1. If * is the operation defined by $a*b = a^b$ for $a, b \in N$, then $(2 * 3) * 2$ is equal to
(A) 81 (B) 512 (C) 216 (D) 64 (E) 243
ANSWER : D

2. The domain of the function $f(x) = \begin{Bmatrix} (x^2-9)/(x-3), \text{if } x \neq 3 \\ 6, \quad \text{if } x = 3 \end{Bmatrix}$ is
(A) (0, 3) (B) $(-\infty, 3)$ (C) $(-\infty,\infty)$ (D) $(3, \infty)$ (E) (-3, 3)
ANSWER : C

3. Let $f(x) = x^3$ and $g(x) = 3^x$. The values of a such that $g(f(a)) = f(g(a))$ are
(A) 0, 2 (B) 1, 3 (C) 0, ±3 (D) 1, ±2 (E) 0, $\pm\sqrt{3}$
ANSWER : E

4. If, $f\left(\frac{x+1}{2x-1}\right) = 2x$, x∈ N, then the value of is equal to f (2) is equal to
(A) 1 (B) 4 (C) 3 (D) 2 (E) 5
ANSWER : D

5. If A\B = {a, b}, B\A = {c, d} and A∩B = {e, f}, then the set B is equal to
(A) {a, b, c, d} (B) {e, f, c, d} (C) {a, b, e, f}
(D) {c, d, a, e} (E) {d, e, a, b}
ANSWER : B

6. The function f : A →B is given by f (x) = x, x ∈A, is one to one but not onto. Then
(A) $B \subset A$ (B) A = B (C) $A' \subset B'$ (D) $A \subset B$ (E) $A \cap B = \phi$
ANSWER : D

7. The principal argument of the complex number $z = \dfrac{1+\sin\frac{\pi}{3} + i\cos\frac{\pi}{3}}{1+\sin\frac{\pi}{3} - i\cos\frac{\pi}{3}}$ is
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{2\pi}{3}$ (D) $\frac{\pi}{2}$ (E) $\frac{\pi}{4}$
ANSWER : B

8. If $\dfrac{(1+i)(2+3i)(3-4i)}{(2-3i)(1-i)(3+4i)} = a + ib$, then $a^2 + b^2 =$
(A) 132 (B) 25 (C) 144 (D) 128 (E) 1
ANSWER : E

9. Let z, w be two nonzero complex numbers. If $\overline{z+iw} = 0$ and arg (zw) = π, then arg Z =
(A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$ (E) $\frac{\pi}{8}$
ANSWER : C

10. If $z = \frac{2-i}{i}$, then Re(z^2) + Im(z^2) is equal to

(A) 1 (B) -1 (C) 2 (D) -2 (E) 3

ANSWER : A

11. If $|z+1| < |z-1|$, then z lies

(A) On the x-axis (B) On the y-axis (C) In the region x < 0
(D) In the region y > 0 (E) In the region x > y

ANSWER : C

12. If $\left|z - \frac{3}{z}\right| = 2$, then the greatest value of $|z|$ is

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

ANSWER : C

13. If the roots of the quadratic equation $mx^2 - nx + k = 0$ are tan 33^0 and tan 12^0 then the value of $\frac{2m+n+k}{m}$ is equal to

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

ANSWER : D

14. If α and β are the roots of 4x2 + 2x + 1 = 0, then β =

(A) $-\frac{1}{4\alpha}$ (B) $-\frac{1}{2\alpha}$ (C) $-\frac{1}{\alpha}$ (D) $-\frac{1}{3\alpha}$ (E) $\frac{1}{\alpha}$

ANSWER : A

15. If α and α^2 are the roots of the equation $x^2 + 6x + c = 0$, then the positive value of *c* is

(A) 2 (B) 3 (C) 4 (D) 9 (E) 8

ANSWER : E

16. If one of the roots of the quadratic equation $ax^2 - bx + a = 0$ is 6, then value of $\frac{b}{a}$ is equal to

(A) $\frac{1}{6}$ (B) $\frac{11}{6}$ (C) $\frac{37}{6}$ (D) $\frac{6}{11}$ (E) $\frac{6}{37}$

ANSWER : C

17. If the equation $2x^2 - (a+3)x + 8 = 0$ has equal roots, then one of the values of *a* is

(A) -9 (B) -5 (C) -11 (D) 11 (E) 9

ANSWER : C

18. If 6^{th} term of G.P. is 2, then the product of first 11 terms of the G.P. is equal to

(A) 512 (B) 1024 (C) 2048
(D) 256 (E) 32

ANSWER : C

19. If the produce of five consecutive terms of a G.P. is $\frac{243}{32}$, then the middle term is

(A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{4}{3}$ (D) $\frac{3}{4}$ (E) 1

ANSWER : B

20. If a_1, a_2, a_3, a_4 are in A.P., then $\frac{1}{\sqrt{a_1}+\sqrt{a_2}}+\frac{1}{\sqrt{a_2}+\sqrt{a_3}}+\frac{1}{\sqrt{a_3}+\sqrt{a_4}}=$

