MILLENNIUM SECONDARY AND PREPARATORY SCHOOL 2012 E.C GRADE 12
MATHS NATURAL OPEN BOOK MODEL EXAM -ONE

CHOOSE THE BEST ANSWER

1. If p⇔q is false, then which one of the following is always true?

   A. pvq B. p^q C. p ⇒ q D. p^¬q

2. The simplified form of $\left(\neg q \Rightarrow p\right)$ ^$(\neg pvq)$is

   A. p B. q C. q ⇒ p D. pvq

3. Which of the following is true about the function $f(x) = x^2 + 1$?

   A. It is an odd function B. It is an even function

   C. It is neither odd nor even function. D. Its range is R.

4. Which one of the following is a proposition?

   A. The most quality coffee in the world is from Ethiopia. B. $3x + 4 = 8$

   C. Tell me the truth. D. Ethiopians are intelligent.

5. Given that p: Every triangle is isosceles.

   q: Every square is a rectangle, then the symbolic representation of the compound statement "Every triangle is isosceles while every square is a rectangle" is

   $A. pVq$ B. p⇒q C. p⇔q D. p^q

6. Let p, q and r be statements. If $(p \wedge \neg q) \Rightarrow \neg r$ is false, then the truth value of p, q and r respectively are:

   A. T,F,F C. F,T,T

   B. T,F,T D. T,T,F

7. If $f(x) = \frac{x+2}{\sqrt{x+2}}$ and $g(x) = x - 2$, then $f(g(x))$ is equal to

   A. $\frac{\sqrt{x}}{x}$ B. $\sqrt{x}$ C. $\sqrt{x} + 2$ D. $\sqrt{x} - 2$

8. If $f(x) = \begin{cases} 5 - \sqrt{9 - x^2} & if\ |x| \leq 3, \\ 10 - 2x & if\ x > 3 \end{cases}$ then $f(0) - f(4)$ is equal to

   A. 1 B. 3 C. -2 D. 0

9. Let $g(x) = x + 1$ and$f\left(g(x)\right) = x^2 - 2$, then $g(3)$ is

   A. 1 B. 2 C. -2 D. 7

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10. $5[\sqrt{3}] - 4[-\sqrt{10}]$ is equal to ----

A.21 B. -11 C. 19 D. -19

11. If $f = \{(-3,-2),(0,4),(-1,-2),(1,5)\}$ and $g = \{(-1,-3),(0,1),(-2,4),(1,7),(2,0)\}$, then which of the following is true?

A. $(gof)(-3) = 2$.

B. $(fog)(2) = 0$

C. $(fog) = \{(-1,-2),(0,5),(1,7)\}$

D. $-2f - g = \{(-1,-7),(0,-9),(1,-17)\}$

12. Which one of the following does not define a rational function?

A. $f(x) = \frac{x^2+3x}{x^2-1}$ B. $h(x) = \frac{\sqrt{x+1}}{x+2}$

C. $g(x) = \frac{\sqrt{2}x+1}{x+3} + \frac{x+2}{x+1}$ D. $k(x) = \frac{2x+1}{\sqrt{(x^2+1)^2}}$

13. The simplest form of the expression $\left(\frac{x(x+1)}{x^2+2x+1}\right)\left(\frac{x+1}{x}\right)$ is _____

A. 1 B. 2 C. $x+2$ D. x

14. The solution set of the equation $\frac{x+4}{x-5} - \frac{1}{x+5} = \frac{10}{x^2-25}$ is

A. $\{2 \pm \sqrt{26}\}$ B. $\{1 \pm \sqrt{26}\}$ C. $\{3\}$ D. $\{-3\}$

15. Which one of the following is true about the function $(x) = \frac{x^3+1}{x^2-1}$?

A. It has a horizontal asymptote at $x = \pm 1$.

B. Its domain is the set of real numbers.

C. It has an oblique asymptote $y = x$.

D. It has only a horizontal asymptote.

16. The sum of infinite terms in a geometric progression is 2 and the sum of their squares is $\frac{4}{3}$, then what is the series?

A. $\{1,\frac{1}{2},\frac{1}{4},\frac{1}{8}\text{-----}\}$ B. $\{2,\frac{1}{2},\frac{1}{4},\frac{1}{8}\text{-----}\}$ C. .$\{1,\frac{2}{3},\frac{1}{4},\frac{1}{8}\text{-----}\}$ D. $\{-\frac{1}{2},\frac{1}{2},\frac{1}{4},\frac{1}{8}\text{-----}\}$

17. $\sum_{n=1}^{\infty}\left[\left(\frac{-1}{3}\right)^n + 4^{1-n}\right]$ is equal to A. $\frac{1}{12}$ B. $\frac{19}{12}$ ***C***. $\frac{13}{12}$ D. $\frac{25}{12}$

18. Suppose $\{a_n\}$ is an A.P such that $a_5 = 21$ and $a_{10} = 66$, then$a_2 =$

A. -6 B. -15 C. 3 D.9

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19. The series $\frac{1}{1.2}+\frac{1}{2.3}+\frac{1}{3.4}$-----$+\frac{1}{n(n+1)}$ is equal to

