1. The maximum value of xe^{-x} is

$a)\frac{-1}{e}$

$b)\ e$

$c)\frac{1}{e}$

$d)-e$

2. If [x] is the greatest integer function not greater than x, then $\int_0^{11}[x]dx$ is equal to

a) 55 b) 45

c)66 d)35.

3. If $x-1$ is a factor of $x^5-4x^3+2x^2-3x+k=0$, then k is

a) 3 b) 4

c) -4 d)2.

4. If one of the slopes of the pair of the lines $ax^2+2hxy+by^2=0$ is n times the other, then

$a)4ab=(n+1)^2h$

$b)4(n+1)^2ab=nab$

$c)4h^2=(n+1)^2ab$

$d)4nh^2=(n+1)^2ab$

5. Inverse of a diagonal non singular matrix is

a) Diagonal matrix b) Scalar matrix

c) Skew symmetric matrix d) zero matrix.

6. $2\cos^{-1}x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is valid for all values of x satisfying .

$a) 0 \le x \le \frac{1}{\sqrt{2}}$

$b) -1 \le x \le 1$

$c) 0 \le x \le 1$

$d) \frac{1}{\sqrt{2}} \le x \le 1$

7. If the conjugate of $(x+iy)(1-2i)$ *is* $1+i$ *then*

$a)\ x = \frac{-1}{5}$

$b) x - iy = \frac{1+i}{1-2i}$

$c) x + iy = \frac{1-i}{1-2i}$

$d)\ x = \frac{1}{5}$

8. The value of $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin^3 x}{\sin^3 x + \cos^3 x}\, dx$ is

$a) \frac{\pi}{6}$

$b) \frac{\pi}{2}$

$c) \frac{\pi}{3}$

$d) \frac{\pi}{12}$

9. The value of $\frac{\sin 70^0 + \cos 40^0}{\cos 70^0 + \sin 40^0}$ is

$a) 1$

$b) \frac{1}{\sqrt{3}}$

$c) \sqrt{3}$

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

10. The perimeter of a sector is a constant .If its area is to be maximum, then the sectorial angle is

$a) 2^c$

$b) \frac{\pi^c}{6}$

$c) \frac{\pi^c}{4}$

$d) 4^c$

11. If $(24,92) = 24m + 92n$ then m,n is

$a) (-4,3)$

$b) (-1,4)$

$c) (4,-1)$

$d) (4,-3)$

12. If $\alpha \; and \; \beta$ are different complex numbers with $|\beta| = 1, then \begin{vmatrix} \beta - \alpha \\ 1 - \overline{\alpha}\beta \end{vmatrix}$ is equal to

$a) 2$

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

$c) 1$

$d) \frac{1}{3}$

13. If A and B are square matrices of order n such that $A^2 - B^2 = (A-B)(A+B)$, then which of the following is true

a) Either A or B is zero matrix b) A=B

c) AB=BA d) Either A or B is identity matrix.

14. If the matrix $\begin{bmatrix} 2 & 3 \\ 5 & -1 \end{bmatrix}$=A+B, where A is symmetric and B is skew symmetric ,then B is

a) $\begin{bmatrix} 2 & 4 \\ 4 & -1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix}$

c) $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$.

15. If $\vec{a} \perp \vec{b}$ and $\left(\vec{a}+\vec{b}\right) \perp \left(\vec{a}+m\vec{b}\right)$ then m=

a) -1 b) 1

c) $-\frac{\left|\vec{a}\right|^2}{\left|\vec{b}\right|^2}$ d) 0

16. The area of the circle having its centre at (3,4) and touching the line 5x+12y-11=0 is

a) 16 Π sq units b) 4 Π sq units

c) 12 Π d) 25 Π sq units.

17. The modulus and amplitude of $\frac{1+2i}{1-(1-i)^2}$

a) $\sqrt{2}\ and\ \frac{\Pi}{6}$ b) 1 and $\frac{\pi}{4}$

c) 1 and 0 d) 1 and $\frac{\pi}{3}$.

18. The maximum area of a rectangle that can be inscribed in a circle of radius 2 units is

a) 8Π sq units b) 4 sq units

c) 5 sq units d) 8 sq units.

19. $\int \frac{(x-1)e^x}{(x+1)^3} dx =$

a) $\frac{e^x}{x+1}+c$ b) $\frac{e^x}{(x+1)^2}+c$

c) $\frac{e^x}{(x+1)^3}+c$ d) $\frac{xe^x}{x+1}+c$

20. The value of $\int_{-1}^{2} \frac{|x|}{x} dx$ is

a) 0 b)1 c) 2 d) 3

21.The inverse of the preposition $(p \wedge \sim q) \rightarrow r$ is

a) $(\sim r) \rightarrow (\sim p) \vee q$

b) $(\sim p) \vee q \rightarrow (\sim r)$

c) $r \rightarrow p \wedge (\sim q)$

d) $(\sim p) \vee (\sim q) \rightarrow r$.

