(a-b)^3$ (d) a^3-b^3

43. Ekku yhft, fd $f(x)$ vf/kdre iw.kkZad Qyu gS vkSj $g(x)$ ekikad Qyu gS rks $(fof)\left(-\frac{9}{5}\right)+(gog)(-2)$ dk eku crkvksA

Let $f(x)$ be the greatest integer function $g(x)$ be the modulus function. Find the value of $(fof)\left(-\frac{9}{5}\right)+(gog)(-2)$

(a) -1 (b) 0

(c) 1 (d) 2

44. Ekku yhft, fd X fnYyh esa jgus okys lHkh O;fDr;ksa dk lewg gSA X es a vkSj b O;fDr ijLij lEcfU/kr dgs tkrs gS] ;fn mudh vk;q esa vf/kdre 5 o"kksZ dk vUrj gSA ;g lEcU/k

Let X be the set of all persons in Delhi. Two persons a and b in X are said to be related to each other, if the difference between their ages is maximum 5 years. This relation is

(a) ,d rqY;rk lEcU/k gS
an equivalence relation.

(b) LorqY; vkSj laØed gS
Reflexive and transitive but not symmetric

(c) lefer vkSj laØed gS ijUrq LorqY; ugha gSA
symmetric and transitive but not reflexive.

(d) LorqY; vkSj lefer gS ijUrq laØed ugha gS
reflexive and symmetric but not transitive.

45. leqPp; $A=\{x: x+4=4\}$ fUkEufyf[kr esa ls fdlds }kjk fu:fir fd;k tk ldrk gS\

Set $A=\{x: x+4=4\}$ can be represented by which one of the following?

(a) 0 (b) ∅

(c) {∅} (d) {0}

46. $(1+x+2x^3)\left(\frac{3x^{-2}}{2}-\frac{1}{3x}\right)^9$ ds foLrkj es x ls LorU= in D;k gS\

Find the independent of x in the expansion of $(1+x+2x^3)\left(\frac{3x^{-2}}{2}-\frac{1}{3x}\right)^9$

(a) $\frac{1}{3}$

(b) $\frac{19}{54}$

(c) $\frac{1}{4}$

(d) ,slk dksbZ Hkh in fo|eku ugha gSaA
Such term does not exist.

47. ;fn ,d js[kk] js[kk $5x-y=0$ ij yEc gS vkSj funsZ'kkad v{kksa ds lkFk 5 oxZ bdkbZ {ks=Qy dk f=Hkqt cukrh gS rks bl js[kk dk lehdj.k D;k gS\

If a line is perpendicular to the line $5x-y=0$ and makes a triangle of area 5 square units with the coordinate axes then find the equation of line?

(a) $x+5y\pm5\sqrt{2}=0$ (b) $x-5y\pm5\sqrt{2}=0$

(c) $5x+y\pm5\sqrt{2}=0$ (d) $5x-y\pm5\sqrt{2}=0$

48. $\int_a^b \frac{x^7+sinx}{cosx}dx$, dk eku crkb, tgk¡ ij $a+b=0$

Find the value of $\int_a^b \frac{x^7+sinx}{cosx}dx$, if $a+b=0$ is given.

(a) $2b-a\sin(b-a)$ (b) $a+3bcos(b-a)$

(c) $sina-(b-a)cosb$ (d) 0

49. OkØksa $y=sinx$ vkSj $y=cosx$ rFkk js[kkvksa $x=0$ vkSj $x=\frac{\pi}{4}$ }kjk ifjc) {ks= dk {ks=Qy D;k gS\

What is the area bounded by the curves $y=sinx$ and $y=cosx$ between the lines $x=0$ and $x=\frac{\pi}{4}$?

(a) $\sqrt{2}-1$ (b) $\sqrt{2}+1$

(c) $\sqrt{2}$ (d) 2

50. fdlh igkM+h dk f'k[kj] h Å¡pkbZ okyh bekjr ds 'kh"kZ vkSj ry ls Øe'k% mUu;u dks.k α rFkk β ij izsf{kr gksrk gSA ml igkM+h dh Å¡pkbZ D;k gS\ / If a mountain is seen at an angles of elevation α and β from the top and base of a building of height h then calculate the height of the mountain.

(a) $\frac{h\cot\beta}{\cot\beta-\cot\alpha}$ (b) $\frac{h\cot\alpha}{\cot\alpha-\cot\beta}$

(c) $\frac{h\,tan\alpha}{\tan\alpha-\tan\beta}$ (d) $\frac{h\,tan\alpha}{\cot\alpha-\cot\beta}$

51. If $sin\theta+cos\theta=\sqrt{2}\,cos\theta$, then what is $cos\theta-sin\theta$ equal to?

(a) $-\sqrt{2}\ cos\theta$ (b) $-\sqrt{2}\ sin\theta$

(c) $\sqrt{2}\ sin\theta$ (d) $2\ sin\theta$

52. eku yhft, $\frac{p}{q}$ izdkj dh lHkh la[;kvksa dk ,d leqPp; S gS] tgk¡ $p,q\in\{1,2,3,4,5,6\}$. gSA leqPp; S esa dqy vo;oksa dh la[;k crkb,A / Let S be the set of all the numbers of the form $\frac{p}{q}$ where $p,q\in\{1,2,3,4,5,6\}$. How many elements are there in S?