(A) $\frac{\sqrt{a_4}-\sqrt{a_1}}{a_3-a_2}$ (B) $\frac{a_4-a_1}{a_3-a_2}$ (C) $\frac{a_3-a_2}{\sqrt{a_4}-\sqrt{a_1}}$

(D) $\frac{a_1-a_4}{a_3-a_1}$ (E) $\frac{a_5-a_0}{a_1-a_4}$

ANSWER : A

21. If $a_1, a_2, a_3, \ldots\ldots a_{20}$ are in A.P. and $a_1 + a_{20} = 45$, then $a_1, a_2, a_3, \ldots\ldots a_{20}$ is equal to
(A) 90 (B) 900 (C) 350 (D) 450 (E) 730

ANSWER : D

22. Sum of the series
1(1) + 2 (1 + 3) + 3 (1 + 3 +5) + 4 (1 + 3 + 5 + 7) + ….+ 10 (1 + 3 + 5 + 7+ …+ 19) is equal to
(A) 385 (B) 1025 (C) 1125 (D) 2025 (E) 3025

ANSWER : E

23. In an A.P., the 6^{th} term is 52 and 11^{th} term is 112. Then the common difference is equal to
(A) 4 (B) 20 (C) 12 (D) 8 (E) 6

ANSWER : C

24. If the coefficients of x^3 and x^4 in the expansion of $(3 + kx)^9$ are equal, then the value of k is

(A) 3 (B) $\frac{1}{3}$ (C) 2 (D) $\frac{1}{2}$ (E) 1

ANSWER : C

25. The total number of 7 digit positive integral numbers with district digits that can be formed using the digits 4, 3, 7, 2, 1, 0, 5 is
(A) 4320 (B) 4340 (C) 4310 (D) 4230 (E) 4220

ANSWER : A

26. If ${}^nP_4 = 5\,({}^nP_4)$, then the value of n is equal to
(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

ANSWER : D

27. The remainder when 2^{2016} is divided by 63, is
(A) 1 (B) 8 (C) 17 (D) 32 (E) 61

ANSWER : A

28. If ${}^nC_2 + {}^nC_3 = {}^6C_3$ and ${}^nC_x = {}^nC_3$, $x \neq 3$, then the value of x is equal to
(A) 5 (B) 4 (c) 2 (D) 6 (E) 1

ANSWER :C

29. If $\sum_{k=0}^{18} \frac{k}{{}^{18}C_k} = a \sum_{k=0}^{18} \frac{1}{{}^{18}C_k}$, then the value of a is equal to

(A) 3 (B) 9 (C) 6 (D) 18 (E) 36

ANSWER : B

30. If the square of the matrix $\begin{pmatrix} a & b \\ a & -b \end{pmatrix}$ is the unit matrix, then b is equal to

(A) $\frac{a}{1+a^2}$ (B) $\frac{1-a^2}{a}$ (C) $\frac{1+a^2}{a}$ (D) $\frac{a}{1-a^2}$ (E) $1 + a^2$

ANSWER : B

31. If $[1 \quad x \quad 1]\begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 2 & 0 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ x \end{bmatrix} = 0$, then the values of x are

(A) 1, 5 (B) -1, -5 (C) 1, 6 (D) -1, -6 (E) 3, 3

ANSWER : D

32. If A = $\begin{bmatrix} 8 & 27 & 125 \\ 2 & 3 & 5 \\ 1 & 1 & 1 \end{bmatrix}$, then the value of A^2 is equal to

(A) 0 (B) 36 (C) 64 (D) 2400 (E) 3600

ANSWER : E

33. If A= $\begin{bmatrix} x & 1 & -x \\ 0 & 1 & -1 \\ x & 0 & 7 \end{bmatrix}$ and det(A) = $\begin{vmatrix} 3 & 0 & 1 \\ 2 & -1 & 2 \\ 0 & 0 & 3 \end{vmatrix}$, then the value of x is

(A) -3 (B) 3 (C) 2 (D) -8 (E) -2

ANSWER : A

34. The coefficient of x^2 in the expansion of the determinant

$\begin{vmatrix} x^2 & x^3+1 & x^5+2 \\ x^2+3 & x^2+x & x^3+x^4 \\ x+4 & x^3+x^5 & 2^3 \end{vmatrix}$ is

(A) -10 (B) -8 (C) -2 (D) -6 (E) 8

ANSWER : A

35. Let A = $\begin{bmatrix} 1 & \frac{-1-i\sqrt{3}}{2} \\ \frac{-1-i\sqrt{3}}{2} & 1 \end{bmatrix}$. Then A^{100} =

(A) 2^{100} (B) 2^{99}A (C) 2^{98}A (D) A (E) A^2

ANSWER : B

36. The least integer satisfying $\frac{396}{10} - \frac{19-x}{10} < \frac{376}{10} - \frac{19-9x}{10}$ is

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

ANSWER : C

37. If $|x-1|+|x-3| \le 8$, then the values of x lie in the interval

(A) (-∞, -2) (B) (-2, 6) (C) (-3, 7)
(D) (-2, ∞) (E) (6, ∞)

ANSWER : B

38. Let p : 57 is an odd prime number,
q: 4 is a divisor of 12.
r : 15 is the LCM of 3 and 5
Be three simple logical statements. Which one of the following is true?