A. $\frac{n}{n(n+3)}$ B. $\frac{n}{n(n+2)}$ ***C***. $\frac{n}{(n+1)}$ D. $\frac{1}{n(n+1)}$

20. If $\log_3 2, \log_3 2^x - 5$ and $\log_3 2^x - \frac{7}{2}$ are in an A.P, then $x =$ __

A. 2 B.3 C. 4 D. 2 or 3

21. If $\frac{3+5+7+ ---to\ n\ terms}{5+8+11+ ---to\ 10\ terms} = 7$, then the value of n is

A. 35 B.36 C. 37 D.40

22. The interior angles of a convex polygon are in A.P.The smallest angle is $120°$ and the common difference is $5°$. The number of sides of the polygon is

A. 7 ***B***. 9 C. 11 D. 16

23. The sum of three terms of an arithmetic progression is 33 and their product is 792. The least of them is A. 8 B. 11 C. 18 ***D***. 4

24. $5x - y, 2x + y, x + 2y$ form an A.P and the numbers $(y+1)^2, xy+1, (x-1)^2$ form a G.P.Then $(x, y) =$ A. $(0,0)$ B. $\left(\frac{1}{4}, \frac{1}{2}\right)$ ***C***. $(-2,-4)$ D. $(2,4)$

25. The sum of the first three terms of a GP is to the sum of the first six terms as 125:152. the common ratio of the G.P is A. $\frac{1}{5}$ B. $\frac{2}{5}$ ***C***. $\frac{3}{5}$ D. $\frac{4}{5}$

26. The sum of integers from 1 to 100 that are divisible by 2 or 5 is

A. 3050 B.2020 C. 2222 D. 2456

27. If $\{a_n\}$ is a sequence such that $a_1 = 2$,and $a_{n+1} = a_n + 4$ for all $n \geq 1$, then $\sum_{n=1}^{35} a_n$ is equal to; A. 2460 B. 2458 ***C***. 2450 D. 2442

28. What is the 50th term of the sequence? $3,10,17,24,31,---?$

A. 310 ***B***.346 C. 510 D. 531

29. How many four digit even numbers can be formed from 1, 2, 3, 4, and 5 if the numbers start with 3? A. 40 ***B***. 50 C. 100 D. 120

30. A ball is thrown vertically from ground up to a height of 16m. Each time it drops h meters, it rebounds 0.8h meters. Nothing that the ball travels every height of h twice. What is the total vertical distance traveled by the ball before it comes to rest?

A. $144m$ B. $80mC.\ 160m$ D. 320m

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31. Let $s_n = 4n^2,\ n = 1,2,3,---$ be the sum of the first n terms of the sequence then which of the following is the third term of the sequence?

A. 8 B. 12 C. 16 ***D***. 20

32. Consider the sequence$\{a_n\}$, $n \geq 1$ where the first term is $a_1 = 2$, and $a_n = 3a_{n-1}$ for all $n \geq 2$, Then $\sum_{i=1}^{20} a_i$ is equal to

A. $3^{20} - 1$ B. $1 - \frac{1}{3^{20}}$ C. $1 - \frac{1}{2^{21}}$ D. . $3^{-20} - 1$

33. Consider the sequence$\{a_n\}$, $n \geq 1$, where the first term is $a_1 = 2$, and $a_{n+1} = a_n + 4$ for all $n \geq 1$, then the sum $a_3 + a_4 + a_5 + a_6 + a_7 + --- + a_{35}$ is equal to

A.2460 B. 2458 C. 2442 D.2450

34. Suppose a geometric sequence $\sum_{n=1}^{\infty} G_n$ has n terms $G_{10} = 192$ and $G_6 = 12$. Which of the following is equal to G_2? A. $\frac{3}{2}$ B. $\frac{3}{4}$ C. $\frac{3}{8}$ D. $\frac{3}{16}$

35. If kth term of a sequence is $a_k = \frac{(-1)^k(2-k)}{2k-1}$, what is its next term a_{k+1} when k is even?

A. $\frac{k-1}{2k+1}$ B. $\frac{3-k}{2k+3}$ C. $\frac{k-3}{2k+1}$ D. $\frac{1-k}{2k+1}$

36. If a geometric sequence $G_2 = -10$, $G_4 = \frac{-8}{5}$ and G_5 is positive, then which of the following is a general formula for G_n?

A.$25\left(-\frac{2}{5}\right)^n$ B. $-25\left(\frac{2}{5}\right)^{n-1}$ C. $\frac{(2)^{n-1}}{(-5)^{n-2}}$ D. $25\left(-\frac{2}{5}\right)^{n-1}$

37. *On which of the following intervals does the graph of* $f(x) = \frac{x}{x^2+9}$ *increasing?*

A. $(-\infty, \infty)$ $B.[-3,3]$ $C.(-\infty,-3)$ $D.[3,\infty)$

38. $\lim_{x\to\infty}\left(\frac{x+4}{x-1}\right)^x$ *equal to*

A. 0 $B.1$ $C.e$ $D.e^5$

39. The respective values of a and b for which the function f(x) $= \begin{cases} 2x^2 - 5x, & x \leq 2 \\ ax^2 + bx - 12, & x > 2 \end{cases}$ is differentiable at x=2 are:

A. 4 and 2 C. 5 and -1
B. 6 and 3 D. -1 and 7

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40. $\lim_{n\to\infty}(\frac{1}{1-n^2}+\frac{2}{1-n^2}+---+\frac{n}{1-n^2})$ is equal to