(a) 21 (b) 23

Defence Guru TM

(c) 32 (d) 36

53. jSf[kd lehdj.k fudk; $2x+3y+5z=9, 7x+3y-2z=8$ vkSj $2x+3y+\lambda z=\mu$ ds fy, fdl izfrcU/k ds v/khu vuUr% vusd gy gksaxs\

(a) $\lambda=5, \mu\neq 9$ (b) $\lambda=5, \mu=9$

(c) $\lambda=9, \mu\neq 5$ (d) $\lambda=9, \mu\neq 9$

54. izfrcU/k $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}\ldots..+\frac{1}{2^{n-1}}<2-\frac{1}{1000}$ dks lUrq"V djus okys /ku iw.kkZad n dk egÙke eku D;k gS\

Find the maximum value of n satisfying the condition $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}\ldots..+\frac{1}{2^{n-1}}<2-\frac{1}{1000}$

(a) 8 (b) 9

(c) 10 (d) 11

55. ;fn α vkSj β, lehdj.k $x^2-(1-2a^2)=0$ ds ewy gSa rks fdl izfrcU/k ds v/khu $\frac{1}{\alpha^2}+\frac{1}{\beta^2}<1$ gksxk / If α and β, are the roots of the equation $x^2-(1-2a^2)=0$ then under which condition $\frac{1}{\alpha^2}+\frac{1}{\beta^2}<1$ is valid?

(a) $a^2<\frac{1}{2}$ (b) $a^2>\frac{1}{2}$

(c) $a^2>1$ (d) $a^2\in\left(\frac{1}{3},\frac{1}{2}\right)$

56. ;fn $Re\frac{z-1}{z+1}=0$, tgk¡ $z=x+iy$,d lfeEJ la[;k gS] rks fuEufyf[kr esa ls dkSu lk ,d lgh gS\

If $Re\frac{z-1}{z+1}=0$, where $z=x+iy$ is a complex number, then which one of the following is correct?

(a) $z=1+i$ (b) $|z|=2$

(c) $z=1-i$ (d) $|z|=1$

57. 150 eh- Å¡pkbZ dh ,d [kM+h pV~Vku ds f'k[kj ls ,d xfreku uko dks ns[kk tk jgk gSA uko dk voueu dks.k 2 feuV esa 60° ls cnydj 45° gks tkrk gSA uko dh pky eh@?k.Vs esa fdruh gksxh\

A moving boat is seen from the top of a hill of height 150m. The angle of elevation changes from 60° to 45° in 2 minutes. Find the speed of the boat in metre/hour

(a) $\frac{4500}{\sqrt{3}}$ (b) $\frac{4500(\sqrt{3}-1)}{8}$

(c) $4500\sqrt{3}$ (d) $\frac{4500\sqrt{3}+1}{\sqrt{3}}$

58. fcUnq (2,4) ls xqtjus okys rFkk js[kkvksa $x-y=4$ vkSj $2x+3y+7=0$ ds izfrPNsn ij dsUnz okys o`Ùk dh f=T;k D;k gS\/ What is the radius of the circle passing through the point (2,4) and having to centre at the intersection point of the lines $x-y=4$ and $2x+3y+7=0$

(a) 3 bdkbZ@units (b) 5 bdkbZ@units

(c) $3\sqrt{3}$ bdkbZ@units (d) $5\sqrt{2}$ bdkbZ@units

59. ;fn $ax^3+bx^2+cx+d=\begin{vmatrix} x+1 & 2x & 3x \\ 2x+3 & x+1 & x \\ 2-x & 3x+4 & 5x-1 \end{vmatrix}$ rks $a+b+c+d$ dk eku D;k gS\ / If $ax^3+bx^2+cx+d=\begin{vmatrix} x+1 & 2x & 3x \\ 2x+3 & x+1 & x \\ 2-x & 3x+4 & 5x-1 \end{vmatrix}$ then find the value of $a+b+c+d$

(a) 62 (b) 63

(c) 65 (d) 68

60. $e^{y\sqrt{1-x^2}+x\sqrt{1-y^2}}=ce^x$, ¼tgk¡] $c>0, |x|<1, |y|, <1$½ dks lUrq"V djus okys vody lehdj.k dh ?kkr vkSj dksfV Øe'k% D;k gS\

What is the order and degree of the differential equation satisfying the condition $e^{y\sqrt{1-x^2}+x\sqrt{1-y^2}}=ce^x$, ¼Where, $c>0, |x|<1, |y|, <1$½