22. In a triangle ABC, if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and a=2 then its area is

$a) 2\sqrt{3}$

$b) \sqrt{3}$

$c) \frac{\sqrt{3}}{2}$

$d) \frac{\sqrt{3}}{4}$

23. A value of x satisfying $150x \equiv 35 (\mathrm{mod}\, 31)$ is

a) 14 b) 22

c) 24 d) 12.

24. Which one of the following is not correct for the features of exponential function given by $f(x) = b^x$ where b>1?

a) For very large negative values of x, the function is very close to zero.

b) The domain of the function is R, the set of real numbers

c) The point (1,0) is always on the graph of the function .

d) The range of the function is the set of all positive real numbers.

25. The value of the integral $\int_{\frac{-\pi}{4}}^{\frac{\pi}{4}} \log(\sec\theta - \tan\theta) d\theta$ is

a) 0

$b)\frac{\pi}{4}$

$c)\pi$

$d)\frac{\pi}{2}$

26. The domain of the function $f(x)=\sqrt{\cos x}$ is

$a)\left[\frac{3\pi}{2},2\pi\right]$

$b)\left[0,\frac{\pi}{2}\right]$

$c)\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$

$d)\left[0,\frac{\pi}{2}\right]\bigcup\left[\frac{3\pi}{2},2\pi\right]$

27. Consider the following statement

i) If any two rows or columns of a determinant are identical, then the value of the determinant Is zero.

ii) If the corresponding rows and columns of a determinant are interchanged, then the value of the determinant does not change.

iii) If any two rows of a determinant are interchanged ,then the value of the determinant changes.

Which of these are correct?

a) i and iii b) I and ii

c) i, ii, iii d) ii and iii.

28. If a, b ,c are in arithmetic progression then the value of $\begin{vmatrix} x+2 & x+3 & x+a \\ x+4 & x+5 & x+b \\ x+6 & x+7 & x+c \end{vmatrix}$ *is*

a) 0 b) x-(a+b+c)

c) a+b+c d) 9 x^2 +a+b+c.

29. A stone is dropped into a quiet lake and waves move in circle at the speed of 5 cm/sec. At that instant, when the radius of a circular wave is 8 cm. How fast is the enclosed area increasing?

a) 6 Π cm^2/s b) 8 Π cm^2/s

c) $\frac{8}{3} cm^2 / s$ d) 80 Π cm^2 / s .

30. Area of the region bounded by two parabolas $y = x^2$ and $x = y^2$ is

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

c) 4 d) 3.

31) The line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ is parallel to the plane

a) 2 x +3 y +4 z =0

b) 3 x +4 y +5 z =7

c) 2 x + y -2 z =0

d) $x + y + z$ =2

32) Two dices are thrown simultaneously. The probability of obtaining a total score of 5 is

a) 1/9 b) 1/18

c) 1/36 d) 1/12

33) If $\vec{a}$ & $\vec{b}$ are two unit vectors inclined at an angle $\pi/3$ then the value of $\left|\vec{a} + \vec{b}\right|$ is

a) equal to 1 b) greater than 1

c) equal to 0 d) less than 1

34) If $\tan x = \frac{3}{4}, \pi < x < \frac{3\pi}{2}$, then the value of cos $x/2$ is

a) -1/ $\sqrt{10}$ b) 3/ $\sqrt{10}$

c) 1/ $\sqrt{10}$ d) -3/ $\sqrt{10}$.

35) How many 5 digits telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once

a) 335 b) 336

c) 338 d) 337

36) If 21st and 22nd terms in the expansion of $(1+x)^{44}$ are equal ,then x is equal to

a) 8/7 b) 21/22

c) 7/8 d) 23/24

37) The area of the triangle formed by line joining the vertex of the parabola $x^2=12y$ to the end of latus rectum is

a) 20 sq units b) 18 sq units

c) 17 sq units d) 19 sq units

38) The mean division from means of the data 3,10,10,4,7,10,5,is

a) 2 b) 2.57

c) 3 d) 3.75

39) The probability distribution of x is

x	0	1	2	3
P(x)	0.2	K	K	2k

Find the value of k

a) 0.3 b) 0.1

c) 0.2 d) 0.4

40) The value of $\tan(1^0)+\tan(89^0)$ is …….

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

c) $\frac{1}{\sin(1^0)}$ d) $\frac{2}{\sin(1^0)}$

41) The function f(x)=[x] where [x] denotes greatest integer function is continuous at ….

a) -2 b) 1.5

c) 4 d) 1

42) If two dice are thrown simultaneously then the probability that the sum of the number which comes up on the dice to be more than 5 is ……..

a) 1/16 b) 13/18

c) 5/36 d) 5/18

43) If 4n $\alpha = \pi$ then the value of tan α .tan 2 α . tan 3 α . tan 4 α ……tan(2n-2) α tan(2n-1) α is

a) 0 b) 1

c) -1 d) None of these

44) Between two junction stations A & B there are 12 intermediate stations the number of ways in which a train can be made to stop at 4 of these stations so that no two of these waiting stations are consecutive is

a) 8_{C_4} b) 9_{C_4}

c) $12_{C_4} - 4$ d) none of these

45) If in a triangle ABC , $\frac{a^2 - b^2}{a^2 + b^2} = \frac{\sin(A-B)}{\sin(A+B)}$,

a) right angled (or) isosceles

b) right angled and isosceles

c) equilateral

d) none of these

46) If $|k| = 5$ and $0^0 \le \theta \le 360^0$,then the no. of differential solutions of

