MAJOR KALSHI CLASSES PVT. LTD.
Allahabad, U.P.

MAJOR KALSHI CLASSES PVT. LTD.

"A way to get commissioned"

NDA/NA MOCK TEST

MATHEMATICS

TEST BOOKLET

Time Allowed : ***Two Hours and Thirty Minutes*** Maximum Marks : **300**

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/ discrepancy will render the Answer Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** write ***anything else*** on the Test Booklet.
4. This Test Booklet contains **120** items (questions). Each item is printed both in **Hindi** and **English**. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. **All** items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the invigilator ***only the Answer Sheet.*** You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers :**

    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

    (iii) If a question is left blank i.e., no answer is given by the candidate, there will be **no penalty** for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

/;ku nh % vun"kk dk fgUnh :ikUrj bl ifLrdk d fiNy i'B ij Nik gA

1. If SinA + SinB + SinC = 3, then what is CosA + CosB + CosC equal to?
(a) –1 (b) 0
(c) 1 (d) 3

2. If two arcs of the same length of two circles subtend angles of 60^o and 75^o at their centres, then ratio of their radii is:
(a) 5 : 4 (b) 4 : 5
(c) 3 : 4 (d) 4 : 3

3. The sides of ΔABC are 7 cm, $4\sqrt{3}$ cm and $\sqrt{13}$ cm, then smallest angle is:
(a) 20^o (b) 36^o
(c) 45^o (d) 30^o

4. In a ΔABC if Cot A, Cot B, Cot C are in Airthmetic Progression, then a^2, b^2, c^2 are in
(a) Airthmetic Progression
(b) Geometric Progression
(c) Harmonic Progression
(d) None of these

5. In ΔABC, $a(\text{Sin B} - \text{Sin C}) + b(\text{Sin C} - \text{SinA}) + c(\text{Sin A} - \text{Sin B})$ is equal to:
(a) 0
(b) a + b + c
(c) $a^2 + b^2 + c^2$
(d) None of these

6. In ΔABC, what is the value of
$\frac{a(b\,\text{Cos C} - c\,\text{CosB})}{b^2 - c^2}$ $(b \neq c)$ is
(a) 0 (b) 1
(c) –1 (d) None of these

7. If $\text{Sin}^2x + \text{Sin}^2y = 1$, then what is the value of Cot (x + y) is
(a) 1 (b) $\sqrt{3}$
(c) 0 (d) $\frac{1}{\sqrt{3}}$

8. The value of x if
$\text{Cos}(\tan^{-1} x) = \text{Sin}\left(\text{Cot}^{-1}\frac{3}{4}\right)$ will be:
(a) $\pm\frac{1}{2}$ (b) $\pm\frac{1}{3}$
(c) $\pm\frac{\sqrt{5}}{3}$ (d) None of these

9. If $\text{Sin}^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - ..\right) + \text{Cos}^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - ..\right) = \frac{\pi}{2}$
for $0 < |x| < \sqrt{2}$, then x is equal to:
(a) $\frac{1}{2}$ (b) 1
(c) $-\frac{1}{2}$ (d) –1

10. The solution of $\tan^{-1} x + 2\text{Cot}^{-1}x = \frac{2\pi}{3}$ is:
(a) $-\frac{1}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{3}}$
(c) $-\sqrt{3}$ (d) $\sqrt{3}$

11. The complex number Z such that $\left|\frac{Z - i}{Z + i}\right| = 1$ lies on:
(a) x-axes (b) line y = 1
(c) Circle (d) None of these

12. If $\arg(z) = \frac{\pi}{4}$, then:
(a) $\text{Re}(z^2) = 0$ (b) $\text{Im}(z^2) = 0$
(c) $\text{Re}(z^2) = \text{Im}(z^2)$ (d) None of these

13. The Binary Number corresponding to the decimal number $(104)_{10}$ is:
(a) $(10001011)_2$ (b) $(1101000)_2$
(c) $(1011001)_2$ (d) None of these

14. If Z is a complex number such that $z + z^{-1} = 1$, then value of $z^{99} + z^{-99}$ is:
(a) 1 (b) –1
(c) 2 (d) –2

1. ;fn SinA + SinB + SinC = 3, rk CosA + CosB + CosC dk eku cjkcj g%

(a) –1 (b) 0

(c) 1 (d) 3

2. ;fn nk cjkcj yEckb d pki nk oRrk d dUn ij Øe"k% 60^o vkj 75^o dk dk.k cukr g] rk mudh f=T;kvk dk vuikr gkxk%

(a) 5 : 4 (b) 4 : 5

(c) 3 : 4 (d) 4 : 3

3. ;fn ΔABC dh Hkt k, Øe"k% 7 leh] $4\sqrt{3}$ leh vkj $\sqrt{13}$ leh g] rk lcl NkVk dk.k gkxk%

(a) 20^o (b) 36^o

(c) 45^o (d) 30^o

4. ;fn ΔABC e Cot A, Cot B, Cot C lekUrj J.kh e gk rk a^2, b^2, c^2 gkxk%

(a) lekUrj J.kh

(b) x.kkRed J.kh

(c) gjkRed J.kh

(d) bue l dkb ugh

5. ΔABC e $a(\text{Sin B} - \text{Sin C}) + b(\text{Sin C} - \text{SinA}) + c(\text{Sin A} - \text{Sin B})$ cjkcj g%

(a) 0

(b) a + b + c

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

(d) bue l dkb ugh

6. ΔABC e $\frac{a(b\,\text{Cos}\,C - c\,\text{Cos}B)}{b^2 - c^2}$ $(b \neq c)$ dk eku g%

(a) 0 (b) 1

(c) –1 (d) bue l dkb ugh

7. ;fn $\text{Sin}^2x + \text{Sin}^2y = 1$ rk Cot (x + y) dk eku g%

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

(c) 0 (d) $\frac{1}{\sqrt{3}}$

8. ;fn $\text{Cos}(\tan^{-1}x) = \text{Sin}\left(\text{Cot}^{-1}\frac{3}{4}\right)$ rk x dk eku gkxk%

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

(c) $\pm\frac{\sqrt{5}}{3}$ (d) bue l dkb ugh

9. ;fn $\text{Sin}^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - ..\right) + \text{Cos}^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - ..\right) = \frac{\pi}{2}$ d fy; $0 < |x| < \sqrt{2}$ rk x cjkcj g%

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

(c) $-\frac{1}{2}$ (d) –1

10. lehdj.k $\tan^{-1}x + 2\text{Cot}^{-1}x = \frac{2\pi}{3}$ dk gy g%

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

(c) $-\sqrt{3}$ (d) $\sqrt{3}$

11. lfEeJ l[;k Z, tk $\left|\frac{Z-i}{Z+i}\right| = 1$ dk lr'V djrk g] vofLFkr gkxk%

(a) x-v{k ij (b) j[kk y = 1 ij

(c) oRr ij (d) bue l dkb ugh

12. ;fn $\arg(z) = \frac{\pi}{4}$, rk

(a) $\text{Re}(z^2) = 0$ (b) $\text{Im}(z^2) = 0$

(c) $\text{Re}(z^2) = \text{Im}(z^2)$ (d) bue l dkb ugh

13. n"keyo l[;k $(104)_{10}$ dk f}vk/kkjh eku g%

(a) $(10001011)_2$ (b) $(1101000)_2$

(c) $(1011001)_2$ (d) bue l dkb ugh

14. ;fn $z + z^{-1} = 1$ e Z ,d lfEeJ l[;k g rk $z^{99} + z^{-99}$ dk eku g%

(a) 1 (b) –1

(c) 2 (d) –2

15. If a and b are non zero roots of $x^2 + ax + b = 0$, then least value of $x^2 + ax + b$ is:

(a) $\frac{2}{3}$ (b) –1

(c) $-\frac{9}{4}$ (d) 1

16. Let $f : R \to R$ be given by $f(x) = (3 - x^3)^{1/3}$ then (fof)(x) is:

(a) $x^{1/3}$ (b) x^3

(c) x (d) $(3 - x^3)$

17. The value of a and b, so that

$f(x) = \begin{cases} x^2 + 3x + a, & x \le 1 \\ bx + 2, & x > 1 \end{cases}$ is differentiable at x=1

