GGSIPU mathmatics 2010

1. If $| z_1 - 1 | < 1$, $| z_2 - 2 | < 2$, $| z_3 - 3 | < 3$, then $| z_1+z_2+z_3 |$

   a is less than 6

   b is more than 3

   c is less than 12

   d lies between 6 and 12

2. If z_1 and z_2 are two complex numbers such that $| z_1 | = | z_2 | + | z_1 - z_2 |$, then

   a $\text{Im}\left(\frac{z_1}{z_2}\right) = 0$

   b $\text{Re}\left(\frac{z_1}{z_2}\right) = 0$

   c $\text{Re}\left(\frac{z_1}{z_2}\right) = \text{Im}\left(\frac{z_1}{z_2}\right)$

   d None of the above

3. The largest term common to the sequences 1,11,21,31, .. to 100 terms and 31,36,41,46 … to 100 terms is

   a 381 b 471

   c 281 d None of these

4. If the roots of $a_1x^2 + b_1x + c_1 = 0$ are α_1,β_1 and those of $a_2x^2 + b_2x + c_2 = 0$ are α_2,β_2 such that $\alpha_1\beta_1 = 1 = \beta_2\beta_2$, then

   a $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

   b $\frac{a_1}{c_2} = \frac{b_1}{b_2} = \frac{c_1}{a_2}$

   c $a_1a_2 = b_1b_2 = c_1c_2$

   d None of the above

5. The number of real roots of $x+3\ ^4+x+5\ ^4 = 16$ is

   a 0 b 2

   c 4 d None of these

6. The number of six digits numbers that can be formed from the digits 1,2,3,4,5,6 and 7.So,that digit do not repeat and the terminals digits are even, is

a 144 b 72

c 288 d 720

7. The value of the expression

$^{K-1}C_{K-1} + {}^{K}C_{K-1} + \ldots + {}^{n+k-2}C_{K-1}$ is

a $^{n+k-1}C_{K-1}$ b $^{n+k-1}C_{K}$

c $^{n+k}C_{K}$ d None of these

8. The system of equations

X+2y+3z = 4

2x+3y+4z = 5

3x+4y+5z = 6 has

a many solutions b no solution

c unique solution d None of these

9. A skew symmetric matrix S satisfies the relation $S^2 + I = 0$, where I is a unit matrix, then SS' is equal to

a I b 2 I

c - I d None of these

10. A die is rolled so that the probability of face I is proportional to I,i= 1,2,…,6. The probability of an even number occurring when the die is rolled, is

a $\frac{7}{4}$ b $\frac{4}{7}$

(c) $\frac{5}{7}$ (d None of these

11. If $\tan^{-1}\left(\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right) = \alpha$, then x^2 is equal to

a sin 2 α b sin α

b cos 2 α d cos α

12. $\tan\left(\frac{\pi}{4}+\frac{1}{2}cos^{-1}\frac{a}{b}\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}cos^{-1}\frac{a}{b}\right)$ is equal to

a $\frac{2a}{b}$ b $\frac{a}{b}$

c $\frac{b}{a}$ c $\frac{2b}{a}$

13. In a $\triangle$ABC, A:B:C = 3:5:4, then a+b+c$\sqrt{2}$ is equal to

a 2b b 2c

c 3b d 3a a

14. The set of values of x for which $\frac{\tan 3x-\tan 2x}{1+\tan 3x\ \tan 2x}=1$ is

a ϕ b $\left\{\frac{\pi}{4}\right\}$

c $\left\{n\pi+\frac{\pi}{4}, n=1,2,3,..\right\}$

d $\left\{2n\pi+\frac{\pi}{4}, n=1,2,3,...\right\}$

15. Which of the two 3x-4y+4 = 0 and 3x-3y+12 = 0 is nearer to origin?

a 4x -3y+12=0 b 3x -3y+12 = 0

c 3x -4y+4 = 0 d None of these

16. If the equal sides AB and AC each equal to a of a right angled isosceles $\triangle$ABC be produced to P and Q so that BP.CQ = AB^2, then the line PQ always passes through the fixed ppoint

a a,0 b 0,a

c a,a d None of these

17. ABC is a variable triangle with yhe fixed vertex C1,2 and A,B having the coordinates cos t,sin t, sin t, -cos t respectively where t is a parameter the locus of the centroid of the $\triangle$ABC is