(A) $p \vee (\sim q \wedge r)$ (B) $\sim p \vee (q \wedge r)$ (C) $(p \wedge q) v \sim$
(D) $(p \vee q) \wedge \sim r$ (D) $\sim p \wedge (\sim q \wedge r)$

ANSWER : B

39. Let p, q, r be three simple statements. Then $\sim (p \vee q) \vee \sim (p \vee r)$

(A) $(\sim p) \wedge (\sim q \vee \sim r)$ (B) $(\sim p) \wedge (q \vee r)$ (C) $p \wedge (q \vee r)$
(D) $p \vee (q \wedge r)$ (E) $(p \vee q) \wedge r$

ANSWER : A

40. If p : 3 is a prime number and q ; one plus one is three, then the compound statement "It is not that 3 is a prime number or it is not that one plus one is three" is

(A) $\sim p \vee q$ (B) $\sim (p \vee q)$ (C) $p \wedge \sim q$
(D) $\sim p \vee \sim q$ (E) $p \vee \sim q$

ANSWER : D

41. The value of $\sin^2 \frac{\pi}{8} + \sin^2 \frac{3\pi}{8} + \sin^2 \frac{5\pi}{8} + \sin^2 7$ is equal to

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) 1 (E) 2

ANSWER : E

42. The value of $\frac{\sqrt{3}}{\sin 15^0} - \frac{1}{\cos 15^0}$ is equal to

(A) $4\sqrt{2}$ (B) $2\sqrt{2}$ (C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$ (E) $\frac{\sqrt{3}}{2}$

ANSWER : A

43. If sin x + cos x = $\sqrt{2}$, then sin x cos x =

(A) 1 (B) $\frac{1}{2}$ (C) 2 (D) $\sqrt{2}$ (E) $\frac{1}{\sqrt{2}}$

ANSWER : B

44. If $\tan\theta = \frac{1}{2}$ and $\tan\phi = \frac{1}{3}$, then $\tan(2\theta + \phi) =$

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) $\frac{1}{3}$ (D) 3 (E) $\frac{1}{2}$

ANSWER : C

45. The value of x satisfying the equation $\tan^{-1} x + \tan^{-1}\left(\frac{2}{3}\right) = \tan^{-1}\left(\frac{7}{4}\right)$ is equal to

(A) $\frac{1}{2}$ (B) $-\frac{1}{2}$ (C) $\frac{3}{2}$ (D) $-\frac{1}{3}$ (E) $\frac{1}{3}$

ANSWER : A

46. If tan A – tan B = x and cot B – cot A = y, then cot(A-B) is

(A) $\frac{1}{x-y}$ (B) $\frac{1}{x+y}$ (C) $\frac{1}{x}+y$ (D) $\frac{1}{x}-\frac{1}{y}$ (E) $\frac{1}{x}+\frac{1}{y}$

ANSWER : E

47. If $\tan^{-1} x + \tan^{-1} y = \frac{2\pi}{3}$, then $\cot^{-1} x + \cot^{-1} y$ is equal to

(A) $\frac{\pi}{2}$ (B) $\frac{1}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\sqrt{3}}{2}$ (E) π

ANSWER : C

48. If the orthocenter, centroid, incentre and circumcentre concide in a triangle ABC, and if the length of side AB is $\sqrt{75}$ units, then the length of the altitude of the triangle through the vertex A is

(A) $\sqrt{3}$ units (B) 3 units (C) $\frac{\sqrt{15}}{2}$ units

(D) $\frac{15}{2}$ units (E) $\frac{\sqrt{5}}{2}$ units

ANSWER : C

49. If A (2, 4) and B (6, 10) are two fixed points and if a point P moves so that $\angle APB$ is always a right angle, then the locus of P is

(A) $x^2 + y^2 + 8x + 14y + 52 = 0$ (B) $x^2 + y^2 - 8x + 14y - 52 = 0$

(C) $x^2 + y^2 + 8x - 14y + 52 = 0$ (D) $x^2 + y^2 - 8x - 14y - 52 = 0$

(E) $x^2 + y^2 - 8x - 14y + 52 = 0$

ANSWER : E

50. The points (-1, 0) and (-2, 1) are the two extremities of a diagonal of a parallelogram. If (-6, 5) is the third vertex, then the fourth vertex of the parallelogram is

(A) (2, -6) (B) (2, -5) (C) (3, -4) (D) (-3, 4) (E) (3, -5)

ANSWER : C

51. The slope of the straight line $\frac{x}{10}-\frac{y}{4}=3$ is

(A) $\frac{5}{2}$ (B) $\frac{-5}{2}$ (C) $\frac{2}{5}$ (D) $\frac{-2}{5}$ (E) $\frac{4}{3}$

ANSWER : C

52. If y-intercept of the line 4x – ay = 8 is thrice its x-intercept, then the value of a is equal to

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) $-\frac{3}{4}$ (D) $-\frac{4}{3}$ (E) $-\frac{2}{3}$