(a) 1, 1 (b) 1, 2

(c) 2, 1 (d) 2, 2

61. ;fn $\int_0^{\pi/2}\frac{dx}{3\,cosx+5}=kcot^{-1}2$ rks k dk eku D;k gS\

If $\int_0^{\pi/2}\frac{dx}{3\,cosx+5}=kcot^{-1}2$ then find the value of k

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) 1 (d) 2

62. oØksa $|y|=1-x^2$ }kjk izfrcU/k {ks=Qy D;k gS\

Find the bounded by the curves $|y|=1-x^2$

(a) $\frac{4}{3}$ oxZ bdkbZ@sq.units (b) $\frac{8}{3}$ oxZ bdkbZ@sq.units

(c) 4 oxZ bdkbZ@sq.units (d) $\frac{16}{3}$ oxZ bdkbZ@sq.units

63. ;fn $xdy=ydx+y^2dy, y>0$ vkSj $y(1)=1$ rks $y(-3)$ fdlds cjkcj gS\ / If $xdy=y\,dx+y^2dy, y>0$ and $y(1)=1$, then find the value of $y(-3)$.

(a) dsoy 3/Only 3

(b) pdsoy -1/Only -1

(c) -1 vkSj 3 nksuksa /Both-1 and 3

(d) u rks -1 vkSj u gh 3/Neither-1 nor 3

64. $\cos(2cos^{-1}0.8)$ dk eku D;k gS\

What is the value of $\cos(2cos^{-1}0.8)$?

(a) 0.81 (b) 0.28

(c) 0.48 (d) 0.56

65. ;fn nh?kZo`Ùk $9x^2+16y^2=144$, js[kk $3x+4y=12$ dk vijks/ku djrk gS] rks bl izdkj cuus okyh thok dh yEckbZ D;k gS\ / If an ellipse $9x^2+16y^2=144$, intersects the line $3x+4y=12$ then find the length of the chord so formed?

(a) 5 bdkbZ@units (b) 6 bdkbZ@units

(c) 8 bdkbZ@units (d) 10 bdkbZ@units

66. fuEufyf[kr esa ls dkSu lk lehdj.k u ljy js[kkvksa ds dqy dks iznf'kZr djrk gS tks ewy fcUnq ls ,Sfdd nwjh ij fLFkr gSA

Defence Guru TM

Which one of the following equations represents the family of straight lines at a unit distance from the origin?

(a) $\left(y - x\frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$.

(b) $\left(y + x\frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$

(c) $\left(y - x\frac{dy}{dx}\right)^2 = 1 + \left(\frac{dy}{dx}\right)^2$

(d) $\left(y + x\frac{dy}{dx}\right)^2 = 1 - \left(\frac{dy}{dx}\right)^2$

67. fdlh Hkh ,d fof'k"V fnu o"kkZ gksus dk la;ksx 25% gSA 7 fnuksa dh vof/k esa o"kkZ ds de ls de ,d fnu gksus dh izkf;drk D;k gS\ / The probability of having a rainy day is **25**%. Find the probability of having at least one rainy day in period of 7 days

(a) $\mathbf{1 - \left(\frac{1}{4}\right)^7}$ (b) $\left(\frac{1}{4}\right)^7$

(c) $\left(\frac{3}{4}\right)^7$ (d) $\mathbf{1 - \left(\frac{3}{4}\right)^7}$

68. ,d ledks.k f=Hkqt ΔABC esa] ;fn d.kZ $AB = p$, rks $\vec{AB}.\vec{AC} + \vec{BC}.\vec{BA} + \vec{CA}.\vec{CB}$ / If in a right angled triangle ΔABC, hypotenuese $AB = p$, then find the value of $\vec{AB}.\vec{AC} + \vec{BC}.\vec{BA} + \vec{CA}.\vec{CBC}$

(a) $\vec{\boldsymbol{p}}$ (b) $|\vec{\boldsymbol{p}}|^2$

(c) $2|\vec{\boldsymbol{p}}|^2$ (d) $\frac{|\vec{p}|^2}{2}$

69. eku yhft, $f: A \to R$ tgk¡] $A = R/\{0\}$ bl izdkj gS fd $f(x) = \frac{x+|x|}{x}$ gSA fuEufyf[kr lewPp;ksa esa ls fdl ,d $f(x)$ lr~r gS\ / Let $\boldsymbol{f}: \boldsymbol{A} \to \boldsymbol{R}$ where $\boldsymbol{A} = \boldsymbol{R}/\{\mathbf{0}\}$ is such that $(\boldsymbol{x}) = \frac{x+|x|}{x}$. In which of the following sets the fuction $f(x)$ continuous ?

