MATHS

BOOKS - BITSAT GUIDE

SOLVED PAPER 2017

Part Iv Mathematics

1. Find the coefficient of x^5 in the expansion of $(1+x)^{21}+(1+x)^{22}+\ +(1+x)^{30}$.

A. ${}^{35}C_5$

B. ${}^{9}C_5$

C. ${}^{31}C_6-{}^{21}C_6$

D. ${}^{30}C_5+{}^{20}C_5$

Answer: c

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2. If z =a + ib satisfies arg (z-1) =arg (z+3i) , then $(a-1):b=$

A. $2:1$

B. $1:3$

C. $-1:3$

D. None of these

Answer: b

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3. If P and P denote the length of the perpendicular from a focus and the centre of an ellipse with semi - major axis of length a, respectively , on a tangent to the ellipse and r denotes the focal distance of the point , then

A. ap = rp'

B. rp =ap'

C. ap=rp'+1

D. ap'+rp=1

Answer: a

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4. The value of $\sum_{r=1}^{10} r.\frac{{}^{n}C_{r}}{{}^{n}C_{r-1}}$ is equal to

A. 5 (2n -9)

B. 10 n

C. 9 (n-4)

D. None of these

Answer: a

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5. The numbers $3^{2\sin 2\alpha - 1}$, 14 and $3^{4 - 2\sin 2\alpha}$ form first three terms of A.P., its fifth term is

A. -25

B. -12

C. 40

D. 53

Answer: d

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6. For the equation $3x^2 + px + 3 = 0, p > 0,$ if one of the root is square of the other, then p is equal to $1/3$ b. 1 c. 3 d. $2/3$

A. $\frac{1}{2}$

B. 1

C. 3

D. $\frac{2}{3}$

Answer: c

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7. If $a = \log_2 3$, $b = \log_2 5$ and $c = \log_7 2$, then $\log_{140} 63$ in terms of a, b, c is

A. $\frac{2ac+1}{2c+abc+1}$

B. $\frac{2ac+1}{2a+c+a}$

C. $\frac{2ac+1}{2c+ab+a}$

D. None of these

Answer: d

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8. If $\cos(x-y), \cos x$ and $\cos(x+y)$ are in H.P., then $\left|\cos x \frac{\sec(y)}{2}\right|$ equals

A. $\pm\sqrt{2}$

B. $\pm 1/\sqrt{2}$

C. ± 2

D. None of these

Answer: a

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9. Let $A=\{1,2,3,4,5\}$ and R be a relation defined by $R=\{(x,y): x,y \in A, x+y=5\}$. The ,R is

A. reflexive and symmetric but not transitive

B. an equivalence relation

C. symmetric but neither reflexive nor transitive

D. neither reflexive nor symmetric but transitive

Answer: c

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10. The number of times the digit 5 will be written when listing the integers from 1 to 100, is

A. 271

B. 272

C. 300

D. None of these

Answer: c

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11. Let A and B be two sets that $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X. then

A. A=B

B. A=X

C. B=X

D. $A \cup B = X$

Answer: a

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12. Let $A = [-1, 1]$ and $f: A \to A$ be defined as $f(x) = x|x|$ for all $x \in A, then f(x)$

A. many-one and into function

B. one-one and into function

C. one-one and into function

D. one-one and into function

Answer: d

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13. The general solution of $\sin x - 3\sin 2x + \sin 3x = \cos x - 3\cos 2x + \cos 3x$ is.

A. $n\pi + \frac{\pi}{8}$

B. $\frac{n\pi}{2} + \frac{\pi}{8}$

C. $(-1)^n \frac{n\pi}{2} + \frac{\pi}{8}$

D. $2n\pi + \cos^{-1}\frac{3}{2}$

Answer: b

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14. The equation of two equal sides of an isosceles triangle are 7x - y + 3 = 0 and x + y - 3 = 0 and its third side is passes through the point (1, - 10). The equation of the third side is

A. $x - 3y = -31$

B. $x - 3y = 31$

C. $x + 3y = 31$

D. $x + 3y = -31$

Answer: b

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15. If two distinct chords, drawn from the point (p, q) on the circle $x^2 + y^2 = px + qy$ (where pq $\neq$ ~ 0) are bisected by the x-axis, then

A. $p^2 = q^2$

B. $p^2 = 8q^2$

C. $p^2 < 8q^2$

D. $p^2 > 8q^2$

Answer: d

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16. Find the length of the perpendicular drawn from point $(2, 3, 4)$ to line $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$.