A. 0 B. $\frac{-1}{2}$ C. $\frac{1}{2}$ D. 2

41. Find $\lim_{n\to\infty}(6^n+7^n)^{\frac{1}{n}}$. A. 6 B. 7 C. 4 D. 5

42. Let qn=n+ sin (nπ), n=1, 2, 3 ---- be the nth term of sequence, then which one of the following is true

A. 4 B. 3 C. 5 D. 0

43. Which one is true for the sum of the series $\sum_{n=0}^{\infty} 2^n\, 3^{2-n}$

A. 6 B. ∞ C. 18 D. 27

44. A ball is dropped from height of 5 meter the ball rebounds 60% of the distance after each fall find the total distance

A. 10m B. 20 m C. 30 m D. 80 m

45. A person is scheduled to get raise of birr 250 every 6 month during his first 5 years on the job if his starting salary is birr 25,250 per year what will his salary be at the end of the 3rd year?

A. 25250 B. 26750 B. 26570 D. 25750

46. The monthly rent of machinery birr 200 is to be paid at the end of each month. If it is not paid at the end of the month, the amount due will increase birr 3 per day. What will be the amount to be paid after a delay of 10 days?

A.2300 B.230 C. 2000 D.6000

47. Which one of the following is a convergent sequence?

A. $\{\frac{(-1)^n}{(0.1)^n}\}$ B.$\{\frac{3+3^n}{2^n}\}$ C. $\{\frac{1}{n}+cosn\}$ D. $\{\frac{1-4^n}{5^n}\}$

48. $\lim_{X\to 6^-}\sqrt{X-\sqrt{72-X^2}}$=_____ A.0 B.6 C. ∞ D.Does not exist

49. Which one of the following is not true statement?

A.$\{1^n\}$ is monotonic sequence.

B. The sequence $\{(n)^{\frac{1}{n}}\}$ is converges to zero

C. The sequence $\{10+\frac{1}{n}\}$ is strictly decreasing.

D. The sequence $\{\frac{2n-1}{n+4}\}$ is monotonic and bounded

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50. For which of the following sets of values of x will x+2, x+4 and 2x+11 be consecutive terms of a geometric sequence?

A. {-1, 0} B. {-1, 3} C. {-1,-6} D. {1, 6}

51. $\sum_{n=1}^{60}(-1)^n(2n+1)$ is equal to? A.60 B.240 C.∞ D.40

52. Given $f(x)=\dfrac{4x^3-ax^2+bx+c}{x^2+2x-3}$ where a, b and c are real number. If f has a finite limit at every real number and $\lim\limits_{x\to 1} f(x)=8$, then which one of the following is False?

A. $\lim\limits_{x\to -3} f(x)=-8$ B. a=c C. $\lim\limits_{x\to -1} f(x)=0$ D. a + 3b=0

53. What is the value of $\lim\limits_{x\to 2}(4x-7)^{\frac{3}{2x-7}}$?

A. e^4 B. e^5 C. e^6 D. e^{-5}

54. $\lim\limits_{x\to 1}\left(\dfrac{1+\cos\pi x}{x^2-2x+1}\right)$ is equal to: A. $\dfrac{-\pi}{2}$ B. π^2 C. $\dfrac{\pi}{2}$ D. $\dfrac{\pi^2}{2}$

55. Which one of the following is True about the series $25\frac{1}{4}+24\frac{1}{2}+23\frac{1}{4}+22\frac{1}{2}+21\frac{1}{4}+\ldots$

A. It is an arithmetic sequence B. Its smallest positive term is $1\frac{1}{4}$

C. Its maximum sum is 334.75 D. It is a convergent series.

56. What is the value of $\lim\limits_{x\to 0}\dfrac{(30)^x-(6)^x+(5)^x-1}{2x-x^2}$?

A. ln5 B.e^5 C. lnb D does not exist

57. Which one of the following is necessarily true?

A. If the sum of two sequence is convergent, then both sequences are convergent.

B. If the function f is not differentiable at c, then f is not continuous at c.

C. If f is differentiable both from the right and left at c, then f is differentiable at c.

D. If f is continuous both from the right and left at c, then f is continuous at c.

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58. Which one of the following sequences is unbounded?

A. $\left\{(-1)^n\sqrt{2n-1}-\sqrt{2n+3}\right\}_{n=1}^{\infty}$ B. $\left\{\cos\left(\frac{1}{n}\right)\right\}_{n=1}^{\infty}$

C. $\left\{\ln\left(\frac{1}{n}\right)\right\}_{n=1}^{\infty}$ D. $\left\{\sin(n)\right\}_{n=1}^{\infty}$

59. For non-zero real number p, let f be defined by $f(x)=\begin{cases}\frac{\tan px}{x}; for x<0\\ 3x+2p^2; for x\geq 0\end{cases}$ what value of p make f continuous at x=0?