(a) $\boldsymbol{A}$ (b) $\boldsymbol{B} = \{\boldsymbol{x} \in \boldsymbol{R}: \boldsymbol{x} \leq \mathbf{0}\}$

(c) $\boldsymbol{C} = \{\boldsymbol{x} \in \boldsymbol{R}: \boldsymbol{x} \leq \mathbf{0}\}$ (d) $\boldsymbol{D} = \boldsymbol{R}$

70. ,d e'khu ds rhu iqtsZ A, B vkSj C gS] ftuds nks"k;qDr gksus dh izkf;drk,¡ Øe'k% 0.02,0.10 vkSj 0.05 gSA ;fn bu iqtksZa esa ls dksbZ Hkh ,d iqtkZ lnks"k gks tk,] rks e'khu dke djuk cUn dj nsrh gSA bldh D;k izkf;drk gS fd e'khu dke djuk cUn ugha djsxh\ / There are three parts $\boldsymbol{A}, \boldsymbol{B}$ and $\boldsymbol{C}$ of a machine. The probabilities of beibng defective of part $\boldsymbol{A}, \boldsymbol{B}$ and $\boldsymbol{C}$ are respectively **0.02**, **0.10** and **0.05**. Machine stops working if any part of the machine is defective. Find the probability that the machine do not stop working.

(a) **0.06** (b) **0.16**

(c) **0.84** (d) **0.94**

71. eku yhft, fd ;kn`fPNd pj $B(6, p)$ dk vuqlj.k djrk gSA ;fn $16P(X = 4) = P(X = 4) = P(X = 2)$, rks p dk eku D;k gS\ / Let a random variable X, follows the binomial distribution $\boldsymbol{B}(\mathbf{6}, \boldsymbol{p})$. if $\mathbf{16}\boldsymbol{P}(\boldsymbol{X} = \mathbf{4}) = \boldsymbol{P}(\boldsymbol{X} = \mathbf{2})$, then find the value of $\boldsymbol{p}$

(a) $\frac{1}{3}$ (b) $\frac{1}{4}$

(c) $\frac{1}{5}$ (d) $\frac{1}{6}$

72. eku fyft, $f(x) = (|x| - |x-1|)^2$ gSA ;fn $x > 1$ gS] rks $f'(x)$ fdlds cjkcj gS\ / Let $f(x) = (|x| - |x-1|)^2$ If $x > 1$, then $f'(x)$ is equal to what?

(a) 0 (b) $2x - 1$

(c) $4x - 2$ (d) $8x - 4$

73. $\int \frac{x^4-1}{x^2\sqrt{x^4+x^2+1}} dx$ =?

(a) $\sqrt{\frac{x^4+x^2+1}{x} + c}$ (b) $\sqrt{x^2 + 2 - \frac{1}{x^2} + c}$

(c) $\sqrt{x^2 + \frac{1}{x^2} + 1 + c}$ (d) $\sqrt{\frac{x^4+x^2+1}{x} + c}$

74. fuEufyf[kr esa ls dkSu lk ,d vfjDr leqPp; dk mnkgj.k gS\ Which one of the following sets is the example of a non void set?

(a) lHkh le vHkkT; la[;kvksa dk leqPp;A

Set of all even prime numbers

(b) $\{x: x^2 - 2 = 0$ vkSj x ifjes; gS$\}$

$\{x: x^2 - 2 = 0$ and x is rational$\}$

(c) $\{x: x$,d /ku iw.kkZad gS] $x < 8$,oa lkFk gh $x > 12\}$

$\{x: x$ is a positive integer, $x < 8$ and $x > 12\}$

(d) $\{x: x$ fdUgh nks lekUrj js[kkvksa dk ,d mHk;fu"B fcUnq gS$\}$

$\{x: x$ is a common point of two parallel lines$\}$

75. $C_0C_r + C_1C_{r+1} + C_2C_{r+2} + \cdots + C_{n-r}C_n$ =?

(a) $\frac{(2n)!}{(n-r)!(n+r)!}$ (b) $\frac{n!}{(n-r)!(n+r)!}$

(c) $\frac{n!}{(n-r)!}$ (d) $\frac{(2n)!}{(n-r)}$

76. ml o`r dk lehdj.k crkb, tks o`rksa $x^2 + y^2 + 2gx + c = 0, x^2 + y^2 + 2g'x + c = 0$ vkSj $x^2 + y^2 + 2hx + 2ky + a = 0$ esa ls izR;sd dks ledks.k ij dkVrk Gsa Find the equation of a circle that cuts each of the circles $x^2 + y^2 + 2gx + c = 0, x^2 + y^2 + 2g'x + c = 0$ and $x^2 + y^2 + 2hx + 2ky + a = 0$ atright angles.

(a) $k(x^2 + y^2) + (a - c)x + ck = 0$

(b) $k(x^2 + y^2) + (a - c)x - ck = 0$

(c) $k(x^2 + y^2) + (c - a)y + ck = 0$

(d) $k(x^2 + y^2) + (a - c)y - ck = 0$

77. nks lfn'kksa $\hat{\imath} + \hat{\jmath} + \hat{k}$ rFkk $2\hat{\imath} + 3\hat{\jmath} - \hat{k}$ ds yEcdksf.kd ,dkad yEckbZ dk lfn'k D;k gS\ What is the unit vector perpendicular to both the vectors$\hat{\imath} + \hat{\jmath} + \hat{k}$ and $2\hat{\imath} + 3\hat{\jmath} - \hat{k}$?

