MATHS

BOOKS - BITSAT GUIDE

QUESTION-PAPERS-2012

Mathematics Single Correct Answer Type

1. The equation of the base BC of an equilateral ΔABC is $x + y = 2$ and A is $(2, -1)$. The length of the side of the triangle is

A. $\sqrt{2}$

B. $\left(\frac{3}{2}\right)^{\frac{1}{2}}$

C. $\left(\frac{1}{2}\right)^{\frac{1}{2}}$

D. $\left(\frac{2}{3}\right)^{\frac{1}{2}}$

Answer: D

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2. The equation of the circle circumscribing the triangle formed by the lines

$x + y = 6, 2x + y = 4$ and $x + 2y = 5$ is

A. $x^2 + y^2 + 17x + 19y - 50 = 0$

B. $x^2 + y^2 - 17x - 19y - 50 = 0$

C. $x^2 + y^2 + 17x - 19y - 50 = 0$

D. $x^2 + y^2 - 17x - 19y + 50 = 0$

Answer: D

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3. The length of tangent from (5,1) to the circle $x^2 + y^2 + 6x - 4y - 3 = 0$ is

A. 7

B. 49

C. 63

D. 21

Answer: A

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4. If the length of the major axis of the ellipse $\left(\frac{x^2}{a^2}\right)+\left(\frac{y^2}{b^2}\right)=1$ is three times the length of minor axis, its accentricity is

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

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

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

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

Answer: D

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5. S and T are the foci of the ellipse $\left(\frac{x^2}{a^2}\right)+\left(\frac{y^2}{b^2}\right)=1$ and B is an end of the minor axis. If STB is equilateral triangle, then eccentricity of the ellipse is

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

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

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

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

Answer: C

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6. The difference of the focal distances of any point on the hyperbola is equal to its

A. latusrectum

B. eccentricity

C. length of the transverse axis

D. half the length of the transverse axis

Answer: C

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7. If $A + B + C = 180^\circ$, then $\frac{\cot A + \cot B + \cot C}{\cot A \cot B \cot C}$ is equal to

A. 1

B. $\cot A \cos B \cot C$

C. -1

D. 0

Answer: A

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8. The angles of a triangle are in AP and the least angle is 30°. What is the greatest angle (in radian) ?

A. $\frac{7\pi}{12}$

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

C. $\frac{5\pi}{6}$

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

Answer: D

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9. If $p = \tan 20^\circ$ express $\frac{\tan 160^\circ - \tan 110^\circ}{1 + \tan 160^\circ . \tan 110^\circ}$ in terms of p.

A. $\left(\frac{1 - p^2}{2p}\right)$

B. $\left(\frac{2p}{1 + p^2}\right)$

C. $\left(\frac{1 + p}{2p}\right)$

D. $\left(\frac{1 - p}{2p}\right)$

Answer: A

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10. If $4\sin^{-1}x + \cos^{-1}x = \pi$, then x is equal to

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

B. 2

C. 1

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

Answer: A

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11. In ΔABC, if a=2, b=3 and $\sin A = \frac{2}{3}$. Then, cos C is equal to

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

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

C. $\frac{2}{\sqrt{13}}$

D. $\frac{1}{\sqrt{13}}$

Answer: B

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12. The vector equation

$\bar{r} = \hat{i} - 2\hat{j} - \hat{k} + t\left(6\hat{j} - \hat{k}\right)$, represents a line passing through points

A. $(0, 6, -1)$ and $(1, -2, -1)$

B. $(0, 6, -1)$ and $(-1, -4, -2)$

C. $(1, -2, -1)$ and $(1, 4, -2)$

D. $(1, -2, -1)$ and $(0, -6, 1)$

Answer: C

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13. The work done by the force $4i - 3j + 2k$ in moving a particle along a straight line from the point (3,2,-1) to (2,-1,4) is

A. 0 units

B. 4 units

C. 15 units

D. 19 units

Answer: C

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14. $\lim_{x \to 0} \dfrac{(2+x)\sin(2+x) - 2\sin 2}{x} =$

A. $\sin 2$

B. $\cos 2$

C. 1

D. $2\cos 2 + \sin 2$

Answer: D

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15. If $f(x) = \left(\frac{3x + \tan^2 x}{x}\right)$ is continuous at $x = 0$, then $f(0)$ is equal to.