A. 2 B. -2 C. $\frac{1}{2}$. D. $-\frac{1}{4}$

60. Let $f(x)=\frac{6\cos(2x)+\sin(2x)\sin x-6}{x^2}$, then $\lim_{x\to 0} f(x)$ is

A. 0 B. -10 C. -6 D. -1

61. Let $h(x)=e^{3x-1}$ and $g(x)=\tan x$ /. If $f(x)=xh(x)+h(g(x))$,which of the following is equal to $f'(0)$

A. $4e^{-1}$ B. $\frac{1}{e}\left(1+\frac{1}{e}\right)$ C. $3e^{-1}$ D. $\frac{1}{e}\left(1-\frac{1}{e}\right)$

62. Which one of the following function continuous and differentiable at the indicate point?

A. $f(x)=\sqrt[3]{x-3}$ at x=3 B. $f(x)=|2x-1|$ at $x=\frac{1}{2}$.

C. $f(x)=\sqrt[3]{x^2}$ at x=0 D. $f(x)=|x^2+1|+|x|$ at $x=-1$

63. Let $f(x)=3-e^{4-5x}$, then $\frac{d}{dx}\left(f^{-1}\right)(1)$ =----------

A. $\frac{1}{10}$ B. $\frac{1}{5}$ C. $\frac{1}{2}$ D. $\frac{1}{\ln 2}$.

64. What is the derivative of $f(x)=\ln\left(\cos\sqrt{x^2+4}\right)$?

A. $\frac{-x\tan\sqrt{x^2+4}}{\sqrt{x^2+4}}$ B. $\frac{-x\sin\sqrt{x^2+4}}{\sqrt{x^2+4}}$ C. $\frac{2x\tan\sqrt{x^2+4}}{\sqrt{x^2+4}}$ D. $\frac{-2x}{\sqrt{x^2+4}}\sin\sqrt{x^2+4}$.

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65. Let $f(x)=\frac{\ln x}{e^x}$, which of the following is the equation of line tangent to the curve of f(x) at x=1? A. y - e^x +1 =0 B. $y-x+e=0$ C. y -x e^x +e =0 D. e^y –x+1=0

66. Let $f(x)=\cos\left(\ln\sqrt{e^x}\right)$, then what is the value of $f'(\frac{\pi}{2})$?

A. $\frac{\sqrt{2}}{2}$ B. $-\frac{\sqrt{2}}{2}$ C. $\frac{\sqrt{2}}{2}$ D. $\frac{\sqrt{2}}{2}$

67. Which one of the following is the second derivative of $f(x)=\frac{1}{2}\ln\left(\frac{1+\sin x}{-1+\sin x}\right)$?

A. $\frac{1}{2}\ln(\sin x)$ B. -sec x tanx C. cscx cot x D. -secxtanx

68. What is the value of a and b respectively if $f(x)=\begin{cases}2x^2-5x, x\le 2\\ ax^2+bx-12, x>2\end{cases}$ is differentiable at x=2? A. 5 &-1 B. 4&1 C. 6 & 3 D. -1 & 7

69. Which one of the following is **true** about $f(x)=\begin{cases}x-1, if x<-1\\ x^2-1, if\ -1\le x<1\\ 7x-2, if 1\le x<5\\ 3-x, if x\ge 5\end{cases}$?

A. $f'(-1)=-1$ B. $f'(5)=-1$ C. $f'(3)=7$ D. $f'(1)=7$

70. What is the point of tangency on the curve f(x) = x^3 +x^2 +3x-1 where the tangent line parallel to y= 4x-3?

A. (-1, -4) B. $\left(\frac{-1}{3},\frac{-2}{27}\right)$ C. (1, 4) D. $\left(\frac{-1}{3},\frac{1}{9}\right)$

71. What is the maximum interval where $f(x)=\frac{x}{\sqrt{1+x^4}}$ differentiable?

A. x > 0 B. $[0,\infty)$ C. $[1,\infty)$ D. $(-\infty,\infty)$

72. One of the following is an asymptote of the hyperbola $y^2-x^2+4x-5=0$.

A. $y=x+2$ B. $y=-x+2$ C. $y=-x-2$ D. $y=x-4$.

73. The general second degree equation $4x^2+4xy-2y^2-6=0$ is

A. a degenerate circle B. a parabola C. an ellipse D. a hyperbola

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74. If the foci and the end points of the major axis of an ellipse coincides respectively with the vertices and foci of the hyperbola $x^2 - 3y - 3 = 0$,then which of the following is the equation of the ellipse? A. $3x + y^2 - 3 = 0$. B. $x^2 + 4y^2 - 4 = 0$.

C. $4x^2 + y^2 - 4 = 0$. D. $x^2 + 3y - 3 = 0$.

75. Which of the following is true about the ellipse whose equation is given by

$4x^2 + y^2 = 16$?

A. Length of the minor axis is 2. C. the foci are $(0, -2)$ and $(0,2)$

B. Length of the major axis is 16. D. $(0, -4)$ and $(0,4)$ are vertices.

76. For what values of is the equation $x^2 + y^2 + 6x - 4y + k = 0$ represents a circle?

A. For all $k \geq 0$. **B.** For all $k \geq 10$.

C. For all $k < 13$ D. For all $k = 16$

77. Let l be the line containing (1, 5) and its angle of inclination be$\theta = 135°$. Which of the following is the distance from 1 to (-1, 1)?

A.2 $\sqrt{2}$ **B. 3**$\sqrt{2}$ C. $4\sqrt{2}$ D. $6\sqrt{2}$

78. Which of the following is the eccentricity of the ellipse,

$4x^2 + y^2 - 8x + 2y + 4 = 1$. A.$\frac{1}{2}\sqrt{3}$ B.$\frac{2\sqrt{3}}{3}$ C. $\frac{1}{2}$. D. $\frac{\sqrt{3}}{4}$.