A. $\frac{3}{7}\sqrt{101}$

B. $\frac{2}{7}\sqrt{101}$

C. $\frac{2}{7}\sqrt{103}$

D. $\frac{3}{7}\sqrt{103}$

Answer: a

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17. The image of the point (1,6,3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is (a,b,c) then a+b+c=

A. $(-1, 0, 7)$

B. $(-1, 0, -7)$

C. $(1, 0, 7)$

D. $(2, 0, 7)$

Answer: c

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18. The distances of the point (1,-5,9) from the plane $x - y + z = 5$ measured along a straight line x=y=z is $2\sqrt{3}$ k , then the value of k is

A. 5

B. 6

C. $\sqrt{3}$

D. 4

Answer: a

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19. $\lim_{n \to \infty} \sin\left[\pi\sqrt{n^2+1}\right]$ is equal to

A. ∞

B. 0

C. does not exist

D. None of these

Answer: b

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20. A function is defined as $f(x) = \begin{cases} e^x, & x \leq 0 \\ |x-1|, & x > 0 \end{cases}$, then f(x) is

A. f(x) is differentiable at x=0

B. $f(x)$ is continuous at x = 0 ,1

C. f(x) is differentiable at x=1

D. None of the above

Answer: b

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21. If a function $f: R \to R$ satisfy the equation $f(x+y) = f(x) + f(y)$, $\forall x, y$ and the function f(x) is continuous at x=0 , then

A. f(x) is continuous for all positive real values of x

B. f(x) is continuous for all x

C. f(x) =0 for all x

D. None of the above

Answer: b

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22. The value of $f(0)$ so that the function $f(x) = \frac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$ is continuous at each point on its domain is:

A. $\frac{1}{3}$

B. $-\frac{1}{3}$

C. $\frac{2}{3}$

D. $-\frac{2}{3}$

Answer: a

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23. Consider the greatest integer function, defined by $f(x) = [x], 0 \leq x < 2$. Then,

A. f is derivable at x=1

B. f is not derivable at x=1

C. f is derivable at x =2

D. None of these

Answer: b

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24. The function $f(x) = -2x^3 + 21x^2 - 60x + 41$,in the interval $(-\infty, 1)$,

A. f(x) is decreasing in $(-\infty, 1)$

B. f(x) is decreasing in $(-\infty, 2)$

C. f(x) is increasing in $(-\infty, 1)$

D. f(x) is increasing in $(-\infty, 2)$

Answer: b

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25. Rolle's theorem is not applicable to the function $f(x) = |x|$ defined on [-1,1] because

A. f'(1) does not exist

B. f'(-1) does not exist

C. f(x) is discontinuous at x=0

D. f' (0) does not exist

Answer: d

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26. If the two curves $y = a^x$ and $y = b^x$ intersect at an angle α, then tan α equals

A. $\frac{a-b}{1+ab}$

B. $\frac{\log a - \log b}{1 + \log a \log b}$

C. $\frac{a + b}{1 - ab}$

D. $\frac{\log a + \log b}{1 - \log a \log b}$

Answer: b

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27. Evaluate $\frac{\int_0^n [x]dx}{\int_0^n \{x\}dx}$ (where $[x]$ and $\{x\}$ are integral and fractional parts of x respectively and $n \varepsilon N$).

A. $\frac{1}{n-1}$

B. $\frac{1}{n}$

C. n

D. $n - 1$

Answer: d

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28. The maximum value of $f(x) = x + \sin 2x, x \in [0, 2\pi]$ is

A. $\frac{\pi}{2}$

B. 2π

C. $\frac{3\pi}{4}$

D. $\frac{3\pi}{2}$

Answer: b

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29. The area bounded by the curve $y = |\cos x - \sin x|, 0 \leq x \leq \frac{\pi}{2}$ and above x-axis is

A. $2\sqrt{2}$

B. $2\sqrt{2} - 2$

C. $2\sqrt{2} + 2$

D. 0

Answer: b

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30. The solution of dy//dx=cos(x+y)+sin(x+y), is given by

A. $\log\left[1+\tan\left(\frac{a+y}{2}\right)\right]+C=0$

B. $\log\left[1+\tan\left(\frac{x+y}{2}\right)\right]=x+C$

C. $\log\left[1-\tan\left(\frac{x+y}{2}\right)\right]=x+C$

D. None of above

Answer: b

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31. The area enclosed between the curves $y=x^3$ and $y=\sqrt{x}$ is