(a) 2, 3 (b) 3, 5

(c) 4, 2 (d) None of these

18. If $f(x) = \tan^{-1}\sqrt{\frac{1+\sin x}{1-\sin x}}$, $0 \le x < \frac{\pi}{2}$ then $f'\left(\frac{\pi}{6}\right)$ is

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

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

19. The point on the parabola $y = (x - 3)^2$ where the tangent is parallel to the line joining (3, 0) and (4, 1) is

(a) $\left(\frac{3}{4}, \frac{1}{2}\right)$ (b) $\left(\frac{7}{2}, \frac{1}{4}\right)$

(c) $\left(-\frac{7}{2}, \frac{1}{4}\right)$ (d) None of these

20. If $y = a \log |x| + bx^2 + x$ has its extreme values at $x = -1$ and $x = 2$ then value of a and b is

(a) $\left(2, -\frac{1}{2}\right)$ (b) $\left(1, \frac{1}{2}\right)$

(c) $\left(\frac{3}{4}, 4\right)$ (d) None of these

21. The value of $\int \frac{e^{\log\sqrt{x}}}{x}$ is

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

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

22. The value of $\int_0^1 x(1-x)^{99} dx$ is

(a) $\frac{1}{10010}$ (b) $\frac{1}{10100}$

(c) $\frac{1}{1010}$ (d) None of these

23. The value of $\int_{-1}^{1} f(x)dx$ where

$f(x) = \begin{cases} 1 - 2x, & x \le 0 \\ 1 + 2x, & x \ge 0 \end{cases}$

(a) 2 (b) 1

(c) 3 (d) 4

24. The value of $\int_{-\pi/2}^{\pi/2} (x^3 + x\cos x + \tan^5 x + 1)$ is

(a) 0 (b) 2

(c) π (d) 1

25. The value of $\int_1^2 |x - 3| dx$ is

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

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

26. The degree of the differential equation

$\left(\frac{dy}{dx}\right)^{10} + 3x.\frac{d^2y}{dx^2} = 0$ is

(a) 1 (b) 2

(c) 3 (d) 4

27. The equation of the curve whose slope is $\frac{dy}{dx} = \frac{2y}{x}$, $x > 0, y > 0$ which passes through the point (1, 1) is

(a) $x^2 = y$ (b) $y^2 = x$

(c) y = x (d) None of these

15. ;fn a vkj b lehdj.k $x^2 + ax + b = 0$ d v"kU; ey g rk $x^2 + ax + b$ dk U;ure eku g\

(a) $\frac{2}{3}$ (b) –1

(c) $-\frac{9}{4}$ (d) 1

16. ;fn $f : R \to R$ bl çdkj g] fd $f(x) = (3 - x^3)^{1/3}$ (fof)(x) dk eku g\

(a) $x^{1/3}$ (b) x^3

(c) x (d) $(3 - x^3)$

17. a vkj b d fdl eku d fy;]

$$f(x) = \begin{cases} x^2 + 3x + a, & x \le 1 \\ bx + 2, & x > 1 \end{cases}$$ x=1 ij vodyuh; g\

(a) 2, 3 (b) 3, 5

(c) 4, 2 (d) bue l dkb ugh

18. ;fn $f(x) = \tan^{-1}\sqrt{\frac{1+\sin x}{1-\sin x}}$, $0 \le x < \frac{\pi}{2}$ rk $f'\left(\frac{\pi}{6}\right)$ dk eku g\

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

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

19. ijoy; $y = (x-3)^2$ ij og fcUn D;k g ftl ij [khph x;h Li"k j[kk fcUnvk (3, 0) vkj (4, 1) dk feyku okyh j[kk d lekUrj g\

(a) $\left(\frac{3}{4}, \frac{1}{2}\right)$ (b) $\left(\frac{7}{2}, \frac{1}{4}\right)$

(c) $\left(-\frac{7}{2}, \frac{1}{4}\right)$ (d) bue l dkb ugh

20. ;fn $y = a \log|x| + bx^2 + x$ dk $x = -1$ vkj $x = 2$ ij pje eku g rk a vkj b dk eku g\

(a) $\left(2, -\frac{1}{2}\right)$ (b) $\left(1, \frac{1}{2}\right)$

(c) $\left(\frac{3}{4}, 4\right)$ (d) bue l dkb ugh

21. $\int \frac{e^{\log\sqrt{x}}}{x}$ dk eku g\

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

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

22. $\int_0^1 x(1-x)^{99} dx$ dk eku g\

(a) $\frac{1}{10010}$ (b) $\frac{1}{10100}$

(c) $\frac{1}{1010}$ (d) bue l dkb ugh

23. $\int_{-1}^{1} f(x)dx$ dk eku gkxk] tgk

$$f(x) = \begin{cases} 1-2x, & x \le 0 \\ 1+2x, & x \ge 0 \end{cases}$$

(a) 2 (b) 1

(c) 3 (d) 4

24. $\int_{-\pi/2}^{\pi/2} (x^3 + x\cos x + \tan^5 x + 1)$ dk eku gkxk\

(a) 0 (b) 2

(c) π (d) 1

25. $\int_1^2 |x-3| dx$ dk eku gkxk\

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

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

26. vody lehdj.k $\left(\frac{dy}{dx}\right)^{10} + 3x.\frac{d^2y}{dx^2} = 0$ dh ?kkr D;k g\

(a) 1 (b) 2

(c) 3 (d) 4

27. ml oØ dk lehdj.k D;k g] ftldh ço.krk $\frac{dy}{dx} = \frac{2y}{x}$, $x > 0, y > 0$ g ,o tk fcUn (1, 1) l gkdj tkrk g\

(a) $x^2 = y$ (b) $y^2 = x$

(c) y = x (d) bue l dkb ugh

28. The solution of the differential equation

$(x+y)^2.\frac{dy}{dx}=1$ is

(a) $y + \tan^{-1}(x + y) = C$

(b) $y - \tan^{-1}x = C$

(c) $y - \tan^{-1}(x + y) = C$

(d) None of these

29. The integrating factor (I.F) of the diferential equation $\frac{dy}{dx}+\sec x.y=\tan x$ is

(a) sec x

(b) tan x

(c) secx. tanx

(d) secx + tanx

30. The value of θ for which the line $x\cos\theta+y\sin\theta=2$ is perpendicular to the line $x - y = 3$, where $\theta\in(0,\pi)$

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

(c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

31. The area of the triangle formed by the lines $y - x = 0$, $x + y = 0$ and $x - k = 0$ is

(a) $\frac{k^2}{2}$ (b) k^2

(c) $\frac{k^2}{4}$ (d) None of these

32. The equation of the line parallel to x-axis and passing through the point (3, –4) is

(a) y = 4 (b) x = 4

(c) y = –4 (d) None of these

33. The image of the point (3, 8) with respect to a line mirror x + 3y = 7 is

(a) (1, 4) (b) (–1, –4)

(c) (2, 1) (d) None of these

34. The equation of the circle which touches the lines x = 0, y = 0 and x = 4 and lies in the first quadrant is:

(a) $x^2 + y^2 - 4x - 4y + 4 = 0$

(b) $x^2 + y^2 + 4x + 4 = 0$

(c) $x^2 + y^2 + 2x + y + 5 = 0$

(d) None of these

35. The value of $\int_{-1}^{3}(|x|+|x-1|)dx$ is

(a) 9 (b) 6

(c) 10 (d) 5

36. If f(x) is a function satisfying $f\left(\frac{1}{x}\right)+x^2.f(x)=0$ for all non zero x, then the value of $\int_{\sin\theta}^{\operatorname{cosec}\theta} f(x)dx$ is :