(a) $\frac{-4\hat{\imath}+3\hat{\jmath}-\hat{k}}{\sqrt{26}}$ (b) $\frac{-4\hat{\imath}+3\hat{\jmath}+\hat{k}}{\sqrt{26}}$

(c) $\frac{-3\hat{\imath}+2\hat{\jmath}-\hat{k}}{\sqrt{14}}$ (d) $\frac{-3\hat{\imath}+2\hat{\jmath}+\hat{k}}{\sqrt{14}}$

78. fuEufyf[kr esa ls dkSu lk f}in dk izkpy gks ldrk gS\

Which one of the following can be the parameters of binomial distribution?

(a) $np = 2, npq = 4$ (b) $n = 4, p = \frac{3}{2}$

(c) $n = 8, p = 1$ (d) $np = 10, npq = 8$

Defence Guru TM

79. vyx&vyx lans'kksa dh] tks rhu 0 vkSj nks 1 }kjk fu:fir fd, tk ldrs gSa] la[;k D;k gS\ What is the total number of the different codes formed by three 0 and 1 ?

(a) 10 (b) 9

(c) 8 (d) 7

80. ;fn $f(x) = \lambda x^2 + 2x + 3$ rFkk $f''(1) + f'(1) + f(1) = 0$ rks λdk eku crkvksA If $f(x) = \lambda x^2 + 2x + 3$ and $f''(1) + f'(1) + f(1) = 0$, then find the value of λ .

(a) $\frac{7}{5}$ (b) $\frac{5}{7}$

(c) $-\frac{7}{5}$ (d) $-\frac{5}{7}$

81. ;fn $f\left(x - \frac{1}{x}\right) = x^2 + \frac{1}{x^2}, x \neq 0$ rks $f(x)$ dk eku crkvksA

If $f\left(x - \frac{1}{x}\right) = x^2 + \frac{1}{x^2}, x \neq 0$ then find the value of $f(x)$.

(a) x^2 (b) $x^2 - 1$

(c) $x^2 - 2$ (d) $x^2 + 2$

82. $\frac{\cot x + \operatorname{cosec} x - 1}{\cot x - \operatorname{cosec} x + 1} = ?$

(a) $\frac{\sin x}{1-\cos x}$ (b) $\frac{1-\cos x}{\sin x}$

(c) $\frac{1+\cos x}{\sin x}$ (d) $\frac{\sin x}{1+\cos x}$

83. k ds fdl eku ds fy, lehdj.k $3x^2 + 3y^2 + (k+1)z^2 + x - y + z = 0$,,d xksyk fu:fir djsxk\

For what value of k,the equation $3x^2 + 3y^2 + (k+1)z^2 + x - y + z = 0$,will represent a sphere?

(a) 3 (b) 2

(c) 1 (d) -1

84. ;fn $\alpha = \cos^{-1}\left(\frac{4}{5}\right), \beta = \tan^{-1}\left(\frac{2}{3}\right), 0 < \alpha < \beta < \frac{\pi}{2}$,rks $\alpha + \beta$dk eku crkb,A If $\alpha = \cos^{-1}\left(\frac{4}{5}\right), \beta = \tan^{-1}\left(\frac{2}{3}\right)$and $0 < \alpha < \beta < \frac{\pi}{2}$ then find the value of $\alpha + \beta$.

(a) $\tan^{-1}\left(\frac{17}{6}\right)$ (b) $\sin^{-1}\left(\frac{3}{\sqrt{13}}\right)$

(c) $\sin^{-1}\left(\frac{3}{15}\right)$ (d) $\cos^{-1}\left(\frac{3}{\sqrt{13}}\right)$

85. Ekkuk $f(x) = ax^2 + bx + c$ bl izdkj gS fd $f(1) = f(-1)$ vkSj a, b, c lekUrj Js.kh esa gSa rks b dk eku D;k gS\ Let $f(x) = ax^2 + bx + c$ is such that $f(1) = f(-1)$and a, b, c are in arithmetic progression then find the value of b.

(a) -1

(b) 0

(c) 1

(d) Kkr ugh fd;k tk ldrk gSA@Cannot be determined

86. $(1+x)^{2n+1}$ds izlkj esa nks e/; inks ads xq.kkadksa dk vkSlr D;k gS\ / Find the average of the two middle terms in the expansion of $(1+x)^{2n+1}$

(a) ${}^{2n+1}C_{n+2}$ (b) ${}^{2n+1}C_n$

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

87. ;fn A vkSj B f}rh; dksfV ds ,sls oxZ vkO;wg gS fd $|A| = -1$ rFkk $|B| = 3$ rks $|3AB|$ fdlds cjkcj gS\ / If A and B are two square matrices of second order such that $|A| = -1$ and $|B| = 3$ then find the value of $|3AB|$.