79. The acute angle b/n the lines: $3x + 2y = 11$and $2x + y = -12$ is

A. $\tan^{-1}\left(\frac{1}{8}\right)$ B. $\tan^{-1}\left(\frac{9}{8}\right)$ C. $\tan^{-1}\left(\frac{7}{8}\right)$ D. $\tan^{-1}\left(\frac{6}{8}\right)$

80. The equation of the hyperbola with foci $(\pm 2\sqrt{3}, 0)$ and asymptotes $y = \pm\sqrt{2}x$ is

A. $\frac{y^2}{8} - \frac{x^2}{4} = 1$ B. $\frac{x^2}{8} + \frac{y^2}{4} = 1$ C. $\frac{x^2}{8} - \frac{y^2}{4} = 1$ D. $\frac{x^2}{36} + \frac{y^2}{16} = 1$

81. The equation of the line passes through P (1, 2) and the intersection point of $x + y = 5$ and $2x - y = 1$ is

A.$y + x + 1 = 0$ B. $y - x + 1 = 0$ C. $y - x - 1 = 0$ D. $y + x - 1 = 0$

82. Which of the following is the equation of the parabola with vertex at (1, 2) and directrix the line $x = 0$?

A.$y^2 - 4x - 4y + 8 = 0$. B. $x^2 - 2x + 4y - 7 = 0$.
C. $y^2 + 4x - 4y = 0$. D. $x^2 - 2x + y - 1 = 0$.

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83. Seven white balls and three black balls are randomly placed in a row. The probability that no two black balls are placed adjacently equals

A. $\frac{1}{2}$ ***B***. $\frac{7}{15}$ C. $\frac{2}{15}$ D. $\frac{1}{3}$

84. There are four machines and it is known that exactly two of them are faulty. They are tested one by one, in a random order till both the faulty machines are identified. Then the probability that only two tests are needed is

A. $\frac{1}{3}$ B. $\frac{1}{6}$ C. $\frac{1}{2}$ D. $\frac{1}{4}$

85. Bag A contains 6 red & 4 black balls & bag B contains 4 red & 6 black balls. One ball is drawn at random from bag A & placed in bag B. Then one ball is drawn at random from bag B & placed in bag A. If one ball is now drawn at random from bag A, the probability that it is found to be red is A. $\frac{18}{110}$ B. $\frac{8}{110}$ C. $\frac{56}{550}$ ***D***. $\frac{32}{55}$

86. Three faces of a die are yellow two faces red and one blue. The die is tossed three times. The probability that the colors yellow, red& blue appear in the first, second & the third tosses respectively is

A. $\frac{18}{36}$ ***B***. $\frac{1}{36}$ C. $\frac{8}{36}$ D. $\frac{3}{36}$

87. A bag contains7 green and 5 yellow balls. Two balls are drawn at a time The probability that both balls are of same color is A . $\frac{1}{33}$ B. $\frac{5}{33}$ C. $\frac{7}{22}$ ***D***. $\frac{31}{66}$

88. A letter is selected at random from the letters of the word "PROBABILITY". The chance that it is a vowel is

A . $\frac{3}{11}$ B. $\frac{2}{11}$ **C**. $\frac{4}{11}$ D. $\frac{8}{11}$

89. Eight chairs are numbered from 1-8. Two women and three men wish to occupy one chair each. First the women choose the chairs amongst chairs numbered from 1-4, then the men select the chairs from amongst the remaining. The number of possible arrangement is

A 20 B. 288 C. 96 ***D***. $4p2 \times 6p3$

90. The sum of the digits in the unit place of all the numbers formed with the help of 3, 4, 5, 6 taken all at a time is A. 18 ***B***. 108 C.432 D. 144

91. The number of ways in which 10 persons can go in to boats, so that there may be 5 in each boat, supposing that two particular persons will not go in same boat is

A. $\frac{1}{4}\binom{10}{5}$ B.$\frac{1}{2}\binom{8}{5}$ ***C***.$\binom{2}{1}\binom{8}{5}$ D. $\binom{8}{5}$

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92. In a foot ball championship 153 matches were played. Every team played one match with the other. The number of teams participating in the championship is _____.
A. 17 ***B***. 18 *C*. 9 *D*. 12

93. If $nPr = 720\binom{n}{r}$, then r is equal to ***A***. 6 *B*. 4 *C*. 7 *D*. 8

94. 12 persons are to be arranged along a round table. If two particular persons among them are not to sit side by side, the total number of arrangement is ***A***. 9× 10! *B*. 45× 8! *C*. 2× 10! *D*. 10!