ANSWER : D

53. The equation of one of the straight lines passing through the point (0, 1) and is at a distance of $\frac{3}{5}$ units from the origin is

(A) 4x + 3y = 3 (B) –x + y = 1 (C) x +y = 1
(D) 5x + 4y = 4 (D) -5x + 4y = 4

ANSWER : A

54. The nearest point on the line x + y -3 = 0 from the point (3, -2) is

(A) (3, 5) (B) (4, 1) (C) 3, -5) (D) (5, -1) (E) 5, -1)

ANSWER : D

55. The image of the origin with respect to the line 4x + 3y = 25, is

(A) (4, 3) (B) (3, 4) (C)(6, 8) (D) 4, 6) (E) (8, 6)

ANSWER : E

56. If the area of the circle $4x^2 + 4y^2+8x-16y + \lambda = 0$ is 9 π sq. units, then the value of λ is

(A) 4 (B) -4 (C) 16 (D) -16 (E) -8

ANSWER : D

57. The radius of the circle passing through the points (2, 3), (2, 7) and (5, 3) is

(A) 5 (B) 4 (C) $\frac{5}{-2}$ (D) 2 (E) $\sqrt{5}$

ANSWER : C

58. If a diameter of the circle $x^2 + y^2$ -2x -6y+6 = 0 is a chord of another circle C having centre (2, 1), then the radius of the circle C is

(A) 2 (B) $\sqrt{3}$ (C) 3 (D) $\sqrt{5}$ (E) 5

ANSWER :C

59. In the family of concentric circles $2(x^2 + y^2) = k$, the radius of the circle passing through (1, 1) is

(A) $\sqrt{2}$ (B) 4 (C) $2\sqrt{2}$ (D) 1 (E) $3\sqrt{2}$

ANSWER : A

60. Let P be a point on an ellipse at a distance of 8 units from a focus. If the eccentricity is $\frac{4}{5}$, then the distance of the point P from the directrix is

(A) 5/8 (B) 8/5 (C) 5 (D) 8 (E) 10

ANSWER : E

61. If (-3, 0) is the vertex and y-axis is the directrix of a parabola, then its focus is at the point

(A) (0, -6) (B) (-6, 0) (C) (6, 0) (D) (0, 0) (E) (3, 0)

ANSWER : B

62. The foci o the ellipse $4x^2 + 9y^2 = 1$ are

(A) $\left(\pm\frac{\sqrt{3}}{2},0\right)$ (B) $\left(\pm\frac{\sqrt{5}}{2},0\right)$ (C) $\left(\pm\frac{\sqrt{5}}{3},0\right)$ (D) $\left(\pm\frac{\sqrt{5}}{6},0\right)$ (E) $\left(\pm\frac{\sqrt{5}}{4},0\right)$

ANSWER : D

63. The directrix of a parabola is x+ 8 = 0 and its focus is at (4,3). Then the length of the latus-rectum of the parabola is

(A) 5 (B) 9 (C) 10 (D) 12 (E) 24

ANSWER :E

64. If the eccentricity of the ellipse $ax^2 + 4y^2 = 4a$, (a <4) is $1/\sqrt{2}$, then its semi minor axis is equal to

(A)2 (B) $\sqrt{2}$ (C)1 (D) $\sqrt{3}$ (E)3

ANSWER : B

65. The hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ passes through the point ($\sqrt{6}$,3) and the length of the latus rectum is 18/5. Then the length of the transverse axis is equal to

(A)5 (B) 4 (C) 3 (D)2 (E) 1

ANSWER : D

66. The angle between $\vec{a}$ and $\vec{b}$ is $5\pi/6$ and the projection of $\vec{a}$ on $\vec{b}$ is $\frac{-9}{\sqrt{3}}$ then $|\vec{a}|$ is equal to

(A)12 (B) 8 (C) 10 (D) 4 (E) 6

ANSWER : E

67. The direction cosines of the straight line given by the planes x = 0 and z= 0 are

(A) 1,0,0 (B) 0,0,1 (C) 1,1,0 (D) 0,1,0 (E) 0,1,1

ANSWER :D

68. $\vec{a} = 2\hat{i} - \hat{j} - m\hat{k}$ and $\vec{b} = \frac{4}{7}\hat{i} - \frac{2}{7}\hat{j} + 2\hat{k}$ are collinear, then the value of m is equal to

(A) – 7 (B) – 1 (C) 2 (D) 7 (E) – 2

ANSWER : A

69. Let $\vec{a} = 2\hat{i} + 5\hat{j} - 7\hat{k}, \vec{b} = \hat{i} + 3\hat{j} + 5\hat{k}$. .Then $(3\vec{a} - 5\vec{b}).(4\vec{a} \times 5\vec{b}) =$

(A) – 7 (B) 0 (C) – 13 (D) 1 (E) – 8

ANSWER : B

70 If $\vec{a} + 2\vec{b} - \vec{c} = \vec{0}$ *and* $\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a} = \lambda \vec{a} \times \vec{b}$, then the value of λ is equal to