(a) 2 (b) 1

(c) 0 (d) None of these

37. What is the value of $\int_0^4\left\{\sqrt{x}\right\}dx$, where {x} denotes the fractional part of x?

(a) $\frac{3}{7}$ (b) $\frac{2}{7}$

(c) $\frac{5}{7}$ (d) $\frac{7}{3}$

38. Find the value of $\int_0^{[x]}(x-[x])dx$, where [.] denotes Greatest Integer Function.

(a) [x] (b) $\frac{[x]}{2}$

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

39. The value of $\int_0^{\pi}\frac{xdx}{1+\cos^2 x}$ is

(a) $\frac{\pi}{2\sqrt{2}}$ (b) $\frac{\pi}{\sqrt{2}}$

(c) $\frac{\pi^2}{2\sqrt{2}}$ (d) None of these

28. vody lehdj.k $(x+y)^2.\frac{dy}{dx}=1$ dk gy g%

(a) $y + \tan^{-1}(x + y) = C$

(b) $y - \tan^{-1}x = C$

(c) $y - \tan^{-1}(x + y) = C$

(d) bue l dkb ugh

29. vody leh dj.k $\frac{dy}{dx}+\sec x.y=\tan x$ dk lekdyu x.kkd D;k g\

(a) sec x

(b) tan x

(c) secx. tanx

(d) secx + tanx

30. θ d fdl eku d fy; j[kk, $x\cos\theta+y\sin\theta=2$ vkj $x - y = 3$ ijLij yEcor g] tgk $\theta\in(0,\pi)$

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

(c) $\frac{\pi}{2}$ (d) $\frac{\pi}{6}$

31. j[kkvk $y - x = 0, x + y = 0$ vkj $x - k = 0$ dk feyku l cuu oky f=Hkt dk {k=Qy D;k g%

(a) $\frac{k^2}{2}$ (b) k^2

(c) $\frac{k^2}{4}$ (d) bue l dkb ugh

32. ml j[kk dk lehdj.k D;k g tk x-v{k d lekUrj g ,o fcUn (3, –4) l gkdj tkrk g%

(a) y = 4 (b) x = 4

(c) y = –4 (d) bue l dkb ugh

33. fcUn (3, 8) dk ljy j[kk x + 3y = 7 d lki{k çfrfcEc D;k g%

(a) (1, 4) (b) (–1, –4)

(c) (2, 1) (d) bue l dkb ugh

34. ml oÙk dk lehdj.k D;k g] tk j[kkvk x = 0, y = 0 vkj x = 4 dk çFke prFkk"k e Li"k djrk g%

(a) $x^2 + y^2 - 4x - 4y + 4 = 0$

(b) $x^2 + y^2 + 4x + 4 = 0$

(c) $x^2 + y^2 + 2x + y + 5 = 0$

(d) bue l dkb ugh

35. $\int_{-1}^{3}(|x|+|x-1|)dx$ dk eku g%

(a) 9 (b) 6

(c) 10 (d) 5

36. ;fn Qyu f(x), $f\left(\frac{1}{x}\right)+x^2.f(x)=0$, x d lHkh v"kU; ekuk dk lr'V djrk g rk] $\int_{\sin\theta}^{\operatorname{cosec}\theta} f(x)dx$ dk eku g%

(a) 2 (b) 1

(c) 0 (d) bue l dkb ugh

37. $\int_0^4\left\{\sqrt{x}\right\}dx$ dk eku D;k g] tgk {x}, x dk fHkUukRed eku Qyu g\

(a) $\frac{3}{7}$ (b) $\frac{2}{7}$

(c) $\frac{5}{7}$ (d) $\frac{7}{3}$

38. $\int_0^{[x]}(x-[x])dx$ dk eku Kkr dj] tgk [.] vf/kdre i.kkd Qyu g&

(a) [x] (b) $\frac{[x]}{2}$

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

39. $\int_0^{\pi}\frac{xdx}{1+\cos^2 x}$ dk eku D;k g%

(a) $\frac{\pi}{2\sqrt{2}}$ (b) $\frac{\pi}{\sqrt{2}}$

(c) $\frac{\pi^2}{2\sqrt{2}}$ (d) bue l dkb ugh

For the next two (02) items that follow:

Consider the limit

$$\lim_{x\to\infty}\left(\frac{x^2-1}{x+1}-ax-b\right)=2$$

40. The value of a is

(a) –2 (b) –1

(c) 1 (d) 2

41. The value of b is

(a) -2 (b) -3

(c) 1 (d) 2

42. The value of $\lim_{x\to\infty}\left(\frac{x^2+2x-1}{2x^2-3x-2}\right)^{\frac{2x+1}{2x-1}}$ is

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

(c) 1 (d) 0

43. The value of $\lim_{x\to0}\frac{\sin(\pi\cos^2 x)}{x^2}$ is

(a) 1 (b) π

(c) 2π (d) –1

For the next two (02) items that follow:

Consider the function.

$$f(x)=\begin{cases}(1+|\sin x|)^{\frac{a}{|\sin x|}}, & -\pi/6<x<0\\ b, & x=0\\ e^{\tan 2x/\tan 3x}, & 0<x<\pi/6\end{cases}$$

Function is continuous at x = 0.

44. The value of a is:

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

(c) $\frac{2}{3}$ (d) None of these

45. The value of b is

(a) $e^{1/2}$ (b) $e^{3/2}$

(c) 1 (d) $e^{2/3}$

46. The slope of the tangent to the curve $y=\int_0^x\frac{dx}{1+x^3}$ at the point where x = 1 is

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

(c) $\frac{1}{4}$ (d) None of these

47. A balloon is pumped at the rate of a cm^3/minute. The rate of increase of its surface area when the radius is b cm is

(a) $\frac{2a^2}{b^4}cm^2/min$ (b) $\frac{a}{2b}cm^2/min$

(c) $\frac{2a}{b}cm^2/min$ (d) None of these

For the next three (03) items that follow:

There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C_1, 50 to chemical C_2 and 30 to both the chemical C_1 and C_2.

48. The number of individuals exposed to chemical C_1 but not chemical C_2.

(a) 80 (b) 40

(c) 90 (d) 70

49. The number of individuals exposed to chemical C_2 but not chemical C_1 is

(a) 10 (b) 20

(c) 15 (d) 12

50. The number of individuals exposed to chemical C_1 or chemical C_2.

(a) 110 (b) 130

(c) 150 (d) 140

51. Let A = {9, 10, 11, 12, 13} and $f: A\to N$ be defined by f(n) = the highest prime factor of n, then range of 'f' be

(a) {3, 5, 11, 13} (b) {3, 11, 13}

(c) {1, 3, 5} (d) None of these

vkx vku oky nk (02) ç"uk"kk dh fy;s%

$$\lim_{x\to\infty}\left(\frac{x^2-1}{x+1}-ax-b\right)=2$$ ij fopkj dj%

40. a dk eku D;k g%
(a) -2 (b) -1
(c) 1 (d) 2

41. b dk eku D;k g%
(a) –2 (b) –3
(c) 1 (d) 2

42. $\lim_{x\to\infty}\left(\frac{x^2+2x-1}{2x^2-3x-2}\right)^{\frac{2x+1}{2x-1}}$ dk eku D;k g%
(a) $\frac{1}{2}$ (b) $e^{1/2}$
(c) 1 (d) 0

43. $\lim_{x\to0}\frac{\text{Sin}(\pi\cos^2 x)}{x^2}$ dk eku D;k g%
(a) 1 (b) π
(c) 2π (d) –1

vkx vku oky nk (02) ç"uk"kk dh fy;s%

fuEufyf[kr Qyu ij fopkj dj%

$$f(x)=\begin{cases}(1+|\sin x|)^{\frac{a}{|\sin x|}}, & -\pi/6<x<0\\ b, & x=0\\ e^{\tan 2x/\tan 3x}, & 0<x<\pi/6\end{cases}$$

Qyu $x=0$ ij lrr g%

44. a dk eku D;k g%
(a) $\frac{1}{3}$ (b) $\frac{3}{2}$
(c) $\frac{2}{3}$ (d) bue l dkb ugh

45. b dk eku D;k g%
(a) $e^{1/2}$ (b) $e^{3/2}$
(c) 1 (d) $e^{2/3}$

46. oØ $y=\int_0^x \frac{dx}{1+x^3}$ d Li"kh dh ço.krk $x=1$ ij gkxh%
(a) $\frac{1}{2}$ (b) 1
(c) $\frac{1}{4}$ (d) bue l dkb ugh

47. ,d xCckj dk a leh³@feuV dh nj l iEi fd;k tkrk g rk mldk i'B {k=Qy fdl nj l c<xk ;fn mldh f=T;k b leh g%
(a) $\frac{2a^2}{b^4}$ leh²@feuV (b) $\frac{a}{2b}$ leh²@feuV
(c) $\frac{2a}{b}$ leh²@feuV (d) bue l dkb ugh

vkx vku oky rhu (03) ç"uk"kk dh fy;s%

200 0;fDr ,d Ropk vfu;ferrk d f"kdkj g, g ftue l 120 0;fDr jlk;u C_1 l 50 0;fDr nlj jlk;u C_2 l vkj 30 0;fDr nkuk çdkj d jlk;u C_1 vkj C_2 }kjk lØfer g, g%