(a) 3 (b) -9

(c) -27 (d) -81

88. ;fn $\log_a(ab) = x$ gS] rks $\log_b(ab)$fdlds ckjckj gS\

If $\log_a(ab) = x$ then $\log_b(ab)$ is equal to

(a) $\frac{1}{x}$ (b) $\frac{x}{x+1}$

(c) $\frac{x}{1-x}$ (d) $\frac{x}{x-1}$

89. fdlh o`Ùk dh f=T;k ,d leku :Ik ls 3 cm/s dh nj ls c<+ jgh gSA {ks=Qy esa o`f) nj D;k gS] tc f=T;k 10 cm gS\

The radius of a circle is increasing uniformly at the rate of 3 cm/s. Find the rate of increase in area if radius is 10 cm.

(a) $6\pi\ cm^2/s$ (b) $10\pi\ cm^2/s$

(c) $30\pi\ cm^2/s^2$ (d) $60\pi\ cm^2/s$

90. $\lim_{x \to 0} \frac{2(1-\cos x)}{x^2} = ?$

(a) 0 (b) $\frac{1}{2}$

(c) $\frac{1}{4}$ (d) 1

91. unh ds rV ij [kM+k dksbZ O;fDr ;g izs{k.k djrk gS fd rV ds nwljs fdukjs ij ,d o`{k }kjk vUrfjr dks.k $60°$ gSA tc og O;fDr rV ls 40eh0 ihNs pyk tkrk gS rks ikrk gS fd og dks.k $30°$ dk gSA unh dh pkSM+kbZ D;k gS\

A man standing at the bank of a river observes that a tree at the other bank subtends an angle of 60°. When this man move 40 m away from the bank then angle becomes 30° . Find the width of the river?

(a) 5 m (b) 10 m

(c) 15 m (d) 20 m

92. ;fn $\begin{vmatrix} p & -q & 0 \\ 0 & p & q \\ q & 0 & p \end{vmatrix} = 0$ gS] rc fuEufyf[kr esa ls dkSu lk ,d lgh gS\

If $\begin{vmatrix} p & -q & 0 \\ 0 & p & q \\ q & 0 & p \end{vmatrix} = 0$,then which one of the following is Correct?

a. p bdkbZ ds ?kuewyksa esa ls ,d gSA / p is one of the cube roots of unity.

b. q bdkbZ ds ?kuewyksa esa ls ,d gSA / q is one of the cube roots of unity.

c. p/q bdkbZ ds ?kuewyksa esa ls ,d gSA / p/q is one of the cube roots of unity.

d. mijksDr esa ls dksbZ ughaA / None of the above.

93. ;fn $\int sin4x\ cos7x\ dx = Acos3x + B\ cos11x$gks] rks

If $\int sin4x\ cos7x\ dx = Acos3x + B\ cos11x$ then

(a) $A = \frac{1}{6}, B = -\frac{1}{11}$ (b) $A = \frac{1}{6}, B = -\frac{1}{22}$

(c) $A = -\frac{1}{11}, B = \frac{1}{6}$ (d) $A = \frac{1}{22}, B = -\frac{1}{6}$

94. Ikk¡p la[;kvksa dk ek/; 30 gSA ;fn ,d la[;k dks NksM+ fn;k tkrk gS] rks mudk ek/; 28 gks tkrk gSA NksM+h xbZ la[;k D;k gS\ / The mean of five numbers is 30. If a number is removed then mean becomes 28. Find the removed number.

(a) 28 (b) 30

(c) 35 (d) 38

95. 'kh"kksZa $A(-2,3), B(2,1)$vkSj $C(1,2)$okys ΔABC f=Hkqt dk ifjdsUnz D;k gS\ / What is the circumcentre ofΔABC having the vertices $A(-2,3), B(2,1)$and $C(1,2)$

(a) (-5,-5) (b) (5, 5)

(c) (-5, 5) (d) (5,-5)

96. ,d O;fDr rk'k dh xM~Mh esa ls ,d iRrk fudkyrk gS] okil mlh esa j[krk gS vkSj fQj xM~Mh QsaVdj fQj ,d iRrk fudkyrk gSA og blh izdkj djrk jgrk gS tc rd fd mldk gqdqe dk iRrk ugha vk tkrkA izkf;drk Kkr djsa fd og izFke nks iz;klksa esa vlQy jgrk gSA A person draws a card from a pack of playing cards, replaces it and shuffles the pack. He continues doing this until he shows a spade. The chance that he fail the first two times is :

(a) $\frac{9}{64}$ (b) $\frac{1}{64}$

(c) $\frac{1}{16}$ (d) $\frac{9}{16}$

97. $x^2y\ dx - (x^3 + y^3)dy = 0$dks gy djsaA

Solve $x^2y\ dx - (x^3 + y^3)dy = 0$

(a) $cy = e^{-x^3/3y^3}$ (b) $cy = e^{x^3/y^3}$

(c) $cy = e^{x^3/3y^3}$ (d) $cy = e^{-x^3/y^3}$

98. ;fn$(x + iy)^5 = (p + iq)$ rks $(y + ix)^5$fdlds cjkcj gSA

If $(x + iy)^5 = (p + iq)$then $(y + ix)^5$ is equal to

(a) $q + ip$ (b) $p - iq$ (c) $q - ip$ (d) $-p - iq$

99. ;fn S_n fdlh lkekUrj Js.kh ds n inksa ds ;ksx n'kkZrk gS rFkk $S_{2n} = 3S_n$ rks S_{3n}/S_ndk eku crkvksA