(A)5 (B)4 (C)2 (D) – 2 (E) – 4

ANSWER : D

71. If $\vec{a}.\vec{b} = \vec{0}$ *and* $\vec{a} + \vec{b}$ and makes an angle of 60^o with $\vec{b}$ then $|\vec{a}|$ is equal to

(A)0 (B) $\frac{1}{\sqrt{3}}|\vec{b}|$ (C) $\frac{1}{|\vec{b}|}$ (D) $|\vec{b}|$ (E) $\sqrt{3}|\vec{b}|$

ANSWER : E

72. If $\vec{a} + \vec{b}$ *and* $\vec{a} - \vec{b}$ are perpendicular and $\vec{b} = 3\hat{i} - 4\hat{j} + 2\hat{k}$, then $|\vec{a}|$ is equal to

(A) $\sqrt{41}$ (B) $\sqrt{39}$ (C) $\sqrt{19}$ (D) $\sqrt{29}$ (E) $\sqrt{31}$

ANSWER : D

73. The straight line $\vec{r} = (\hat{i} + \hat{j} + \hat{k}) + \alpha(2\hat{i} - \hat{j} + 4\hat{k})$ meets the xy plane at the point

(A)(2, – 1, 0 (B)(3,4,0) (C) $\left(\frac{1}{2}, \frac{3}{4}, 0\right)$ (D) $\left(\frac{1}{2}, \frac{7}{4}, 0\right)$ (E) $\left(\frac{1}{2}, \frac{5}{4}, 0\right)$

ANSWER : E

74. The equation of the plane passing through (– 1, 5, – 7) and parallel to the plane 2x – 5y + 7z + 11 = 0, is

(A) $\vec{r}.(2\hat{i} - 5\hat{j} - 7\hat{k}) + 76 = 0$ (B) $\vec{r}.(2\hat{i} - 5\hat{j} + 7\hat{k}) + 76 = 0$

(C) $\vec{r}.(2\hat{i} - 5\hat{j} + 7\hat{k}) + 75 = 0$ (D) $\vec{r}.(2\hat{i} - 5\hat{j} + 7\hat{k}) + 65 = 0$

(E) $\vec{r}.(2\hat{i} - 5\hat{j} - 7\hat{k}) + 55 = 0$

ANSWER : B

75. The angle subtended at the point (1,2,3) by the points P(2,4,5) and Q (3,3,1), is

(A) 90^o (B) 60^o (C) 30^o (D) 0^o (E) 45^o

ANSWER : A

76. If the two lines $\frac{x-1}{2} = \frac{1-y}{-a} = \frac{z}{4}$ *and* $\frac{x-3}{1} = \frac{2y-3}{4} = \frac{z-2}{2}$ are perpendicular, then the value of a is equal to

(A) – 4 (B) 5 (C) – 5 (D) 4 (E) – 2

ANSWER : C

77. If the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z+1}{4}$ meets the plane x + 2y + 3z = 14 at P, then the distance between P and the origin is

(A) $\sqrt{14}$ (B) $\sqrt{15}$ (C) $\sqrt{13}$ (D) $\sqrt{12}$ (E) $\sqrt{17}$

ANSWER : A

78. The point of the intersection of the straight lines

$\vec{r}=(3\hat{i}-4\hat{j}+5\hat{k})+\lambda(-\hat{i}-2\hat{j}+2\hat{k})$ *and* $\frac{3-x}{-1}=\frac{y+4}{2}=\frac{z-5}{7}$ is

(A) (– 3, – 4, – 5) (B) (– 3, 4, 5) (C) (– 3, 4, – 5)
(D) (– 3, – 4, 5) (E) (3, – 4, 5)

ANSWER : E

79. The vector of the straight line $\frac{x-2}{1}=\frac{y}{-3}=\frac{1-z}{2}$ is

(A) $\vec{r}=2\hat{i}+\hat{k}+t(\hat{i}+3\hat{j}+2\hat{k})$ (B) $\vec{r}=2\hat{i}-\hat{k}+t(\hat{i}-3\hat{j}-2\hat{k})$

(C) $\vec{r}=2\hat{i}+\hat{k}+(\hat{i}-3\hat{j}+2\hat{k})$ (D) $\vec{r}=2\hat{i}-\hat{j}+t(\hat{i}-3\hat{j}-2\hat{k})$

(E) $\vec{r}=2\hat{i}+\hat{k}+(\hat{i}-3\hat{j}-2\hat{k})$

ANSWER : E

80. The straight line $\vec{r}=(\hat{i}-\hat{j}+52k)+t(2\hat{i}+5\hat{j}+3\hat{k})$ is parallel to the plane $\vec{r}.(2\hat{i}+\hat{j}-3\hat{k})=5$. Then the distance the straight line and the plane is

(A)$9/\sqrt{14}$ (B)$8/\sqrt{14}$ (C)$7/\sqrt{14}$ (D)$6/\sqrt{14}$ (E)$5/\sqrt{14}$

ANSWER : B

81. Two fair dice are rolled. Then the probability of getting a composite number as the sum of the face values is equal to