a $3x^2+y^2-2x-4y-1 = 0$

b $3x^2+y^2-2x-4y-1 = 0$

c $3x^2+y^2+2x+4y-1 = 0$

d $3x^2+y^2+2x+4y+1 = 0$

18. A variable circle having fixed radius ‘a’, passes through origin and meets the coordinates axes in point A and B. Locus of centroid of $\triangle$OAB, O being the origin,is

a 9 $x^2+y^2 = 4a^2$ b 9x $^2+y^2= a^2$

b 9x $^2+y^2 = 2a^2$ d 9x $^2+y^2 = 8a^2$

19. The condition that the straight line $cx-by+b^2= 0$ may touch the circle $x^2+y^2=ax+by$, is

a abc=1 b a=c

c b=ac d None of these

20. If two circles x -1 ^{2} + y -3 ^{2} = r^2 and $x^2+y^2-8x+2y+8 = 0$ intersect in two distinct points, then

a 2<r<8 b r<2

c r=2 d r>2

21. The number of distinct normals that can be drawn from -2,1 to the parabola y ^{2}-4x-2y-3 = 0,is

a 1 b 2 c 3 d 0

22. The parabola $y^2 = \lambda x$ and 25[x -3 ^{2}+y -2 ^{2}] = 3x -4y-2 ^{2} are equal, if λ is equal to

a 1 b 2 c 3 d 6

23. The eccentricity of an elipse whose pair of a conjugate diameter are y=x and 3y=-2x is

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

b $\frac{1}{3}$ d) None of these

24. If the foci of the ellipse $\frac{x^2}{144}$ - $\frac{y^2}{81}$ = $\frac{1}{25}$ coincide, then the value of b is

a 18 b -16

c 16 d - 18

25. The number of vectors of unit length perpendicular to the vectors $\vec{a} = \hat{\imath} + \hat{\jmath}$

And $\vec{b} = \hat{\jmath} + \hat{k}$, is

a -1 b 2

(c) 4 (d) Infinite

26. If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$, $\vec{b}$ =4 $\hat{\imath}$ +3 $\hat{\jmath}$ + 4$\hat{k}$ and $\vec{c} = \hat{\imath} +\alpha \hat{\jmath} +\beta \hat{k}$ are linearly dependent vectors and $|\vec{c}|$ = $\sqrt{3}$, then

a $\alpha = 1, \beta=-1$ b $\alpha = 1, \beta=\pm1$

(b) $\alpha = \pm 1, \beta = \pm 1$ (d) $\alpha = \pm 1, \beta = 1$

27. Let the pairs $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ each determines a plane, then the planes are parallel, if

a $(\vec{a} \times \vec{c}) \times (\vec{b} \times \vec{d}) = \vec{0}$

b $(\vec{a} \times \vec{c}) \cdot (\vec{b} \times \vec{d}) = 0$

c $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = \vec{0}$

d $(\vec{a} \times \vec{b}) \cdot (\vec{c} \times \vec{d}) = \vec{0}$

28. The equation of the plane perpendicular to the yz-plane and passing through the point 1, -2,4 and 3, -4,5 is

a y+2z = 5 b 2y+z = 5

(c) y+2z = 6 d 2y+z=6

29. If the planes $\vec{r} \cdot (2\hat{i} + \lambda\hat{j} - 3\hat{k}) = 0$ and $\vec{r} \cdot (\lambda\hat{i} + 3\hat{j} + \hat{k}) = 5$ are perpendicular, then λ is equal to

a 2 b -2

c 3 d -3

30. The sine of the angle between the straight line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ and the plane 2x-2y+z = 5 is

a $\frac{10}{6\sqrt{5}}$ b $\frac{4}{5\sqrt{2}}$

c $\frac{\sqrt{2}}{10}$ d $\frac{2\sqrt{3}}{5}$

31. If $y = \cos^{-1}\sqrt{\frac{\sqrt{1+x^2}+1}{2\sqrt{1+x^2}}}$, then $\frac{dy}{dx}$ is equal to

a $\frac{1}{1+x^2}$ b $\frac{1}{1-x^2}$

(c) $\frac{1}{2(1+x^2)}$ (d) None of these

32. The value of $\lim_{x\to\infty}[\sqrt{x+\sqrt{x+\sqrt{x}}} - \sqrt{x}]$ is

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

c 0 d None of these

33. The values of a,b and c which make the function f(x = $\begin{cases} \frac{\sin(a+1)x+\sin x}{x}, & x < 0 \\ c, & x = 0 \\ \frac{\sqrt{x+bx^2}-\sqrt{x}}{bx^{3/2}}, & x > 0 \end{cases}$