If S_n denote the sum of first n term of an AP if $S_{2n} = 3S_n$ then the ratio S_{3n}/S_n is equal to

(a) 4 (b) 6 (c) 8 (d) 10

100. λ dk og eku crkb, ftlds fy, vkO;wg xq.kuQy $\begin{bmatrix} 2 & 0 & 7 \\ 0 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix}\begin{bmatrix} -\lambda & 14\lambda & 7\lambda \\ 0 & 1 & 6 \\ \lambda & -4\lambda & -2\lambda \end{bmatrix}$,d bdkbZ vkO;wg gSA

The value of λ for Which the matrix product $\begin{bmatrix} 2 & 0 & 7 \\ 0 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix}\begin{bmatrix} -\lambda & 14\lambda & 7\lambda \\ 0 & 1 & 6 \\ \lambda & -4\lambda & -2\lambda \end{bmatrix}$ is an identity matrix is

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$

(c) $\frac{1}{4}$ (d) $\frac{1}{5}$

101. $(x + a)^{100} + (x - a)^{100}$ dks foLrkj dj ljy djus ds ckn inksa dh dqy la[;k gksxh

The number of terms on simplifying the expression $(x + a)^{100} + (x - a)^{100}$ will be.

(a) 202 (b) 51

(c) 50 (d) 101

102. ;fn $\sin^{-1}\frac{1}{3} + \sin^{-1}\frac{2}{3} = \sin^{-1}x$ rks x dk eku crkvksA / If $\sin^{-1}\frac{1}{3} + \sin^{-1}\frac{2}{3} = \sin^{-1}x$ then find the value of x.

(a) 0 (b) $\frac{\sqrt{5}-4\sqrt{2}}{9}$

(c) $\frac{\sqrt{5}+4\sqrt{2}}{9}$ (d) $\frac{\pi}{2}$

103. Ekkuk $P = \{(x,y)|x^2 + y^2 = 1, x, y \in R\}$,rc P gS

Let $P = \{(x,y)|x^2 + y^2 = 1, x, y \in R\}$, then P is.

(a) LorqY;/ reflexive

(b) lefer/ symmetric

(c) ladzed/ transitive

(d) izfrlefer/antisymmetric

104. ;fn $\sin\theta + \mathrm{cosec}\,\theta = 2$gks rks$sin^2\theta + cosec^2\theta$ dk eku crkvksA / If $\sin\theta + \mathrm{cosec}\,\theta = 2$ then find the value of $sin^2\theta + cosec^2\theta$.

(a) 1

(b) 4

(c) 2

(d) buesa ls dksbZ ugha/ None of these

105. $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}} - 1 = ?$

(a) -1 (b) -2

(c) -3 (d) -4

106. Lkehdj.k $(p - q)x^2 + (q - r)x + (r - p) = 0$ ds ewy Kkr djsaA / The roots of the equation $(p - q)x^2 + (q - r)x + (r - p) = 0$ are.

(a) $\frac{p-q}{r-p}, 1$ (b) $\frac{q-r}{p-q}, 1$

(c) $\frac{r-p}{p-q}, 1$ (d) $1, \frac{q-r}{p+q}$

107. ;fn ,d lekUrj Js.kh dk igyk] nwljk o vfUre in dze'k% a, b rFkk c gSa rks inksa dh la[;k gS / If the first, second and last term of an A.P be a, b and c respectively then number of terms will be.

Defence Guru TM

(a) $\frac{b+c-2a}{b-a}$ (b) $\frac{b+c+2a}{b-a}$

(c) $\frac{b+c-2a}{b+a}$ (d) $\frac{b+c+2a}{b+a}$

108. 7 fofHkUu oLrqvksa dks 4 cPpksa ds e/; ckaVus ds izdkjksa dh la[;k Kkr djsaA / The number of ways of distributing 7 different items among 4 children are.

(a) $P(7,4)$ (b) 7!

(c) 4! (d) $C(7,4)$

109. 10 lR; rFkk vlR; iz'uksa ds mRrj fdrus izdkj ls fn, tk ldrs gS\ / In how many ways can we answer 10 true and false questions?