95. In how many ways can a consonant and a vowel be chosen out of the letters the word "GUARDEN?" A. $\binom{7}{2}$ B. 7P2 C. $4p1 \times 3p1$ ***D***. $\binom{4}{1}\binom{3}{1}$

96. A determinant is unaltered if,

A. two rows are interchanged.

B. Two column are interchanged.

C. Every element in a column is multiplied by the same factor

D. To each element of any row is added the corresponding element of the other row multiplied by a given factor.

97. If $A = \begin{pmatrix} 1 & a & 2 \\ 1 & 2 & 5 \\ 1 & 1 & 1 \end{pmatrix}$ is non invertible, then a = A. 2 ***B***. 1 C. 0 D. -1

98. If A is a non-singular square matrix of order 3, then $|adj(A^3)|$ equals

A. $|A|^8$ ***B***. $|A|^6$ C. $|A|^9$ D. $|A|^{12}$

99. If the matrix $\begin{pmatrix} 1 & 3 & x+2 \\ 2 & 4 & 8 \\ 3 & 5 & 10 \end{pmatrix}$ is singular, then $x =$ ___ A. -2 ***B***. 4 C. 2 D. -4

100. If A = $\begin{pmatrix} 0 & -1 & 2 \\ 1 & 0 & 3 \\ -2 & -3 & 0 \end{pmatrix}$ then $A + 2A^T =$ _ A. A B. $-A^T$ *C*. A^T D. $2A^2$

101. Let = $\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$, A = $\begin{pmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \\ 3 & 2 & 1 \end{pmatrix}$ and B= $\begin{pmatrix} 3 \\ 1 \\ 4 \end{pmatrix}$ and if $Ax = B$, then $x =$ _____

A. $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ B. $\begin{pmatrix} -1 \\ -2 \\ -3 \end{pmatrix}$ C. $\begin{pmatrix} -1 \\ -2 \\ 3 \end{pmatrix}$ ***D***. $\begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$

102. A root of the equation $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ -3 & 3 & -6-x \end{vmatrix} = 0$ is A. 6 *B*. 0 C. 3 D. 9

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103. What is the value of x, if $\begin{vmatrix} 8 & -5 & 1 \\ 5 & x & 1 \\ 6 & 3 & 1 \end{vmatrix} = 2$? A.4 *B.* 8 C. 5 D. 9

104. If A is a non-singular matrix of order 3, then $|adj(adjA)|$ is equal to
A.$|A|^4$ B.$|A|^6$ C.$|A|^3$ D.$|A|^9$

105. If $a \neq b \neq c$, one value of x which satisfies the equation $\begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0$ *is given by*A. $x = c$ B. $x = a$ ***C***. $x = 0$ D. $x = b$

106. If each element of a 3× 3 matrix A is multiplied by 3, then the determinant of the newly formed matrix is A. $3detA$ B. $9detA$ C. $(detA)^3$ *D*. $27det$

107. If A and B are two matrices such that $AB = B$ and $BA = A$, then $A^2+B^2 =$ __
A.$2AB$ B. $2BA$ *C*. $A + B$ D. AB

108. The system of the equation $\begin{cases} x + 2y = 5 \\ 4x + 8y = 20 \end{cases}$ has A. unique solution B. no solution
C. infinitely many solution D. two distinct solution

109. Let A be a 4x4 matrix and $|A| = -2$. then what is the value of $|adj(A)|$?
A. 8 *B*.-8 C. 4 D.-4

110. Let A be a 3x3 invertible Matrix and B be any 3x3 matrix. If $|A| = 2$ and,$|B| = -1$, then $|2A^{-1}B|$ is: A.-1 B.-8 *C*.-4 D. -2

111. The modulus and principal argument of $\frac{-\sqrt{3}+i}{1+i}$ are respectively
A. $2\sqrt{2}$; $\frac{7\pi}{12}$ B. $2\sqrt{2}$; $\frac{-11\pi}{12}$ C.$\sqrt{2}$; $\frac{-11\pi}{12}$ *D*.$\sqrt{2}$; $\frac{7\pi}{12}$

112. If$z = x + yi$; where x *and* y are real numbers, then which of the following is **<u>not true</u>**?
A. $|z| = |\bar{z}|$ B.$|z\bar{z}| = |z|^2$ *C*. $Arg(z) = Arg(\bar{z})$ D. $z\bar{z}$is real number

113. If $\frac{x+yi}{i-1} = (2 - i)^3$, then the value of x and y are respectively
A.10 *and* 14 B. 6 *and* 5 *C*. 9 *and* 13 D. 8 *and* 12

114. If $z = 1 - i$, then what is the value of z^6 ?
A. $1 + \frac{1}{i}$ *B*. $8i$ C. $\frac{i}{8}$ D. $\frac{i}{360}$

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115. The polar form of $z = \frac{1+i\sqrt{3}}{1+i}$ is

A. $\sqrt{2}(\cos 60^0 + i\ \sin 60^0)$ B. $2(\cos 30^0 + i\ \sin 30^0)$

C. $\frac{\sqrt{2}}{2}(\cos 105^0 + i\ \sin 105^0)$ D. $\sqrt{2}(\cos 15^0 + i\ \sin 15^0)$

116. If $z_1 = \frac{2-i}{1+i}$ and $z_2 = \frac{1+i}{1-i}$, then what is the value of $z_1 + 2z_2$?

A. $1 + i$ B. $\frac{1+i}{2}$ C. $\frac{1-i}{2}$ D. $1 - i$

117. If $z = \sqrt{2}\cos(\frac{\pi}{12}) + i\sqrt{2}\sin(\frac{\pi}{12})$, the value of z^3 is:

A. $2 + 2i$ B. $\sqrt{2} + \sqrt{2}i$ C. $2\sqrt{2} + 2\sqrt{2}i$ D. $3\sqrt{2} + 3\sqrt{2}i$

118. If $z^3 = -8$, then the solution set of z in the set of complex number is:

A. $\{-2, -1 + \sqrt{3}i, -1 - \sqrt{3}i\}$ B. $\{-2, 1 + \sqrt{3}i, 1 - \sqrt{3}i\}$

C. $\{2, -1 + \sqrt{3}i, -1 - \sqrt{3}i\}$ D. $\{2, 1 + \sqrt{3}i, 1 - \sqrt{3}i\}$

119. If $P(AnB) = 0.15$, $P(B') = 0.10$, then $P(A/B)$ is A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $\frac{1}{5}$ ***D***. $\frac{1}{6}$