A. 3

B. 2

C. 4

D. 0

Answer: D

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16. If x is measured in degree then $\frac{d}{dx}$ (cos x) is equal to

A. $-\sin x$

B. $-\frac{180}{\pi}\sin x$

C. $-\frac{\pi}{180}\sin x$

D. sin x

Answer: C

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17. $\left(\frac{d}{dx}\right)[\log(\sec x - \tan x)]$ is equal to

A. $-\sec x$

B. $\sec x + \tan x$

C. $\sec x$

D. $\sec x - \tan x$

Answer: A

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18. If $x = \cos^3\theta$ and $y = \sin^3\theta$, then $1 + \left(\frac{dy}{dx}\right)^2$ is equal to

A. $\tan^2\theta$

B. $\cot^2\theta$

C. $\sec^2\theta$

D. $\text{cosec}^2\theta$

Answer: C

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19. If $x = \mathrm{at}^2, y = 2at$, then $\frac{d^2y}{dx^2}$ is equal to

A. $-\frac{1}{t^2}$

B. $-\frac{1}{2at^3}$

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

D. $-\frac{a}{2t^3}$

Answer: B

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20. If the rate of change in the circumference of a circle of 0.3 cm/s then the rate of change in the area of the circle when the radius is 5 cm, is

A. 1.5 sq cm/s

B. 0.5 sq cm/s

C. 5 sq cm/s

D. 3 sq cm/s

Answer: A

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21. If $y = x^3 - ax^2 + 48x + 7$ is an increasing function for all real values of x, then a lies in

A. $(-14, 14)$

B. $(-12, 12)$

C. $(-16, 16)$

D. $(-21, 21)$

Answer: B

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22. Rolle's theorem is not applicable for the function $f(x) = |x|$ in the intervel $[-1, 1]$ 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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23. $\int \frac{2}{(e^x + e^{-x})^2} dx$ is equal to

A. $-\frac{e^{-x}}{(e^x + e^{-x})} + C$

B. $\frac{1}{(e^x + e^{-x})} + C$

C. $\frac{1}{(e^x + 1)^2} + C$

D. $\frac{1}{(e^x - e^{-x})^2} + C$

Answer: A

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24. $\int_0^{\frac{\pi}{2}} \frac{\sin^n \theta}{\sin^n \theta + \cos^n \theta} d\theta$ is equal to

A. 1

B. 0

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

D. $\frac{\pi}{4}$

Answer: D

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25. $\int_0^{\pi} \cos^{101} x dx$ is equal to

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

B. $\frac{1}{102}$

C. $\left(\frac{\pi}{3}\right)^{101}$

D. 0

Answer: D

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26. Show that $\lim_{n \to \infty} \left(\frac{1}{n+1} + \frac{1}{n+2} + + \frac{1}{6n} \right) = \log 6$

A. log 2

B. $\log\left(1+\sqrt{5}\right)$

C. log 6

D. 0

Answer: C

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27. By eliminating the arbitrary constant A and B from $y = Ax^2 + Bx$ we get the differential equation

A. $\frac{d^3y}{dx^3} = 0$

B. $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$

C. $\frac{d^2y}{dx^2} = 0$

D. $x^2\frac{d^2y}{dx^2} + y = 0$

Answer: B

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28. If $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ for $x \neq 0$ and $f(0) = k$ and f(x) is continuous at

x = 0 then k is equal to

A. $a + b$

B. $a - b$

C. a

D. b

Answer: A

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29. If 4 - 5i is a root of the quadratic equation $x^2 + ax + b = 0$ then (a, b) is equal

A. $(8, 41)$

B. $(-8, 41)$

C. $(41, 8)$

D. $(-41, 8)$

Answer: B

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30. If α and β are the roots of the quadratic equation $4x^2 + 3x + 7 = 0$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is