Continuous at x =0, are

a a = $-\frac{3}{2}$, c = $\frac{1}{2}$, b= 0

b a =$\frac{3}{2}$, c = $\frac{1}{2}$, b$\neq$ 0

c a = $-\frac{3}{2}$, c = $\frac{1}{2}$, b$\neq$ 0

d None of the above

34. If the slope of the curve y = $\frac{ax}{b-x}$ at the point 1,1 is 2, then the values of a and b are respectively

a 1, -2 b -1,2

b 1,2 d None of these

35. The sum of intercepts of the tangent to the curve $\sqrt{x}+\sqrt{y}=\sqrt{a}$ upon the coordinates axes is

a 2a b a

c:) $2\sqrt{2}$a d None of these

36. The function f(x = $\frac{\sin x}{x}$ is decreasing in the interval

a $\left(-\frac{\pi}{2},0\right)$ b $\left(\frac{\pi}{2},0\right)$

c $\left(-\frac{\pi}{4},0\right)$ d None of these

37. The set of points where the function f(x = $|x-2|$ cos x is differentiable,is

a - ∞, ∞ b - ∞, ∞ - $\{2\}$

c 0, ∞ d None of these

38. The domain of the function

fx = sin $^{-1}\left\{log_2\left(\frac{1}{2}x^2\right)\right\}$ is

a [-2,-1] ∪ [1,2] b -2,-1] ∪ [1,2]

c [-2,-1] ∪ [1,2] d -2,-1 ∪ 1,2

39. If f is an even function and g is an odd function, then the function fog is

a an even function function

b an odd function

c neither even nor odd

d a periodic function

40. $\int sec^n x \tan x \, dx$ is equal to

a $\frac{sec^n x}{n} + c$ b $\frac{sec^2 x}{n} + c$

c $\frac{\tan x}{n} + c$ d $\frac{sec^n x \tan x}{n} + c$

41. $\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}$ dx is equal to

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

c $\frac{\pi}{12}$ d None of these

42. The area enclosed by | x| +$_1$1| y| = 1 is

a 2 2q unit b 3 sq unit

c $\frac{1}{2}$ sq unit d $\sqrt{2}$ sq unit

43. Maximum value of z = 3x+4y subject to x-y ≤ -1, -x+y ≤ 0, x,y ≥ 0 is given by

a 1 b 4

c 6 d None of these

44. The constraints

$-x_1+x_2 \leq 1$

$-x_1+3x_2 \leq 9$

$X_1, x_2 \geq 0$ defines on

a Bounded feasible space
b Unbounded feasible space
c Both bounded and unbounded feasible space
d None of the above

45. If a variate takes values $a, ar, ar^2, \ldots, ar^{n-1}$ which of the relation between means hold?

a AH = G^2 b $\frac{A+H}{2}$ =G

b A>G>H d A=G=H

46. If for n=4 the approximate value of integral $\int_1^9 x^2dx$ by trapezoidal rule is $2[\frac{1}{2}1+9^2 + \alpha^2+\beta^2+7^2]$, then

a $\alpha = 1, \beta = 3$ b $\alpha = 2, \beta = 4$

c $\alpha = 3, \beta = 5$ d $\alpha = 4, \beta = 6$

47. The value of

$2\cos\frac{\pi}{13}.\ \mathrm{Cos}\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13}$ is equal to

a 2 b 0

c 1 d 3

48. The angle of elevation of the top of a vertical tower from two points at distances a and b a>b from the base and in the same line with it, are complementary. If θ is the angle subtended at the top of the tower by the line joining these points, then sin θ is equal to

a $\frac{a+b}{a-b}$ b $\frac{a-b}{a+b}$

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

49. The probability that out of 10 persons, all born in April, at least two have the same birthday is

a $\frac{{}^3c_{10}}{30)^{10}}$ b $1 - \frac{{}^3c_{10}}{30!}$

c $\frac{30^{10} - {}^3c_{10}}{30^{10}}$ d None of the above

50. There are n-persons sitting in a row. Two of them are selected at random.The probability that two selected persons are not together,is

a $\frac{2}{n}$ (b $1 - \frac{2}{n}$

c $\frac{n(n-1)}{n+1)(n+2)}$ d None of these