48. 0;fDr;k dh l[;k tk doy jlk;u C_1 l lØfer g, g yfdu jlk;u C_2 l lØfer ugh g, g%
(a) 80 (b) 40
(c) 90 (d) 70

49. 0;fDr;k dh l[;k tk doy jlk;u C_2 l lØfer g, g yfdu jlk;u C_1 l lØfer ugh g, g%
(a) 10 (b) 20
(c) 15 (d) 12

50. 0;fDr;k dh l[;k tk jlk;u C_1 ;k jlk;u C_2 l lØfer g, g%
(a) 110 (b) 130
(c) 150 (d) 140

51. ekuk $A=\{9,10,11,12,13\}$ vkj $f:A\to N$ bl rjg ifjHkkf'kr g fd $f(n)$ = vf/kdre vHkkT; x.ku[k.M n dk] rk 'f' dk ijkl D;k g%
(a) {3, 5, 11, 13} (b) {3, 11, 13}
(c) {1, 3, 5} (d) bue l dkb ugh

52. The value of $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x}$ is

(a) Cot 2x (b) Cot x

(c) tan 2x (d) tan x

53. If $\text{Sin } x = \frac{3}{5}$, $\text{Cos } y = -\frac{12}{13}$, where x and y both lie in second quadrant then value of sin(x + y) is

(a) $\frac{55}{65}$ (b) $-\frac{55}{65}$

(c) $-\frac{56}{65}$ (d) None of these

54. The value of

$$\text{Cos}^2 x + \text{Cos}^2\left(x + \frac{\pi}{3}\right) + \text{Cos}^2\left(x - \frac{\pi}{3}\right) \text{ is}$$

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

(c) $-\frac{3}{2}$ (d) $\frac{3}{2}$

55. How many 2 digit even numbers can be formed from the digits 1, 2, 3, 4, 5 if the digits can be repeated

(a) 12 (b) 10

(c) 5 (d) 20

56. Find the number of arrangement of the letters of the word PERMUTATIONS in which there are always 4 letters between P and S

(a) 1814400 (b) 2419200

(c) 25401600 (d) None of these

For the next two (02) items that follow:

A group consists of 4 girls and 7 boys and team is formed from 5 members.

57. In how many ways a team of 5 member be formed if the team have no girl?

(a) 14 (b) 21

(c) 18 (d) None of these

58. In how many ways a team of 5 member be formed if team have at least one boy and one girls

(a) 440 (b) 418

(c) 441 (d) None of these

59. In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together

(a) 11400 (b) 14400

(c) 1440 (d) None of these

For the next two (03) items that follow:

The second, third and fourth terms in the Binomial expansion $(x + a)^n$ are 240, 720 and 1080 respectively, then

60. The value of x is

(a) 1 (b) 3

(c) 2 (d) 4

61. The value of n is

(a) 6 (b) 4

(c) 3 (d) 5

62. The value of a is

(a) 3 (b) 5

(c) 2 (d) 4

63. How many terms of the Geometric Progression 3, $\frac{3}{2}$, $\frac{3}{4}$, ... are needed to give the sum $\frac{3069}{512}$?

(a) 8 (b) 9

(c) 7 (d) 10

64. If p, q, r are in Geometric Progression and the equations $px^2 + 2qx + r = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then $\frac{d}{p}$, $\frac{e}{q}$, $\frac{f}{r}$ are in

(a) Arithmetic Progression

(b) Geometric Progression

(c) Harmonic Progression

(d) None of these

52. $\dfrac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x}$ dk eku D;k g\$

(a) Cot 2x (b) Cot x
(c) tan 2x (d) tan x

53. ;fn $\text{Sin } x = \dfrac{3}{5}$, $\text{Cos } y = -\dfrac{12}{13}$, tgk x ,o y nkuk nl j prFkk"k e g] rk sin(x + y) dk eku g\$

(a) $\dfrac{55}{65}$ (b) $-\dfrac{55}{65}$

(c) $-\dfrac{56}{65}$ (d) bue l dkb ugh

54. $\text{Cos}^2 x + \text{Cos}^2\left(x + \dfrac{\pi}{3}\right) + \text{Cos}^2\left(x - \dfrac{\pi}{3}\right)$

dk eku g\$

(a) $\dfrac{1}{2}$ (b) $-\dfrac{2}{3}$

(c) $-\dfrac{3}{2}$ (d) $\dfrac{3}{2}$

55. vdk 1, 2, 3, 4, 5 l fdruh 2 vd dh le l [;k, cu ldrh g ;fn vdk dh iujkofRr dh tk ldrh g\$

(a) 12 (b) 10
(c) 5 (d) 20

56. PERMUTATIONS "kCn l fdru fHkUu&fHkUu "kCn cu ldr g] ;fn P vkj S d chp lno 4 v{kj jg\

(a) 1814400 (b) 2419200
(c) 25401600 (d) bue l dkb ugh

vkxs vkus okys nks (02) ç"uks"kks ds fy;s\$

,d leg e 4 yMfd;k ,o 7 yMd g ftle l 5 lnL;k dh Vhe cuuh gA

57. fdru rjhd l 5 lnL;k dh Vhe cuk;h tk ldrh g ;fn Vhe e dkb yMdh u gk\

(a) 14 (b) 21
(c) 18 (d) bue l dkb ugh

58. fdru rjhd l 5 lnL;k dh Vhe cuk;h tk ldrh g tcfd de l de ,d yMdk ,o ,d yMdh Vhe e gk\

(a) 440 (b) 418
(c) 441 (d) bue l dkb ugh

59. fdru rjhd l 5 yMfd;k vkj 3 yMdk dk ,d ifDr e cBk;k tk ldrk g tcfd nk yMd ,d lkFk u cB\

(a) 11400 (b) 14400
(c) 1440 (d) bue l dkb ugh

vkxs vkus okys rhu (03) ç"uks"kks ds fy;s\$

f}in çlkj $(x + a)^n$ e nlj] rhljk ,o pkFkk in Øe"k% 240] 720 vkj 1080 g rk]

60. x dk eku g\$

(a) 1 (b) 3
(c) 2 (d) 4

61. n dk eku g\$

(a) 6 (b) 4
(c) 3 (d) 5

62. a dk eku g\$

(a) 3 (b) 5
(c) 2 (d) 4

63. x.kkRrj J.kh 3, $\dfrac{3}{2}$, $\dfrac{3}{4}$, ... d fdru ink dk ;kx $\dfrac{3069}{512}$ g\$

(a) 8 (b) 9
(c) 7 (d) 10

64. ;fn p, q, r, x.kkRrj J<h e g ,o lehdj.k $px^2 + 2qx + r = 0$ vkj $dx^2 + 2ex + f = 0$ dk ,d ey mHk;fu'B g rk $\dfrac{d}{p}$, $\dfrac{e}{q}$, $\dfrac{f}{r}$ fdl e gkx\

(a) lekUrj J<h
(b) x.kkRrj J<h
(c) gjkRed J<h
(d) bue l dkb ugh

65. If f is a function satisfying $f(x + y) = f(x).f(y)$ for all $x, y \in N$ such that $f(1) = 3$ and $\sum_{x=1}^{n} f(x) = 120$, then value of n is:
(a) 3 (b) 4
(c) 5 (d) 6

66. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$, where a, b, c, d form G.P., then value of $(q + p) : (q - p)$ is
(a) $\frac{15}{17}$ (b) $\frac{17}{15}$
(c) $\frac{13}{15}$ (d) None of these

67. The distance between the parallel lines $3x - 4y + 7 = 0$ and $3x - 4y + 5 = 0$ is
(a) $\frac{2}{5}$ (b) $\frac{12}{5}$
(c) 1 (d) $\frac{3}{5}$

68. The distance of the line $4x - y = 0$ from the point (4, 1) measured along the line making an angle of 135^o with positive x-axes is
(a) $4\sqrt{2}$ (b) $3\sqrt{2}$
(c) $2\sqrt{2}$ (d) None of these