(A) 7/12 (B) 5/2 (C) 1/12 (C)3/4 (D)3/4 (E) 2/3

ANSWER : A

82. If the mean of the numbers a, b, 8,5,10 is 6 and their variance is 6.8, then ab is equal to

(A) 6 (B) 7 (C) 12 (D) 14 (E) 25

ANSWER : C

83. In a class, in an examination in Mathematics, 10 students scored 100 marks each, 2 students scored zero and the average of the remaining students is 72 marks. I f the class average is 76, then the number of students in the class is

(A) 44 (B) 40 (C) 38 (D) 34 (E) 32

ANSWER : D

84. A bag contains 3 red, 4 white and 5 blue balls. If two balls are drawn at random, then the probability that they are different colours is

(A) 47/66 (B) 23/33 (C) 47/132 (D) 47/33 (D) 70/33

ANSWER : A

85. There are 5 positive numbers and 6 negative numbers. Three numbers are chosen at random and multiplied. The probability that the product being a negative number is
(A) 11/34 (B) 17/33 (C) 16/35 (D) 15/44 (E) 16/33

ANSWER : E

86. The value of $\lim_{x\to 0}\frac{\cot 4x}{\cos ec3x}$ is equal to
(A) 4/3 (B) ¾ (C) 2/3 (D) 3/2 (E) 0

ANSWER : B

87. Let f(x) = $\begin{cases}\cos x & if\ x\geq 0\\ -\cos x & if\ x<0\end{cases}$ which one of the following statements is not true?
(A) f(x) is continuous at x = 1 (B) f(x) is continuous at x= – 1
(C) f(x) is continuous at x = 2 (D) f(x) is continuous at x = – 2
(E) f(x) is continuous at x = 0

ANSWER :E

88. The value of $\lim_{n\to\infty}\frac{{}^nC_3 - {}^nP_3}{n^3}$ is equal to
(A) - 5/6 (B)5/6 (C) 1/6 (D) – 1 / 6 (E) 2/3

ANSWER : A

89. If f(x) = 3x + 5 and g(x) = x^2 – 1, then (f o g) (x^2 – 1) is equal to
(A) $3x^4 - 3x + 5$ (B) $3x^4 - 6x^2 + 5$ (C) $6x^4 + 3x^2 + 5$
(D) $6x^4 - 6x + 5$ (E) $3x^2 + 6x + 4$

ANSWER : B

90. The period of the function f(x) = (4x – 1) is
(A) π (B) π /2 (C)2 π (D) π /4 (E)3 π /4

ANSWER : D

91. If $2^x + 2^y = 2^{x+y}$, then the value of $\frac{dy}{dx}$ at(1,1) is equal to
(A) – 2 (B) – 1 (C) 0 (D) 1 (E) 2

ANSWER : B

92. If f(x) = $\frac{\sin^{-1}}{\sqrt{1-x^2}}$ then the value of (1 – x^2) $f'(x) - xf(x)$ is
(A) 0 (B) 1 (C) 2 (D) 3 (D) 4

ANSWER : B

93. If f(x)= $\left(\frac{x}{2}\right)^{10}$, then $f(1)+\frac{f'(1)}{\lfloor 1}+\frac{f''(1)}{\lfloor 2}+\frac{f'''(1)}{\lfloor 3}+...+\frac{f^{(10)}(1)}{\lfloor 10}$ is equal to

(A) 1 (B) 10 (C) 11 (D) 512 (E) 1024

ANSWER : A

94. If $f'(4)=5, g'(4)=12, f(4)g(4)=2$ *and* $g(4)=6$, *then* $\left(\frac{f}{g}\right)'(4)=$

(A) 5/36 (B) 11/18 (C) 23/36 (D) 13/18 (E) 19/36

ANSWER : D

95. If the derivative of $(ax - 5)e^{3x}$ at x = 0 is - 13, then the value of a is equal to

(A) 8 (B) – 5 (C) 5 (D) – 2 (E) 2

ANSWER : E

96. Let y = $\tan^{-1}$ (sec x + tanx). Then $\frac{dy}{dx}=$

(A) 1/4 (B) 1/2 (C) $\frac{1}{\sec x+\tan x}$ (D) $\frac{1}{\sec^2 x}$ (E) $\frac{1}{\tan x}$

ANSWER : B

97. If s = $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ *and* $t=\sqrt{1-x^2}$, *then* $\frac{ds}{dt}$ *at* $x=\frac{1}{2}$ *is*

(A)1 (B) 2 (C) – 2 (D) 4 (E) – 4

ANSWER : D

98. The minimum value of $2x^3 - 9x^2 + 12x + 4$ is

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

ANSWER : E

99. The slope of the curve y = e^x cos x, $x \in (-\pi, \pi)$ is maximum at

(A) $x=\frac{\pi}{2}$ (B) $x=-\frac{\pi}{2}$ (C) $x=\frac{\pi}{4}$ (D) x = 0 (E) $x=\frac{\pi}{3}$

ANSWER : D

100. If y = f(x) is continuous on [0,6], different on (0,6), f(0) = - 2 and f(6) = 16, then at some point between x = 0 and x = 6, $f'(x)$ must be equal to