120. If A is a square matrix of order n× n and k is a scalar, then adj(kA) is equal to

A. kadjA B. k$^n adjA$ C. k^{n-1} $adjA$ D. k^{n+1} $adjA$

121. Which one of the following is a valid logical argument?

A. $p \Longrightarrow q, q \dashv p$ B. $p \Leftrightarrow q, p \Longrightarrow p \dashv q$

C. $\neg p \wedge q, q \Longrightarrow r \dashv r$ D. $\neg p, p \vee q, r \Longrightarrow q \dashv r$

122. Consider the following arguments, "If there is no rain, then there is a starvation. There is rain. Therefore, there is no starvation." Letting r: there is rain. S: there is starvation. Then, which one of the following is correct symbolic form of the argument and its validity.

A. $\neg$r $\Rightarrow$s, r $\vdash \neg$s is valid argument
B. $\neg$r $\Rightarrow$s, r $\vdash \neg$s is invalid argument
C. $\neg$r $\Leftrightarrow$s, r $\vdash \neg$s is valid argument
D. $\neg$r $\Leftrightarrow$s, r $\vdash \neg$s is invalid argument

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123. As show in the table below. A measurement is grouped in to five class intervals with frequency distributive.

Class interval	45-55	55-65	65-75	75-85	85-95
Frequency	26	38	33	16	7

What are the 1st quartile Q_1 and the 75th percentile $p_{75\ of}$ the measurement?

A. Q_1=30.50 P_{75}=90.50 B.Q_1= 30.50 P_{75}=72.88 C. Q_1= 56.05 P_{75}=90.50 D. Q_1=56.05 P_{75}=72.88

124. Let x and y be real numbers. Which of the following statements is not true?

A. $(\forall y)(\exists x)(x^2-y=0)$ C. $(\exists x)(\exists y)(x+1>y^2)$

B. $(\exists x)(\exists y)(x+1<y^2)$ D. $(\forall x)(\exists y)(y^3-x^2+1=0)$

125. Given $f'(x)=3^x+\sin x$ and $f(0)=2$, then f(x) is given by:

A. $3^x \ln 3 + \cos x$ C. $3^x \ln 3 - \cos x + 3-1/\ln 3$

B. $\frac{3x}{\ln 3} - \cos x + 3-1/\ln 3$ D. $\frac{3x}{\ln 3} - \cos x - 3 + 1/\ln 3$

126. Given $xy^2-x^2y=4$, then which one is the rate of change of x with respect to y?

A. $\frac{x^2-2xy}{y^2-2xy}$ C. $\frac{y^2-2xy}{x^2-2xy}$

B. $\frac{x^2-2xy}{y^2}$ D. $\frac{y^2-xy}{x^2-xy}$

127. A closed box with a square base is to contain 252 cubic feet. The bottom costs Birr 5 per a square foot, the top costs Birr 2 per square foot and the sides cost Birr 3 per square foot. What are the dimensions that will minimize the cost in feet?

A. $s=6, h=7.$ B. $s=6, h=6.$ C. $s=5, h=8$ D. $s=4, h=7$

128. The total cost (in Birr) of producing x radio sets per day is given by the expression $\frac{1}{4}x^2+35x+25$ and the price per set at which they may be sold is given by $50-\frac{1}{2}x$. What should be the daily output to obtain the maximum total profit?

A. 50 sets per day B. 23sets per day C. 10 sets per day D. 7 sets per day

129. A 5 foot girl is walking toward a 20foot lamppost at the rate of 6feet per second. How fast is the tip of her shadow moving toward the base of the post?

A. 8 feet per second. B. 6 feet per second.

C.5$feet\ per\ second$. D.10 $feet\ per\ second$.

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130. Let $F(x) = f(3x+1)g(cosx), such\ that\ f(1) = -2, g(1) = 3,$ $f'(1) = \frac{1}{4}\ and\ F(x) = \frac{1}{2}$, then which one of the following is equal to F'(0)

A. 0 B. $\frac{9}{4}$ C. $\frac{-33}{4}$ D. $\frac{-11}{4}$

131. What is the value of m so that $\vec{a} = 2i + mj + k$ and $\vec{b} = 4i - 2j - 2k$ are perpendicular?

A. -3 *B.* 3 C. 5 D.-5

132. If $\vec{a} = i + 2j - 3k$and $\vec{b} = 3i - j + 2k$, then what is the angle between the vectors$\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$

A. 30^0 B. 60^0 *C.* 90^0 D.0^0

133. If$|\vec{a}| = 2, |\vec{b}| = 5$ and the angle between $\vec{a}$ and $\vec{b}$is $\frac{\pi}{3}$, then $|2\vec{a} - \vec{b}|$ is