69. A person standing at the junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ want to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find the equation of the path that he should follow:
(a) $119x + 102y = 125$ (b) $18x + 12y + 11 = 0$
(c) $2x - 3y + 18 = 0$ (d) None of these

70. The equation of parabola whose vertex (0, 0) and passing through (5, 2) and symmetric with respect to y-axes is
(a) $2y^2 = 9x$ (b) $2x^2 = 25y$
(c) $y^2 = -8$ (d) None of these

71. The equation of the ellipse whose major axes on the x-axes and passing through the points (4, 3) and (6, 2) is
(a) $x^2 + 4y^2 = 52$
(b) $x^2 + 5y^2 = 52$
(c) $4x^2 + y^2 = 52$
(d) None of these

72. The variance of the following data:
6, 8, 10, 12, 14, 16, 18, 20, 22, 24 is
(a) 45 (b) 33
(c) 24 (d) 28

For the next three (03) items that follow:
Suppose there are three vectors

$\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} + 2\hat{j} - \hat{k}$, on the basis of this solve the following question:

73. Find the value of $[\vec{a}\,\vec{b}\,\vec{c}]$
(a) 4 (b) 3
(c) 2 (d) 1

74. Find the value of $\vec{a} \times (\vec{b} \times \vec{c})$
(a) $\hat{i} + 2\hat{j} + 4\hat{k}$ (b) $\hat{i} + 4\hat{j} + 2\hat{k}$
(c) $\hat{i} - 4\hat{j} + 3\hat{k}$ (d) None of these

75. The value of $[\vec{a} + \vec{b}\;\; \vec{b} + \vec{c}\;\; \vec{c} + \vec{a}]$ is:
(a) 3 (b) 4
(c) 8 (d) 2

76. Consider the following statements in respect of the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & -3 \\ -2 & 3 & 0 \end{bmatrix}$
I. The matrix A is Skew Symmetric.
II. The matrix A is Symmetric.
III. The matrix A is Invertible.
Which of the above statements is/are correct?
(a) Only I (b) Only III
(c) I and II (d) II and III

65. ;fn f ,d Qyu g tk $f(x+y)=f(x).f(y)$ dk lHkh $x,y\in N$ d fy, lr'V djrk g bl rjg fd $f(1)=3$,o $\sum_{x=1}^{n} f(x)=120$, rk n dk eku g%

(a) 3 (b) 4
(c) 5 (d) 6

66. ;fn a vkj b lehdj.k $x^2-3x+p=0$ d ey g vkj c] d lehdj.k $x^2-12x+q=0$, d ey g tgk a, b, c, d x.kkRrj J.kh e g rk $(q+p):(q-p)$ dk eku g%

(a) $\frac{15}{17}$ (b) $\frac{17}{15}$
(c) $\frac{13}{15}$ (d) bue l dkb ugh

67. nk lekUrj j[kkvk $3x-4y+7=0$ vkj $3x-4y+5=0$ d chp dh njh D;k g\

(a) $\frac{2}{5}$ (b) $\frac{12}{5}$
(c) 1 (d) $\frac{3}{5}$

68. ljy j[kk $4x-y=0$ dh fcUn (4, 1) l njh D;k g tk x-v{k d /kukRed fn"kk l 135° dk dk.k cukrh g%

(a) $4\sqrt{2}$ (b) $3\sqrt{2}$
(c) $2\sqrt{2}$ (d) bue l dkb ugh

69. ,d vkneh nk ljy j[kkvk d çfrPNn fcUn ij [kMk g ftld lehdj.k Øe"k% $2x-3y+4=0$ vkj $3x+4y-5=0$ g ,o og ml iFk ij U;ure le; e igpuk pkgrk g ftldk lehdj.k $6x-7y+8=0$ rk iFk dk lehdj.k D;k g%

(a) $119x+102y=125$ (b) $18x+12y+11=0$
(c) $2x-3y+18=0$ (d) bue l dkb ugh

70. ml ijoy; dk lehdj.k D;k g ftldk "kh'k (0, 0) g ,o tk (5, 2) l gkdj tkrk g ,o y-v{k d lefer g%

(a) $2y^2=9x$ (b) $2x^2=25y$
(c) $y^2=-8$ (d) bue l dkb ugh

71. ml nh?koÙk dk lehdj.k D;k g] ft ldk nh?k v{k x-v{k ij g ,o tk fcUnvk (4, 3) vkj (6, 2) l gkdj tkrk g%

(a) $x^2+4y^2=52$
(b) $x^2+5y^2=52$
(c) $4x^2+y^2=52$
(d) bue l dkb ugh

72. fuEufyf[kr vkdMk 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 dk çlj.k D;k g%

(a) 45 (b) 33
(c) 24 (d) 28

vkx vkuk oky rhu (03) ç"uk"kk dh fy;s%

ekuk rhu lfn"k Øe"k% $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=\hat{i}-\hat{j}+\hat{k}$ vkj $\vec{c}=\hat{i}+2\hat{j}-\hat{k}$, g rk mud vk/kkj ij fuEufyf[kr dk gy dj%

73. $[\vec{a}\,\vec{b}\,\vec{c}]$ dk eku Kkr djA

(a) 4 (b) 3
(c) 2 (d) 1

74. $\vec{a}\times(\vec{b}\times\vec{c})$ dk eku Kkr djA

(a) $\hat{i}+2\hat{j}+4\hat{k}$ (b) $\hat{i}+4\hat{j}+2\hat{k}$
(c) $\hat{i}-4\hat{j}+3\hat{k}$ (d) bue l dkb ugh

75. $[\vec{a}+\vec{b}\ \ \vec{b}+\vec{c}\ \ \vec{c}+\vec{a}]$ dk eku g%

(a) 3 (b) 4
(c) 8 (d) 2

76. vk0;g $A=\begin{bmatrix}0&1&2\\-1&0&-3\\-2&3&0\end{bmatrix}$ d lEcU/k e fuEu dFkuk ij fopkj dhft,%

I. vk0;g A fo'ke lefer gA
II. vk0;g A lefer gA
III. vk0;g A 0;RØe.kh; gA

dku lk@l dFku lR; g@g%

(a) doy I (b) doy III
(c) I vkj II (d) II vkj III

77. If $f(x)=\frac{1-x}{1+x}$, then $f\left(\frac{1-x}{1+x}\right)$ is equal to

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

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

78. What is the inverse of $f(x)=(1-x^3)^{1/5}+2$?

(a) $[1-(x-2)^5]^{1/3}$

(b) $[1+(x-2)^5]^{1/3}$

(c) $(x+2)^{1/3}$

(d) $[1+(x+2)^5]^{1/3}$

79. If $f(x)=\frac{\text{Cos}^2x+\text{Sin}^4x}{\text{Sin}^2x+\text{Cos}^4x}$, for $x\in R$ then f(2002) equals to

(a) 1 (b) 2

(c) 3 (d) 4

80. If $f(x)=\frac{2x+1}{3x-2}$, then (fof) (2) is equal to

(a) 1 (b) 3

(c) 4 (d) 2

81. If $f(x)=\begin{vmatrix} x^3 & x^2 & 3x^2 \\ 1 & -6 & 4 \\ p & p^2 & p^3 \end{vmatrix}$, where p is constant then

$\frac{d^2f(x)}{dx^2}$ is

(a) proportional to x^2 (b) proportional to x

(c) proportional to x^3 (d) a constant

82. If $y=\frac{x\sin^{-1}x}{\sqrt{1-x^2}}+\log_e\sqrt{1-x^2}$, then $\left(\frac{d^2y}{dx^2}\right)_{x=0}$ is equal to:

(a) 0 (b) 1

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

83. If a > b > 0 and $f(\theta)=\frac{(a^2-b^2)\cos\theta}{a-b\sin\theta}$ then the maximum value of $f(\theta)$ is

(a) $2\sqrt{a^2+b^2}$ (b) $\sqrt{a^2+b^2}$

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

84. Find the length of the perpendicular drawn from the point (1, 2, 3) to the line

$\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$ is

(a) 4 (b) 7

(c) 6 (d) 3

85. What is the angle between the planes 2x - y - 2z + 1 = 0 and 3x - 4y + 5z - 3 = 0?

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

For the next two (02) items that follow:

Consider the plane passing through the points (1, 1, 0), (1, 2, 1) and (-2, 2, -1) then:

86. The equation of plane is:

(a) 3x + 2y – 4z + 5 = 0

(b) 2x + 3y – 3z – 5 = 0

(c) 2x + 3y – 3z + 5 = 0

(d) x + 2y + z + 3 = 0

87. Direction ratio of the plane is

(a) <3, 2, 1> (b) <1, 2, 1>

(c) <2, 3, –3> (d) None of these

88. Suppose that 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females.

(a) $\frac{19}{20}$ (b) $\frac{20}{21}$

(c) $\frac{17}{18}$ (d) None of these

77. ;fn $f(x)=\frac{1-x}{1+x}$ rk $f\left(\frac{1-x}{1+x}\right)$ dk eku g%

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

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

78. $f(x)=(1-x^3)^{1/5}+2$ dk O;RØe D;k g%

(a) $[1-(x-2)^5]^{1/3}$

(b) $[1+(x-2)^5]^{1/3}$

(c) $(x+2)^{1/3}$

(d) $[1+(x+2)^5]^{1/3}$

79. ;fn $f(x)=\frac{\cos^2 x+\sin^4 x}{\sin^2 x+\cos^4 x}$ lHkh $x\in R$ rk f(2002) dk eku g%

(a) 1 (b) 2

(c) 3 (d) 4

80. ;fn $f(x)=\frac{2x+1}{3x-2}$ rk (fof) (2) dk eku D;k g%

(a) 1 (b) 3

(c) 4 (d) 2

81. ;fn $f(x)=\begin{vmatrix} x^3 & x^2 & 3x^2 \\ 1 & -6 & 4 \\ p & p^2 & p^3 \end{vmatrix}$ tgk p fu;rkd g rk $\frac{d^2f(x)}{dx^2}$ g%

(a) x^2 d lekuikrh (b) x d lekuikrh

(c) x^3 d lekuikrh (d) fLFkjkd

82. ;fn $y=\frac{x\sin^{-1}x}{\sqrt{1-x^2}}+\log_e\sqrt{1-x^2}$ rk $\left(\frac{d^2y}{dx^2}\right)_{x=0}$ dk eku g%

(a) 0 (b) 1

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

83. ;fn $a>b>0$ vkj $f(\theta)=\frac{(a^2-b^2)\cos\theta}{a-b\sin\theta}$ rk $f(\theta)$ dk vf/kdre eku D;k g%

(a) $2\sqrt{a^2+b^2}$ (b) $\sqrt{a^2+b^2}$

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

84. fcUn (1, 2, 3) l j[kk $\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$ ij Mky x; yEc dh yEckb D;k g\

(a) 4 (b) 7

(c) 6 (d) 3

85. lery 2x - y - 2z + 1 = 0 vkj 3x - 4y + 5z - 3 = 0 d chp dk dk.k D;k g\

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

vkxs vku okys nks (02) ç"uka"kks d fy;%

fcUnvk (1, 1, 0), (1, 2, 1) vkj (–2, 2, –1) l tku oky lery ij fopkj dhft,%

86. lery dk lehdj.k D;k g\

(a) 3x + 2y – 4z + 5 = 0

(b) 2x + 3y – 3z – 5 = 0

(c) 2x + 3y – 3z + 5 = 0

(d) x + 2y + z + 3 = 0

87. lery dk fnd&vuikr g%

(a) <3, 2, 1> (b) <1, 2, 1>

(c) <2, 3, –3> (d) bue l dkb ugh

88. ekuk fd 5% i#"kk vkj 0.25% fL=;k d cky Hkj gA mue l ,d Hkj cky okyk O;fDr dk puk tkrk gA ml O;fDr dh D;k lHkkouk g fd og i#"k gkxk\ dYiuk dj fd i#"kk vkj fL=;k dh l[;k cjkcj g%

(a) $\frac{19}{20}$ (b) $\frac{20}{21}$

(c) $\frac{17}{18}$ (d) bue l dkb ugh

89. The mean and variance of a binomial distribution are $\frac{4}{3}$ and $\frac{8}{9}$ respectively, value of $p(x \geq 1)$ is

(a) $\frac{65}{81}$ (b) $\frac{57}{87}$

(c) $\frac{23}{56}$ (d) None of these

90. If the probability of defective bolts is 0.1, then find standard deviation for the distribution of defective bolts in a total of 500 bolts:

(a) 3.75 (b) 6.71

(c) 3.20 (d) None of these

91. A fair die is rolled. Consider the events. A = {1, 3, 5}, B = {2, 3} and C = {2, 3, 4, 5} then value of $P(A \cap B \mid C)$ is

(a) $\frac{2}{3}$ (b) $\frac{4}{5}$

(c) $\frac{1}{4}$ (d) $\frac{3}{5}$

92. If $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$, then value of $P\left(\frac{\overline{A}}{\overline{B}}\right)$ is:

(a) $\frac{3}{4}$ (b) $\frac{5}{7}$

(c) $\frac{3}{8}$ (d) None of these

93. The area bounded by the curve $y = 2x - x^2$ and the straight line $y = -x$ is:

(a) $\frac{7}{3}$ (b) $\frac{6}{5}$

(c) $\frac{9}{2}$ (d) None of these

94. If the area enclosed between the curves $y = ax^2$ and $x = ay^2$ $(a > 0)$ is 1 square unit, then value of 'a' is

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

(c) $\frac{1}{\sqrt{3}}$ (d) None of these

95. The angle between the two diagonals of a cube is

(a) 30^o (b) 45^o

(c) $\text{Cos}^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (d) $\text{Cos}^{-1}\left(\frac{1}{3}\right)$

96. The distance of the point P(a, b, c) from the x-axis is

(a) $\sqrt{b^2 + c^2}$ (b) $\sqrt{a^2 + c^2}$

(c) $\sqrt{a^2 + b^2}$ (d) None of these

97. The angle between the normals to the plane $2x - y + z = 6$ and $x + y + 2z = 7$ is

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

(c) $\frac{\pi}{4}$ (d) None of these

For the next two (02) items that follow:

Assume X, Y, Z, W and P are matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$ respectively.

98. The restriction on n, k and p so that PY + WY will be defined are:

(a) k = 3, p = n

(b) k is arbitrary, p = 2

(c) p is arbitrary, k = 3

(d) k = 2, p = 3

99. If n = p, then order of the matrix $7x - 5z$ is

(a) $p \times 2$ (b) $2 \times n$

(c) $n \times 3$ (d) $p \times n$

89. f}kin cVu dk ek/; vkj çlj.k Øe'k% $\frac{4}{3}$ vkj $\frac{8}{9}$ g] rk $p(x \geq 1)$ dk eku D;k g\

(a) $\frac{65}{81}$ (b) $\frac{57}{87}$

(c) $\frac{23}{56}$ (d) bue l dkb ugh

90. ;fn [kjkc ckYV dh çkf;drk 0.1 g] rk dy 500 ckYV e l [kjkc ckYV d fy; ekud fopyu çkIr dj\

(a) 3.75 (b) 6.71

(c) 3.20 (d) bue l dkb ugh

91. ,d vfHkur ik"k dk Qdk x;k] ,o mle fuEu ?kVukvk ij fopkj dj] $A = \{1, 3, 5\}$, $B = \{2, 3\}$ vkj $C = \{2, 3, 4, 5\}$ rk $P(A \cap B | C)$ dk eku D;k g\

(a) $\frac{2}{3}$ (b) $\frac{4}{5}$

(c) $\frac{1}{4}$ (d) $\frac{3}{5}$

92. ;fn $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$ vkj

$P(A \cap B) = \frac{1}{4}$, rk $P\left(\frac{\overline{A}}{\overline{B}}\right)$ dk eku D;k g\

(a) $\frac{3}{4}$ (b) $\frac{5}{7}$

(c) $\frac{3}{8}$ (d) bue l dkb ugh

93. oØ $y = 2x - x^2$ vkj ljy j[kk $y = -x$ d chp dk {k=Qy D;k g\

(a) $\frac{7}{3}$ (b) $\frac{6}{5}$

(c) $\frac{9}{2}$ (d) bue l dkb ugh

94. ;fn oØk $y = ax^2$ vkj $x = ay^2$ $(a > 0)$ d chp dk {k=Qy 1 ox bdkb g rk 'a' dk eku D;k g\