(a) 20 (b) 100

(c) 512 (d) 1024

110. $^{15}C_{13} + {}^{15}C_3 = ?$

(a) $^{16}C_3$ (b) $^{0}C_{16}$

(c) $^{15}C_{10}$ (d) $^{15}C_{15}$

111. fcUnq (3, 2) ls xqtjus okyh rFkk js[kk $y = x$ ds yEcor~ js[kk dk lehdj.k crkvksA The equation of a line passing through (3, 2) and perpendicular to line $y = x$ is

(a) $x - y = 5$ (b) $x + y = 5$

(c) $x + y = 1$ (d) $x - y = 1$

112. o`Rr $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$ dk dsUnz crkvksA / The centre of the circle $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$ is

(a) $\left(\frac{x_1+y_1}{2}, \frac{x_2+y_2}{2}\right)$ (b) $\left(\frac{x_1-y_1}{2}, \frac{x_2-y_2}{2}\right)$

(c) $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ (d) $\left(\frac{x_1-x_2}{2}, \frac{y_1-y_2}{2}\right)$

113. ;fn $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}, B = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$, tgk¡ $i = \sqrt{-1}$ rks lgh lEcU/k gS / If $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}, B = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$, where $i = \sqrt{-1}$ then correct relation is

(a) A+B (b) $A^2 = B^2$

(c) A-B (d) $A^2 + B^2 = 0$

114. ;fn $\begin{vmatrix} y+z & x-z & x-y \\ y-z & z+x & y-x \\ z-y & z-x & x+y \end{vmatrix}, = kxyz,$ rks k dk eku gS

If $\begin{vmatrix} y+z & x-z & x-y \\ y-z & z+x & y-x \\ z-y & z-x & x+y \end{vmatrix}, = kxyz,$ then the value of k is

(a) 2 (b) 4

(c) 6 (d) 8

115. $\lim_{x \to 1} \frac{\log x}{x-1} = ?$

(a) 1 (b) -1

(c) 0 (d) ∞

116. ;fn $y = a\,sinx + b\,cosx$, rks $y^2 + \left(\frac{dy}{dx}\right)^2$ gS

If $y = a\,sinx + b\,cosx$, then $y^2 + \left(\frac{dy}{dx}\right)^2$ is

(a) x dk Qyu / function of x

(b) y dk Qyu / function of y

(c) x vkSj y dk Qyu / function of x and y

(d) vpj / constant

117. odz $y = 12x - x^3$ dh fuEu esa ls fdu fcUnqvksa ij izo.krk 'kwU; gksxh\ / The slope of the curve $y = 12x - x^3$ will be zero at which of the following points

(a) (0, 2), (2, 16) (b) (0,-2), (2, -16)

(c) (2,-16), (-2, 16) (d) (2, 16), (-2, -16)

118. $\int \tan^{-1}\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}\,dx = ?$

(a) $2x^2$ (b) $x^2 + c$

(c) $\frac{x^2}{2} + c$ (d) $2x + c$

119. $\int_0^{\pi/2} e^x \sin x\, dx = ?$

(a) $\frac{1}{2}(e^{\pi/2} - 1)$ (b) $\frac{1}{2}(e^{\pi/2} + 1)$

(c) $\frac{1}{2}(1 - e^{\pi/2})$ (d) $2(e^{\pi/2} + 1)$

120. vody lehdj.k $\frac{dy}{dx} = \frac{1+x^2}{xy(1+x^2)}$ dk O;kid gy gSA / The general solution of the differential equation $\frac{dy}{dx} = \frac{1+x^2}{xy(1+x^2)}$ is

(a) $(1 + x^2)(1 + y^2) = c$ (b) $(1 + x^2)(1 + y^2) = cx^2$

(c) $(1 - x^2)(1 - y^2) = c$ (d) $(1 + x^2)(1 + y^2) = cy^2$

Defence Guru TM

NDA MATHEMATICS MODEL TEST PAPER-2023
ANSWER KEY

1.	A	31.	C	61.	B	91.	D
2.	C	32.	B	62.	B	92.	C
3.	A	33.	D	63.	A	93.	B
4.	C	34.	B	64.	B	94.	D
5.	B	35.	A	65.	A	95.	A
6.	B	36.	A	66.	C	96.	A
7.	D	37.	B	67.	D	97.	C
8.	D	38.	C	68.	B	98.	A
9.	B	39.	A	69.	A	99.	B
10.	D	40.	C	70.	C	100.	D
11.	C	41.	A	71.	C	101.	B
12.	D	42.	B	72.	A	102.	C
13.	B	43.	B	73.	C	103.	B
14.	B	44.	D	74.	A	104.	C
15.	D	45.	D	75.	A	105.	B
16.	C	46.	D	76.	D	106.	C
17.	B	47.	A	77.	B	107.	A
18.	D	48.	D	78.	D	108.	A
19.	C	49.	A	79.	A	109.	D
20.	A	50.	B	80.	C	110.	A
21.	C	51.	C	81.	D	111.	B
22.	C	52.	B	82.	C	112.	C
23.	C	53.	B	83.	B	113.	B
24.	D	54.	C	84.	A	114.	D
25.	A	55.	A	85.	B	115.	A
26.	A	56.	D	86.	B	116.	D
27.	B	57.	B	87.	C	117.	D
28.	B	58.	D	88.	D	118.	C
29.	C	59.	B	89.	D	119.	B
30.	A	60.	A	90.	D	120.	B