A. 21 *B.*$\sqrt{21}$ C. 41 D.$\sqrt{41}$

134. The vector form of equation of a line passing through the points $(2,-1)\ and\ (3,2)$is

A. $(x,y) = (2,-1) + \lambda(3,1)$ B.$(x,y) = (3,2) + \lambda(-3,-1)$

B. $(x,y) = (2,-1) + \lambda(-3,-1)$ *D.* $(x,y) = (3,2) + \lambda(-1,-3)$

135. The equation of tangent line to the circle $x^2 + y^2 - x + y = 6$ at $(1,-3)$is:

A. $\frac{1}{2}(x-1) - \frac{5}{2}(y+3) = 0$ B.$\frac{1}{2}(x-1) + \frac{5}{2}(y+3) = 0$

C.$\frac{1}{2}(x+1) - \frac{5}{2}(y+3) = 0$ D. $\frac{1}{2}(x+1) - \frac{5}{2}(y-3) = 0$

136. If a translation T takes the point $(2,-5)\ to\ (-2,1)$, then the image of $(-3,2)$ under translation T is

A. $(-7,8)$ B.$(-1,-4)$ C.$(-1,4)$ D.$(7,-8)$

137. The image of the curve$x^2 + 2y^2 - 8x + 3y = 6$, when it is translated by the vector T$(-2,1)$ is A.$(x-2)^2 + 2(y+1)^2 - 8(x-2) + 3(y+1) = 6$

B. $(x+2)^2 + 2(y-1)^2 - 8(x+2) + 3(y-1) = 6$

C.$x^2 + 2y^2 - 8x + 3y = 6$

D.$(x+2)^2 - 2(y-1)^2 + 8(x+2) - 3(y-1) = 6$

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138. The image of the curve $x^2 + y^2 + 6x - 4y + 9 = 0$ under reflection by the line $y = x$ is:

A. $(x+3)^2 + (y-2)^2 = 4$ B.$(x-3)^2 + (y+2)^2 = 4$

C.$(x+2)^2 + (y-3)^2 = 4$ $D.\ (x-2)^2 + (y+3)^2 = 4$

139. The image of the line $y = \frac{2x}{3} + 1$under reflection by the line$2y = -3x + 4$ is:

A.$2y = -3x + 4$ B.$3y = 2x + 1$ $C.\ 3y = 2x + 3$ D.$2y = -3x + 1$

140. The image of the point $(0,2)$ when it is rotated through 90^0 about the origin is:

$A.\ (-2,0)$ B.$(0,-2)$ C.$(2,0)$ D.$(0,2)$

141. The image of the circle$(x-3)^2 + (y+5)^2 = 1$, when it is rotated through $\frac{-\pi}{2}$ about $(1,2)$ is:

$A.\ (x+6)^2 + y^2 = 1$ B.$x^2 + (y+6)^2 = 1$

C.$(x-6)^2 + y^2 = 1$ D.$x^2 + (y-6)^2 = 1$

142. If $f(x) = 3 - \frac{1}{2}\cos(\frac{2\pi x}{3} - \frac{5\pi}{7})$, then the amplitude and period of the graph of $f(x)$ respectively are

A.$3, \frac{7\pi}{5}$ $B.\ \frac{1}{2}, 3$ C.$\frac{1}{2}, \frac{3\pi}{2}$ D.$3, 5$

143. If $\theta = arc\cos(\frac{1}{2})$, then what is the value of $\tan\theta$

A. $\frac{1}{\sqrt{3}}$ $B.\ \sqrt{3}$ C.$\frac{\sqrt{3}}{2}$ D.1

144. In the interval $[0,2\pi]$ the solution set of $\cos^2 x + \sin x \cos x = 1$

$A.\left\{0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}\right\}$ B.$\{0, \pi\}$

C.$\left\{0, \frac{\pi}{4}, \frac{5\pi}{4}\right\}$ D. $\left\{0, \frac{\pi}{4}\right\}$

145. The expression $\frac{\cos A}{1+\sin A} + \frac{\cos A}{1-\sin A}$ is equal to

A.$2\csc A$ $B.\ 2\sec A$ C.$2\cos A$ D.$2\sin A$

146. $\sin(75^0)$ is equal to

$A.\frac{\sqrt{6}+\sqrt{2}}{4}$ B. $\frac{\sqrt{6}-\sqrt{2}}{4}$ C.$\frac{\sqrt{6}+\sqrt{2}}{2}$ D.$\frac{\sqrt{6}-\sqrt{2}}{2}$

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147. A patrol that on a sea sailed from its station 10km to south and then changed its course and sailed $5+\sqrt{6}km$in the direction N60^0E. Then, what distance the boat should travel in order to return to its station by the shortest route?

A.$4\sqrt{6}km$ *B*.$9km$ C.$3\sqrt{6}km$ D. $7km$

148. If $\sin\theta+\csc\theta=2$, then $\sin^2\theta+\csc^2\theta=$

A.1 *B*. 2 C. 3 D. 4

149. In a ΔABC, $a=4, b=3$ and $A=60°$, then c is equal to the root of the equation

A. $c^2-3c-7=0$ B. $c^2-3c+7=0$

C. $c^2+3c+7=0$ D. $c^2+3c-7=0$

150. If $\sin x+\sin^2\theta=1$, then $\cos^8 x+2\cos^6 x+\cos^4 x$ is equal to

A.0 *B*. 2 C. -1 *D*. 1

Please Try To Cope Up With All The Questions Until Covid-19 Pandemic Settled.

I Think You Are Working The Best At Your Home!

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