(A) – 18 (B) – 3 (C) 3 (D) 14 (E) 18

ANSWER : C

101. The equation of the tangent to the curve $y = x^3 - 6x + 5$ at (2,1) is

(A) 6x – y – 11 = 0 (B) 6x – y – 13 = 0 (C) 6x + y + 11 = 0
(D) 6x – y + 11 = 0 (E) x – 6y – 11 = 0

ANSWER : A

102. Let f(x) = $2x^3 - 5x^2 - 4x + 3$, $\frac{1}{2} \le x \le 3$. The point at which the tangent to the curve is parallel to the x axis, is
(A) (1, – 4) (B) (2, – 9) (C) (2, – 4) (D) (2, – 1) (E) (2 – 5)

ANSWER : B

103. Two sides of a triangle are 8 m and 5 m in length. The angle between them is increasing at the rate 0.08 rad/sec. When the angle between the sides of fixed length is π /3, the rate at which the area of the triangle is increasing is
(A) 0.4 m^2/sec (B) 0.8n^2/sec (C) 0.6m^2/sec
(D) 0.04m^2/sec (E) 0.08 md^2/sec

ANSWER : B

104. If y = $8x^3 - 60x^2 + 144x + 27$ is strictly decreasing function in the interval
(A) (– 5, 6) (B)($-\infty$, 2) (C) 5,6) (D)(3, ∞) (E) 2,3)

ANSWER : E

105. $\int (\sec x)^m (\tan^3 x + \tan x)\,dx$ is equal to

(A) $\sec^{m+2} x + C$ (B) $\tan^{m+2} x + C$ (C) $\frac{\sec^{m+2} x}{m+2} + C$

(D) $\frac{\tan^{m+2} x}{m+2} + C$ (E) $\frac{\sec^{m+1} x}{m+1} + C$

ANSWER : C

106. $\int \frac{1}{7} \sin\left(\frac{x}{7} + 10\right) dx$ is equal to

(A) $\frac{1}{7}\cos\left(\frac{x}{7} + 10\right) + C$ (B) $-\frac{1}{7}\cos\left(\frac{x}{7} + 10\right) + C$ (C) $-\cos\left(\frac{x}{7} + 10\right) + C$

(D) $-7\cos\left(\frac{x}{7} + 10\right) + C$ (E) cos (x + 70) + C

ANSWER : C

107. $\int \left(\frac{x-a}{x} - \frac{x}{x+a}\right)$ dx is equal to

(A) $\log\left|\frac{x+a}{x}\right| + C$ (B) $a \log\left|\frac{x+a}{x}\right| + C$ (C) $a \log\left|\frac{x}{x+a}\right| + C$

(D) $\log\left|\frac{x}{x+a}\right| + C$ (E) $a \log\left|\frac{x-a}{x+a}\right| + C$

ANSWER : B

108. $\int x^4 e^{x^5} \cos\left(e^{x^5}\right) dx$ is equal to

(A) $\frac{1}{3}\sin\left(e^{x^5}\right)+C$ (B) $\frac{1}{4}\sin\left(e^{x^5}\right)+C$ (C) $\frac{1}{5}\sin\left(e^{x^5}\right)+C$

(D) $\sin\left(e^{x^5}\right)+C$ (E) $2\sin\left(e^{x^5}\right)+C$

ANSWER : C

109. $\int \frac{2x+\sin 2x}{1+\cos 2x} dx$ is equal to

(A) x + log |tan x| + C (B) x log |tan x| + C (C) x tan x + C

(D) log |cos x| + C (E) log |sin x| + C

ANSWER : C

110. $\int \frac{1}{\sin x \cos x} dx$ is equal to

(A) log |tan x| + C (B) log |sin 2x| + C (C) log |sec x| + C

(D) log |cos x| + C (E) log |sin x| + C

ANSWER : A

111. $\int \frac{1}{8\sin^2 x+1} dx$ is equal to

(A) $\sin^{-1}(\tan x) + C$ (B) $\frac{1}{3}\sin^{-1}(\tan x)+C$ (C) $\frac{1}{3}\tan^{-1}(3\tan x)+C$

(D) $\tan^{-1}(3\tan x) + C$ (E) $\sin^{-1}(3\tan x) + C$

ANSWER : C

112. $\int_0^{\pi/2} \log\left(\frac{\cos x}{\sin x}\right) dx$ is equal to

(A) $\pi/2$ (B) $\pi/4$ (C) π (D) 2π (E) 0

ANSWER : E

113 The value of $\int_{-1}^{2} 4x^2 |x| dx$ is equal to

(A) 17 (B) 16 (C) 15 (D) 14 (E) 13

ANSWER : A

114. The area of the region bounded by $y^2 = 16 - x^2$, y = 0, x = 0 in the first quadrant is (in square units)

(A) 8π (B) 6π (C) 2π (D) 4π (E) $\pi/2$

ANSWER : D

115. The value of $\int_2^4 (x-2)(x-3)(x-4)\ dx$ is equal to

(A) 1/2 (B) 2 (C) 3 (D) 1/3 (E) 0

ANSWER : E

116. The area bounded by the lines y – 2x = 2, y = 4 and the y-axis is equal to (in square units)

(A) 1 (B) 4 (C) 0 (D) 3 (E) 2

ANSWER : A

117. The general solution of the differential equation $(x + y + 3)\frac{dy}{dx} = 1$ is

(A) $x + y + 3 = Ce^y$ (B) $x + y + 4 = Ce^y$ (C) $x + y + 3 = Ce^{-y}$
(D) $x + y + 4 = Ce^{-y}$ (E) $x + y + 4e^y = C$