A. $\frac{5}{3}$ sq units

B. $\frac{5}{4}$ sq units

C. $\frac{5}{12}$ sq units

D. $\frac{12}{5}$ sq units

Answer: c

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32. $(\lim)_{x \overrightarrow{\infty}} \left(an - \frac{1+n^2}{1+n} \right) = b,$ where a is a finite number, then $a = 1$ (b) $a = 0$ (c) $b = 1$ (d) $b = -1$

A. a=2

B. a=0

C. b=1

D. b=-1

Answer: c

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33. If the papers of 4 students can be checked by any one of the 7 teachers, then the probability that all the 4 papers are checked by exactly 2 teachers is $2/7$ b. $12/49$ c. $32/343$ d. none of these

A. $\frac{12}{49}$

B. $\frac{6}{49}$

C. $\frac{9}{49}$

D. $\frac{15}{49}$

Answer: b

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34. if the equation $(10x-5)^2+(10y-4)^2=\lambda^2(3x+4y-1)^2$ represents a hyperbola then

A. $-2 < \lambda < 2$

B. $\lambda > 2$

C. $\lambda < -2$ or $\lambda > 2$

D. $0 < \lambda < 2$

Answer: c

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35. Let $\hat{a}$ and $\hat{b}$ be two non -collinear unit vectors .If $u = \hat{a} - \left(\hat{a} \cdot \hat{b}\right)\hat{b}$ and $v = \hat{a} \times \hat{b}$, then $|v|$ is equal to

A. $|u|$

B. $|u| + |v.\,\hat{a}|$

C. $2|v|$

D. $|v| + u.\left(\hat{a} + \hat{b}\right)$

Answer: a

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36. If the variance of the observations $x_1, x_2, \ldots\ldots, x_n$ is σ^2, then the variance of $\alpha x_1, \alpha x_2, \ldots., \alpha x_n, \alpha \neq 0$ is

A. σ^2

B. $\alpha\sigma^2$

C. $\alpha^2\sigma^2$

D. $\frac{\sigma^2}{\alpha^2}$

Answer: c

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37. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is

A. 0

B. 1

C. 1.3

D. 2.5

Answer: a

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38. The maximum vlaue of $Z = 9x + 13y$ subject to constraints $2x + 3y \leq 18, 2x + y \leq 10, x \geq 0, y \geq 0$ is

A. 130

B. 81

C. 79

D. 99

Answer: c

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39. A coin is tossed 7 times.Each time a man calls head.The probability that he wins the toss on more occasions is

A. $\frac{1}{4}$

B. $\frac{5}{8}$

C. $\frac{1}{2}$

D. $\frac{1}{6}$

Answer: c

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40. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$ and $f(1) = 2.\ f(p+q) = f(p).\ f(q)\ \forall$ then $x^{f(1)} + y^{f(2)} + z^{f(3)} - \frac{x+y+z}{x^{f(1)} + y^{f(2)} + z^{f(3)}}$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: c

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41. The value of $\frac{2}{1!}+\frac{2+4}{2!}+\frac{2+4+6}{3!}+$ ... is

A. e

B. 2e

C. 3e

D. None of these

Answer: c

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42. If z_1, z_2 and z_3 represent the vertices of an equilateral triangle such that $|z_1| = |z_2| = |z_3|$, then

A. $z_1 + z_2 = z_3$

B. $z_1 + z_2 + z_3 = 0$

C. $z_1 z_2 = \dfrac{1}{z_3}$

D. $z_1 - z_2 = z_3 - z_2$

Answer: b

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43. If $\int \dfrac{\left(\sqrt{x}^5\right)dx}{\left(\sqrt{x}\right)^7 + x^6} = \lambda \log\left(\dfrac{x^a}{x^a + 1}\right) + C$ then $a + \lambda$ equal to

A. 2

B. > 2

C. < 2

D. > 3

Answer: b

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44. Line joining the points (0,3) and (5,-2) is a tangent to the curve $y = \frac{ax}{1+x}$, then

A. $a = 1 +_{\sqrt{3}}$

B. $a \in \phi$

C. $a = -1 \pm \sqrt{3}$

D. $a = -2 \pm 2\sqrt{3}$

Answer: b

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45. The shortest distance between the parabolas $y^2 = 4x$ and $y^2 = 2x - 6$ is

A. 2

B. $\sqrt{5}$

C. 3

D. None of these

Answer: b

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