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

(c) $\frac{1}{\sqrt{3}}$ (d) bue l dkb ugh

95. fdlh ?ku d nk fod.kk d chp dk dk.k D;k g\

(a) 30^o (b) 45^o

(c) $\text{Cos}^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (d) $\text{Cos}^{-1}\left(\frac{1}{3}\right)$

96. fcUn $P(a, b, c)$ dh x- v{k l njh D;k g\

(a) $\sqrt{b^2 + c^2}$ (b) $\sqrt{a^2 + c^2}$

(c) $\sqrt{a^2 + b^2}$ (d) bue l dkb ugh

97. lery $2x - y + z = 6$ vkj $x + y + 2z = 7$ d vfHkyEc d chp dk dk.k D;k g\

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

(c) $\frac{\pi}{4}$ (d) bue l dkb ugh

vkx vku oky nk (02) ç"uk"kk d fy;\

ekuk X, Y, Z, W vkj P Øe'k% $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ vkj $p \times k$ dkfV d vk0;g gA

98. n, k vkj p e çfrc/k D;k g\ ;fn PY + WY ifjHkkf"kr g\

(a) $k = 3, p = n$

(b) k ,d vpj g tgk $p = 2$

(c) p ,d vpj g tgk $k = 3$

(d) $k = 2, p = 3$

99. ;fn $n = p$ rk vk0;g $7x - 5z$ dh dkfV D;k g\

(a) $p \times 2$ (b) $2 \times n$

(c) $n \times 3$ (d) $p \times n$

100. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ and $A + A' = I$ then the value of α is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$

(c) π (d) $\frac{3\pi}{2}$

101. If A is square matrix such that $A^2 = A$ then $(I + A)^3 - 7A$ is equal to

(a) A

(b) I – A

(c) I

(d) 3A

102. Let A be a square matrix of 3×3, then |kA| is equal to

(a) $k|A|$ (b) $k^2|A|$

(c) $k^3|A|$ (d) $3k|A|$

103. If a, b, c are in A.P., then the determinant

$$\begin{vmatrix} x+2 & x+3 & x+2a \\ x+3 & x+4 & x+2b \\ x+4 & x+5 & x+2c \end{vmatrix}$$ is

(a) 0 (b) 1

(c) x (d) 2x

104. The interval in which $y = x^2e^{-x}$ is increasing is

(a) $(-\infty, \infty)$ (b) (–2, 0)

(c) $(2, \infty)$ (d) (0, 2)

105. The line y = x + 1 is a tangent to the curve $y^2 = 4x$ at the point

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

(c) (1, – 2) (d) (–1, 2)

106. If the length of three sides of a trapezium other than base are equal to 10 cm, then area of trapezium when it is maximum

(a) $25\sqrt{3}$ (b) $50\sqrt{3}$

(c) $75\sqrt{3}$ (d) $20\sqrt{3}$

For the next two (02) items that follow:

Consider the function

$f(x) = 12x^{4/3} - 6x^{1/3}, \quad x \in [-1, 1]$

107. The local maximum value of function f(x) is

(a) 13 (b) 14

(c) 18 (d) None of these

108. The local minimum value of the function f(x) is

(a) $\frac{4}{9}$ (b) $-\frac{9}{4}$

(c) $\frac{2}{3}$ (d) 4

109. A relation R is defined on the set Z of integers as follows $mRn \Leftrightarrow m + n$ is odd then which of the following statement is true for R.

I. R is reflexive

II. R is symmetric

III. R is transitive

(a) II (b) II and III

(c) I and II (d) I and III

For the next three (03) items that follow:

Consider the three vertices of a triangle be A(1, 1), B(–1, –1) and $C(-\sqrt{3}, k)$. On the basis of above information solve the questions.

110. If the triangle is an equilateral, then value of 'k' is

(a) $-\sqrt{3}$ (b) $2\sqrt{3}$

(c) $\sqrt{3}$ (d) 4

111. If the area of triangle is 4, then value of 'k' is

(a) $-4-\sqrt{3}$

(b) $4+\sqrt{3}$

(c) $4-\sqrt{3}$

(d) None of these

112. The altitude of an equilateral triangle is

(a) $\sqrt{2}$ (b) $\sqrt{3}$

(c) $\sqrt{5}$ (d) $\sqrt{6}$

100. ;fn $A=\begin{bmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{bmatrix}$ vkj $A+A'=I$ rk α dk eku g%

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$

(c) π (d) $\frac{3\pi}{2}$

101. ;fn A ,d ox vk0;wg g] ,o $A^2=A$] rk $(I+A)^3-7A$ cjkcj g%

(a) A

(b) $I-A$

(c) I

(d) 3A

102. ;fn A, 3×3 dk ox vk0;wg g] rk $|kA|$ dk eku D;k g%

(a) $k|A|$ (b) $k^2|A|$

(c) $k^3|A|$ (d) $3k|A|$

103. ;fn a, b, c A.P. e g] rk fn;k lkjf.kd dk eku g%

$$\begin{vmatrix}x+2 & x+3 & x+2a\\ x+3 & x+4 & x+2b\\ x+4 & x+5 & x+2c\end{vmatrix}$$

(a) 0 (b) 1

(c) x (d) 2x

104. og vUrjky ftlesa $y=x^2e^{-x}$ vf/kdre g%

(a) $(-\infty,\infty)$ (b) (–2, 0)

(c) $(2,\infty)$ (d) (0, 2)

105. j[kk $y=x+1$] fdl fcUnq ij ijoy; $y^2=4x$ ij Li"kZh g%

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

(c) (1, – 2) (d) (–1, 2)

106. fdlh leyEc dh rhu Hkqtk,a vk/kkj d vfrfjDr cjkcj g ,o 10 lseh g] rk leyEc dk {k=Qy tc ;g vf/kdre g] D;k g%

(a) $25\sqrt{3}$ (b) $50\sqrt{3}$

(c) $75\sqrt{3}$ (d) $20\sqrt{3}$

vkx vkuk oky nk (02) ç"uk"kk d fy;%

fuEu ij fopkj dj%

$f(x)=12x^{4/3}-6x^{1/3},\quad x\in[-1,1]$

107. Qyu f(x) dk LFkkuh; mfPp'B eku D;k g%

(a) 13 (b) 14

(c) 18 (d) bue l dkb ugh

108. Qyu f(x) dk LFkkuh; fuEu'B eku D;k g\

(a) $\frac{4}{9}$ (b) $-\frac{9}{4}$

(c) $\frac{2}{3}$ (d) 4

109. eku yhft, R i.kk dk d lePp; Z ij $mRn\Leftrightarrow m+n$] fo'ke g }kjk ifjHkkf"kr ,d lEcU/k g rk dku lk dFku lgh g%

I. R LorY; g

II. R lefer g

III. R lØed g

(a) II (b) II vkj III

(c) I vkj II (d) I vkj III

vkx vkuk oky rhu (03) ç"uk"kk d fy;%

,d f=Hkt ftud "kh'k Øe"k% A(1, 1), B(–1, –1) vkj $C(-\sqrt{3},k)$ g] rk fuEu ç"uk dk mRrj nhft,A

110. ;fn f=Hkt leckg g rk 'k' dk eku D;k g\

(a) $-\sqrt{3}$ (b) $2\sqrt{3}$

(c) $\sqrt{3}$ (d) 4

111. ;fn f=Hkt dk {k=Qy 4 g rk 'k' dk eku D;k g\

(a) $-4-\sqrt{3}$

(b) $4+\sqrt{3}$

(c) $4-\sqrt{3}$

(d) bue l dkb ugh

112. leckg f=Hkt d ,d vfHkyEc dh yEckbZ D;k gksxh\

(a) $\sqrt{2}$ (b) $\sqrt{3}$

(c) $\sqrt{5}$ (d) $\sqrt{6}$

113. The perpendicular distance between two parallel lines $3x + 4y - 6 = 0$ and $6x + 8y + 7 = 0$ is

(a) $\frac{1}{5}$ (b) $\frac{13}{5}$

(c) $\frac{19}{10}$ (d) $\frac{1}{2}$

114. The length of transverse axes of the hyperbola $3x^2 - 4y^2 = 32$ is

(a) $\frac{8\sqrt{2}}{\sqrt{3}}$ (b) $\frac{16\sqrt{2}}{\sqrt{3}}$

(c) $\frac{3}{32}$ (d) $\frac{64}{3}$

115. In an ellipse $9x^2 + 5y^2 = 45$, the distance between the foci is

(a) $4\sqrt{5}$ (b) $3\sqrt{5}$

(c) 3 (d) 4

116. If $x = 1 + \frac{y}{2} + \left(\frac{y}{2}\right)^2 + \left(\frac{y}{2}\right)^3 + \ldots$, where $|y| < 2$, then what is y equal to