ANSWER : B

118. The differential equation representing the family of curves $y^2 = a(ax+b)$ where a and b are arbitrary constants, is of

(A) order 1, degree 1 (B) order 1, degree 3 (C) order 2, degree 3
(D) order1, degree 4 (E) order 2, degree 1

ANSWER : E

119. The solution of the differential equation $\frac{x\frac{dy}{dx} - y}{\sqrt{x^2 - y^2}} = 10x^2$ is

(A) $\sin^{-1}\left(\frac{y}{x}\right) - 5x^2 = C$ (B) $\sin^{-1}\left(\frac{y}{x}\right) = 10x^2 + C$ (C) $\frac{y}{x} = 5x^2 + C$

(D) $\sin^{-1}\left(\frac{y}{x}\right) = 10x^2 + Cx$ (E) $\sin^{-1}\left(\frac{y}{x}\right) + 5x^2 = C$

ANSWER : A

120. The general solution of the differential equation $x\,dy - y\,dx = y^2\,dx$ is

(A) $y = \frac{x}{C-x}$ (B) $x = \frac{2y}{C+x}$ (C) $y = (C + x)(2x)$

(D) $y = \frac{2x}{C+x}$ (E) $x = \frac{y}{C-x}$

ANSWER : A

ENGG./MED./IIT ENTRANCE COACHING

Aspirant
FOR ENGG. & MED. ASPIRANTS

KEAM ANSWER KEY-2016

Qn. No.	BOOK LET CODE				Qn. No.	BOOK LET CODE				Qn. No.	BOOK LET CODE			
	B1	B2	B3	B4		B1	B2	B3	B4		B1	B2	B3	B4
1	D	D	E	B	41	E	E	C	D	81	A	C	D	E
2	C	E	D	E	42	A	D	B	B	82	A	E	A	C
3	E	A	A	A	43	B	E	C	E	83	D	A	C	D
4	D	A	B	B	44	D	B	C	C	84	A	D	B	E
5	B	B	D	D	45	A	A	A	A	85	E	E	B	C
6	D	C	E	B	46	E	C	C	C	86	B	A	D	C
7	A	B	D	B	47	C	A	E	C	87	E	B	E	D
8	E	B	E	A	48	C	E	A	D	88	A	E	A	A
9	B	A	B	D	49	E	E	D	A	89	B	A	A	D
10	A	D	A	E	50	C	B	E	E	90	D	A	B	E
11	C	E	C	B	51	C	A	A	C	91	B	D	C	D
12	C	A	A	D	52	D	C	B	C	92	B	C	B	C
13	D	B	E	E	53	A	D	E	C	93	A	E	B	C
14	A	D	E	D	54	D	A	A	B	94	D	D	A	A
15	E	A	B	C	55	A	E	A	A	95	E	B	D	E
16	C	E	A	A	56	D	B	D	D	96	B	D	E	B
17	C	C	C	B	57	C	E	C	E	97	D	B	A	D
18	C	D	D	B	58	C	A	E	C	98	E	E	B	E
19	B	E	A	E	59	B	B	D	C	99	D	C	D	B
20	A	C	E	C	60	E	D	B	A	100	C	A	A	D
21	D	C	B	C	61	B	B	D	D	101	D	C	E	E
22	E	D	E	B	62	D	B	B	A	102	B	C	C	D
23	C	A	A	C	63	E	A	E	C	103	B	D	D	A
24	C	D	B	C	64	B	D	C	B	104	E	A	E	B
25	A	E	D	A	65	D	E	A	B	105	C	E	C	D
26	D	D	B	C	66	E	B	C	D	106	C	C	C	E
27	A	C	B	E	67	D	D	C	E	107	B	C	D	D
28	C	C	A	A	68	A	E	D	A	108	C	C	A	E
29	B	A	D	D	69	B	D	A	A	109	C	B	D	B
30	B	E	E	E	70	D	C	E	B	110	A	A	E	A
31	D	B	B	A	71	E	A	C	C	111	C	D	D	C
32	E	D	D	B	72	D	B	C	B	112	E	E	C	A
33	A	E	E	E	73	E	B	C	B	113	A	C	C	E
34	A	B	D	A	74	B	E	B	A	114	D	C	A	E
35	C	D	C	A	75	A	C	A	D	115	E	A	E	B
36	B	E	A	D	76	C	C	D	E	116	E	D	B	A
37	B	D	B	C	77	A	B	E	A	117	A	A	D	C
38	B	A	B	E	78	E	C	C	B	118	E	C	E	D
39	A	B	E	D	79	E	C	C	D	119	A	B	B	A
40	D	D	C	B	80	E	A	A	A	120	A	B	D	E