3cos θ +4sin θ =k is

a) 0 b) 2

c) 1 d) ∞

47) The minimum value of $\left[1 + \frac{1}{\sin^n \alpha}\right]\left[1 + \frac{1}{\cos^n \alpha}\right]$ is

a) 1 b) 2

c) $(1+2^{n/2})$ d) none of these

48) The change of an event happening is the square of the chance of a second event but the odds against the first are the cube of the odds against the second. the chance of events are

a) $\frac{1}{9}, \frac{1}{3}$ b) $\frac{1}{16}, \frac{1}{4}$

c) $\frac{1}{4},\frac{1}{2}$ d)none of these.

49) The locus of the chords of contact perpendicular tangents to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ touch another fixed ellipse is a/an

a) circle b) straight line

c) ellipse d) hyperbola

50) The domain of the function f(x)= $\frac{\sqrt{9-x^2}}{\sin^{-1}(3-x)}$ *is*

a) (2,3) b) [2 3)

c) (2,3] d)none of these

51) $\int \frac{2a\sin x+b\sin 2x}{(b+a\cos x)^3}dx$ is equal to

(where t=(b+acosx)

a) $\frac{1}{a^2}\frac{(a^2-b^2)}{t^2}+\frac{2b}{a^2t}+c$

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

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

d) $\frac{2}{a^2}\frac{(a^2-b^2)}{t^3}+\frac{2b}{a^2t}+c$

52) A straight line 'L' cuts the lines AB,AC,&AD of a parallelogram ABCD at points B,C and D respectively. if $\vec{AB_1}=\lambda_1\vec{AB}$, $\vec{AD_1}=\lambda_2\vec{AD}$ and $\vec{AC_1}=\lambda_3\vec{AC}$,then $\frac{1}{\lambda_3}$ is equal to

a) $\frac{1}{\lambda_1}+\frac{1}{\lambda_2}$ b) $\frac{1}{\lambda_1}-\frac{1}{\lambda_2}$

c) $-\lambda_1+\lambda_2$ d) $\lambda_1+\lambda_2$

53) The sum of 20 terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + ...$ is

A) 4410 B) 4210

C) 4120 D) 4040

54) The set of values θ which satisfy the equation $\cos 2\theta = \sin\theta + \cos\theta$ is

a) $\theta = n\pi + \frac{\pi}{2}$, $n \in z$ b) $\theta = 2n\pi$ (or) $\frac{\pi}{4}$, $n \in z$

c) $\theta = 0$ d) $\theta = 2n\pi$ (or) $2n\pi - \frac{\pi}{2}$ $n \in z$

55) When $32^{(32)^{(32)}}$ is divided by 7,then the remainder is

a) 2 b) 8

c) 4 d) none of these

56) Six papers are set in an examination 2 of them in mathematics, the number of ways the paper can be arranged provided the 2 mathematics papers are not successive is

a) 480 b) 440

c) 460 d) 420

57) Four students of class IV ,5 students of class V and 6 students of class VI sit in a row, the number of ways they can sit in a row so that the students belonging to some class are together is

a) 4!5!6! b) $\frac{15!}{4!5!6!}$

c) $\frac{15!}{3!4!5!6!}$ d) 3!4!5!6!

58) Let a=$\cos\alpha + \cos\beta - \cos(\alpha + \beta)$ and b= $4\sin\frac{\alpha}{2}\sin\frac{\beta}{2} - \cos\left(\frac{\alpha+\beta}{2}\right)$ .then value of a-b is

a) 0 b) 1

c) -1 d) none of these

59) If A=$\begin{bmatrix} a & b & c \\ x & y & z \\ p & q & r \end{bmatrix}$ and B=$\begin{bmatrix} q & -b & y \\ -p & a & -x \\ r & c & z \end{bmatrix}$ then

a) $|A| = |B|$ b) $|A| = -|B|$

c) $|A| = 2|B|$ d)none of these

60)If the difference of two unit vectors is again a unit vector. Then the angle between them is

a) 30^0 b) 40^0

c) 60^0 d) 90^0

Answers mathematics- red

1. c 2.a 3.b 4.d 5.a 6.d 7.c 8.d 9.c 10.a 11.c 12.c 13.c 14.d 15.c 16.a

17. c 18.d 19.b 20.b 21.b 22.b 23.c 24.c 25.a 26.d 27.c 28.a 29.d 30.b 31.c 32.a

33. b 34.a 35.b 36.c 37.b 38.b 39.c 40.a 41.b 42.b 43.b 44.b 45.a 46.b 47.c

48 .a 49.c 50.b 51.a 52.a 53.a 54.d 55.c 56.a 57.d 58.b 59.b 60.c