(a) $\frac{x-1}{x}$ (b) $\frac{x-1}{2x}$

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

117. What is the sum of the first 50 term of the series $(1\times3) + (3\times5) + (5\times7) + \ldots$?

(a) 171650

(b) 26600

(c) 26650

(d) 26900

118. The value of $2^{2-\log_2 5}$ is equal to

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$

(c) $\frac{2}{5}$ (d) $\frac{5}{2}$

119. If $\sum_{i=1}^{n}(x_i - 2) = 110$, $\sum_{i=1}^{n}(x_i - 5) = 20$, then what is the mean?

(a) $\frac{11}{2}$ (b) $\frac{2}{11}$

(c) $\frac{17}{3}$ (d) $\frac{17}{9}$

120. The diameter of the sphere $x^2 + y^2 + z^2 - 4x + 6y - 8z - 7 = 0$ is:

(a) 4 (b) 5

(c) 6 (d) 12

113. nk lekUrj j[kkvk $3x+4y-6=0$ vkj $6x+8y+7=0$ d chp dh yEcor njh D;k g\

(a) $\frac{1}{5}$ (b) $\frac{13}{5}$

(c) $\frac{19}{10}$ (d) $\frac{1}{2}$

114. vfrijoy; $3x^2-4y^2=32$ d vuçLFk v{k dh yEckbZ D;k g\

(a) $\frac{8\sqrt{2}}{\sqrt{3}}$ (b) $\frac{16\sqrt{2}}{\sqrt{3}}$

(c) $\frac{3}{32}$ (d) $\frac{64}{3}$

115. nh?kZoRr $9x^2+5y^2=45$ d ukfHk;k d chp dh njh D;k g\

(a) $4\sqrt{5}$ (b) $3\sqrt{5}$

(c) 3 (d) 4

116. ;fn $x=1+\frac{y}{2}+\left(\frac{y}{2}\right)^2+\left(\frac{y}{2}\right)^3+\ldots$ tgk $|y|<2$ rk y dk eku D;k g\

(a) $\frac{x-1}{x}$ (b) $\frac{x-1}{2x}$

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

117. J.kh $(1\times3)+(3\times5)+(5\times7)+\ldots$ d 50 inksa dk ;ksx D;k g\

(a) 171650

(b) 26600

(c) 26650

(d) 26900

118. $2^{2-\log_2 5}$ dk eku D;k g\

(a) $\frac{4}{5}$ (b) $\frac{5}{4}$

(c) $\frac{2}{5}$ (d) $\frac{5}{2}$

119. ;fn $\sum_{i=1}^{n}(x_i-2)=110$, $\sum_{i=1}^{n}(x_i-5)=20$ g] rks ek/; D;k gksxk\

(a) $\frac{11}{2}$ (b) $\frac{2}{11}$

(c) $\frac{17}{3}$ (d) $\frac{17}{9}$

120. xksyk $x^2+y^2+z^2-4x+6y-8z-7=0$ dk 0;kl g\

(a) 4 (b) 5

(c) 6 (d) 12

SPACE FOR ROUGH WORK

dPp dk;l d fy;s txg

MAJOR KALSHI CLASSES PVT. LTD.
Allahabad, U.P.

MAJOR KALSHI CLASSES
PVT. LTD.

"A way to get commissioned"

NDA/NA MOCK TEST

xf.kr

ijh{k.k iqfLrdk

le; % **nks ?k.Vs vFkok rhu feuV** | i.kkZd % **300**

vuqns'k

1- ijh{k.k ikjEHk gksus ds rqjUr ckn] vki bl ijh{k.k iqfLrdk dh iM+rky vo"; dj ysa fd blesa dksbZ fcuk Nik] QVk ;k NVk gvk i'B vFkok i"uka vkfn u gksA ;fn ,slk gS] rks bls lgh ijh{k.k iqfLrdk ls cny yhft,A

2- —i;k /;ku j[ksa fd **OMR** mÙkj&i=d esa] mfpr LFkku ij] jksy uEcj vkSj ijh{k.k iqfLrdk vuØe **A, B, C** ;k **D** dks] /;ku ls ,oa fcuk fdlh pwd ;k folxfr ds Hkjus vkSj dwVc) djus dh ftEesnkjh mEehnokj dh gSA fdlh Hkh izdkj dh pwd@folxfr dh fLFkfr esa mÙkj&i=d fujLr dj fn;k tk;sxkA

3- bl ijh{k.k iqfLrdk ij lkFk esa fn, x, dks'Bd esa vkidks viuk vuØekad fy[kuk gSA ijh{k.k iqfLrdk ij vkSj dqN u fy[ksaA

4- bl ijh{k.k iqfLrdk esa dqy **120** i"ukad ¼iz"u½ fn, x, gSaA izR;sd i"ukad **fgUnh** vkSj **vaxzsth** nksuksa esa Nis gSaA izR;sd i"ukad esa pkj izR;qÙkj ¼mÙkj½ fn, x, gSaA buesa ls ,d izR;qÙkj dks pqu ysa] ftls vki mÙkj&i=d ij vafdr djuk pkgrs gSaA ;fn vkidks ,slk yxs fd ,d ls vf/kd izR;qÙkj lgh gSa] rks ml izR;qÙkj dks vafdr djsa tks vkidks loksZÙke yxsA izR;sd i"ukad ds fy, doy **,d gh** izR;qÙkj pquuk gSA

5- vkidks vius lHkh izR;qÙkj vyx ls fn, x, mÙkj&i=d ij gh vafdr djus gSaA mÙkj&i=d esa fn, x, funs'k nsf[k,A

6- lHkh i"uka"kksa ds vad leku gSaA

7- blls igys fd vki ijh{k.k iqfLrdk ds fofHkUu i"uka"kksa ds izR;qÙkj mÙkj&i=d ij vafdr djuk "kq: djsa] vkidks izos"k izek.k&i= ds lkFk iz'ks'kr vuqns"kksa ds vuqlkj dqN fooj.k mÙkj&i=d esa nsus gSaA

8- vki vius lHkh izR;qÙkjksa dks mÙkj&i=d esa Hkjus ds ckn rFkk ijh{kk ds lekiu ij **doy mÙkj&i=d v/kh{kd** dks lkSai nsaA vkidks viuh lkFk ijh{k.k iqfLrdk ys tkus dh vuqefr gSA

9- dPps dke ds fy, i=d ijh{k.k iqfLrdk ds vUr esa layXu gSA

10- **xyr mÙkjksa ds fy, n.M %**

oLrqfu'B iz"u&i=ksa esa mEehnokj }kjk fn, x, xyr mÙkjksa ds fy, n.M fn;k tk,xkA

(i) izR;sd i"u ds fy, pkj oSdfYir mÙkj gSaA mEehnokj }kjk izR;sd i"u ds fy, fn, x, ,d xyr mÙkj ds fy, i"u gsrq fu;r fd, x, vadksa dk **,d&frgkbZ** n.M ds :i esa dkVk tk,xkA

(ii) ;fn dksbZ mEehnokj ,d ls vf/kd mÙkj nsrk gS] rks bls **xyr mÙkj** ekuk tk,xk] ;|fi fn, x, mÙkjksa esa ls ,d mÙkj lgh gksrk gS] fQj Hkh mlh i"u ds fy, mi;qZDrkuqlkj gh mlh rjg dk n.M fn;k tk,xkA

(iii) ;fn mEehnokj }kjk dksbZ i"u gy ugha fd;k tkrk gS vFkkZr mEehnokj }kjk mÙkj ugha fn;k tkrk gS] rks ml i"u ds fy, ***dksbZ n.M ugha*** fn;k tk,xkA

tc rd vkidks bl ijh{k.k iqfLrdk [kksyus dks u dgk tk,] rc rd u [kksysaA

Note **: English version of the instructions is printed on the front cover of this Booklet.**