A. $-\frac{3}{4}$

B. $-\frac{3}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer: B

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31. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + k, \beta + k$ are the roots of $px^2 + qx + r = 0$, then $\frac{b^2 - 4ac}{q^2 - 4pr}$ is

A. $\frac{a}{p}$

B. 1

C. $\left(\frac{a}{p}\right)^2$

D. 0

Answer: C

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32. Area of the triangle in the argand diagram formed by the complex numbers z, iz, z +iz , where z = x+iy , is

A. |z|

B. $|z|^2$

C. $2|z|^2$

D. $\frac{1}{2}|z|^2$

Answer: D

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33. Sum of the first n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots$ is equal to

A. $n-1+\left(\frac{1}{2}\right)^{n}$

B. 1

C. n - 1

D. $1+2^{-n}$

Answer: A

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34. The sum of $0.2 + 0.22 + 0.222 + \ldots$ to n terms is equal to

A. $\left(\frac{2}{9}\right) - \left(\frac{2}{81}\right)(1 - 10^{-n})$

B. $n - \left(\frac{1}{9}\right)(1 - 10^{-n})$

C. $\left(\frac{2}{9}\right)\left[n - \left(\frac{1}{9}\right)(1 - 10^{-n})\right]$

D. $\left(\frac{2}{9}\right)$

Answer: C

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35. The number of ways in which a term of 11 players can be selected from 22 players including 2 of them and excluding 4 of them is

A. ${}^{16}C_{11}$

B. ${}^{16}C_{5}$

C. ${}^{16}C_{9}$

D. ${}^{20}C_{8}$

Answer: C

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36. The number of ways four boys can be seated around a round talble in four chairs of ditterent colours, is

A. 24

B. 12

C. 23

D. 64

Answer: A

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37. If the coefficient of second, third and fourth terms in the expansion of $(1+x)^n$ are in AP, then n is equal to

A. 7

B. 4

C. 5

D. 6

Answer: A

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38. If $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = k(a-b)(b-c)(c-a)$,

then k is equal to

A. -2

B. 1

C. 2

D. abc

Answer: B

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39. $\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$ is equal to

A. 4abc

B. abc

C. $a^2b^2c^2$

D. $4a^2bc$

Answer: A

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40. If $\Delta_1 = \begin{vmatrix} x & a & b \\ b & x & a \\ a & b & x \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x & b \\ a & x \end{vmatrix}$ are the given determinants then

A. $\Delta_1 = 3(\Delta_2)^2$

B. $\left(\frac{d}{dx}\right)(\Delta_1) = 3\Delta_2$

C. $\left(\frac{d}{dx}\right)(\Delta_1) = 3(\Delta_2)_2$

D. $\Delta_1 = 3(\Delta_2)^{\frac{3}{2}}$

Answer: B

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41. The system $x + 4y - 2z = 3, 3x + y + 5z = 7$ and $2x + 3y + z = 5$ has

A. infinite number of solutions

B. unique solution

C. trivial solution

D. no solution

Answer: D

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42. If the three points (k,2k) (2k,3k) (3,1) are collinear, then k is equal to

A. -2

B. 1

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

D. $-\frac{1}{2}$

Answer: A

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43. The foot of the perpendicular from the point (3, 4) on the line 3x - 4y + 5 = 0 is

A. $\left(\frac{81}{25}, \frac{92}{25}\right)$

B. $\left(\frac{92}{25}, \frac{81}{25}\right)$

C. $\left(\frac{46}{26}, \frac{54}{24}\right)$

D. $\left(-\frac{81}{25}, -\frac{92}{25}\right)$

Answer: A

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44. A kite is flying at an inclination of 60° with the horizontal. If the length of the thread is 120 m, then the height of the kite is

A. $60\sqrt{3}m$

B. 60 m

C. $60\sqrt{3}m$

D. 120 m

Answer: A

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45. If the focus of parabola is at (0,-2) and its directrix is $y = 3$, then its equation is

A. $x^2 = -12y$

B. $x^2 = 12y$

C. $y^2 = -12y$

D. $y^2 = 12x$

Answer: A

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