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Total Pages : 10

BCA-105

B.C.A First Year Examination, 2013

B.C.A
Paper– V
(Basic Mathematics)

40

Maximum Marks : 100

SECTION–A

Marks : 50
Time : 1½ Hours

Candidates are required to first answer the Section–A (Multiple Choice Questions) by marking the correct choice on O.M.R. Sheet in prescribed time. All questions are compulsory and carry equal marks. *There is no negative marking* for wrong answers.

SECTION–B

Marks : 50
Time : 1½ Hours

After depositing O.M.R. Sheet of Section–A with invigilator, the candidates are required to answer *one* question from each unit of Section–B (each question in 250 words) in a separate Answer-book provided to them. All questions carry equal marks. Attempt one question from each unit.

SECTION–A

Marks : 50
Time : 1½ Hours

Candidates are required to first answer the Section–A (Multiple Choice Questions) by marking the correct choice on O.M.R. Sheet in prescribed time. All questions are compulsory and carry equal marks. *There is no negative marking* for wrong answers.

1. If $A \subset B$, then $A \cup B$ will be
(A) A
(B) B
(C) A′
(D) B′

2. If $A = \{1, 2, 4, 5\}$, $B = \{2, 3, 5, 6\}$ and $C = \{4, 5, 6, 7\}$, then $A \cup (B \cap C)$ is equal to
(A) {1, 2, 5, 6}
(B) {1, 2, 4, 5}
(C) {1, 2, 4, 5, 6}
(D) {1, 2, 6}

3. In above question A – B will be
(A) {1, 2}
(B) {1, 4}
(C) {4, 5}
(D) {2, 5}

4. If A has three elements, then number of subsets of A will be
(A) 3
(B) 6
(C) 8
(D) 7

5. If X and Y are two sets such that $n(X) = 17$ $n(Y) = 23$ and $n(X \cup Y) = 38$, then n $(X \cap Y)$ is
(A) 78
(B) 44
(C) 2
(D) None of the above

6. If $(x + 3, 5) = (6, 2x + y)$, then y is equal to
(A) 0
(B) –1
(C) 1
(D) 2

7. If $A = \{1, 2, 3\}$ and $B = \{2, 3\}$, then $n(A \times B)$ will be
(A) 5
(B) 3
(C) 6
(D) None of the above

8. If $A = \{0, 1\}$, then $A \times A$ will be
(A) {0, 1}
(B) {(0, 0), (1, 1)}
(C) {(0, 1), (1, 0)}
(D) {(0, 0), (0, 1), (1, 0), (1, 1)}

9. Let R be the relation defined by "x divides y" on z set of integers is
   (A) Symmetric
   (B) Transitive
   (C) Equivalence
   (D) None of the above

10. Let S be the set of all straight lines in a plane. The relation R in S defined by "X is parallel Y" is
   (A) Reflexive
   (B) Symmetric
   (C) Transitive
   (D) All the above

11. If $f(x) = x^2 - 1$, then $f(-1)$ will be
   (A) 0
   (B) 2
   (C) 1
   (D) 4

12. If $f(x) = \sqrt{16 - x^2}$, then Domain of $f(x)$ will be
   (A) {4}
   (B) [– 4, 4]
   (C) (– 4, 4)
   (D) None of the above

13. If $\tan x = \frac{3}{4}$, then sec x will be
   (A) $\frac{3}{5}$
   (B) $\frac{5}{3}$
   (C) $\frac{5}{4}$
   (D) $\frac{4}{5}$

14. If $f(x) = \log x$ and $g(x) = \sin x$, then $f_0 g(x)$ is
   (A) log sin x
   (B) sin log x
   (C) log x sin x
   (D) sin x log x

15. $\lim_{x \to 0} \frac{\sin x}{x}$ will be equal to
   (A) 1
   (B) 0
   (C) 2
   (D) None of the above

16. The value of $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4}$ is
   (A) $\frac{1}{2}$
   (B) $-\frac{1}{2}$
   (C) $\frac{3}{2}$
   (D) $-\frac{3}{2}$

17. $\lim_{x \to 2} \frac{x^2 - 3}{x^2 + 1}$ is equal to
   (A) $\frac{1}{5}$
   (B) $\frac{2}{5}$
   (C) $\frac{3}{5}$
   (D) $\frac{4}{5}$

18. If $f(x)=\begin{cases}2x+k & ; \ x\neq 1\\ 2 & ; \ x=1\end{cases}$ is continuous at $x = 1$, then the value of k is

(A) 1
(B) 0
(C) -1
(D) 2

19. If $f(x)=\begin{cases}x^2+1 & ; \ x\leq 1\\ x & ; \ x>1\end{cases}$, then $f(x)$ is

(A) Continuous at $x = 1$
(B) Not defined at $x = 1$
(C) Discontinuous at $x = 1$
(D) None of the above

20. If $f(x)=\begin{cases}x+\lambda & , \ x<3\\ 4 & , \ x=3\\ 3x-5 & , \ x>3\end{cases}$ is continuous at $x = 3$, then the value of the λ is

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

21. The roots of quadratic equation $x^2 + 5x + 6 = 0$ are

(A) Real
(B) Imaginary
(C) equal
(D) None of the above

22. If α, β are roots of above equation in question (19), then value of $\alpha^2 + \beta^2$ will be

(A) 11
(B) 10
(C) 13
(D) 12

23. The distance between the points $(-1, 0)$ and $(0, 1)$ is equal to

(A) 1
(B) $\sqrt{2}$
(C) 2
(D) 0

24. The line segment joining the points $(1, -2)$ and $(0, 1)$ is divided by X-axis in the ratio

(A) 2 : 1
(B) 1 : 2
(C) 1 : 1
(D) None of the above

25. The equation of line passing through origin and making an angle 45° with X-axis is

(A) $y = x$
(B) $y = 2x$
(C) $2x + y = 0$
(D) $y + 2x = 0$

26. The equation of line having equal intercept on the axes and passing through (1, 1) is

(A) $x + y = 1$
(B) $x - y = 1$
(C) $x - y = 2$
(D) $x + y = 2$

27. If $A=\begin{bmatrix}1 & -1\\ 2 & 0\end{bmatrix}$, then transpose of A is

(A) $\begin{bmatrix}1 & 2\\ 0 & -1\end{bmatrix}$

(B) $\begin{bmatrix}-1 & 1\\ 2 & 0\end{bmatrix}$

(C) $\begin{bmatrix}1 & 2\\ -1 & 0\end{bmatrix}$

(D) $\begin{bmatrix}1 & -1\\ 0 & 2\end{bmatrix}$

28. If $\begin{bmatrix}x+y & 4\\ -1 & y\end{bmatrix}=\begin{bmatrix}4 & 4\\ -1 & 3\end{bmatrix}$, then x is

(A) -1
(B) 1
(C) 0
(D) 3

29. If $A=\begin{bmatrix}1 & 2\\ 2 & 4\end{bmatrix}$ and $B=\begin{bmatrix}1\\ 5\end{bmatrix}$, then AB is

(A) $\begin{bmatrix}11\\ 22\end{bmatrix}$

(B) $\begin{bmatrix}11 & 22\end{bmatrix}$

(C) $\begin{bmatrix}12\\ 12\end{bmatrix}$

(D) None of the above

30. Inverse of the matrix $\begin{bmatrix}4 & 1\\ 2 & 3\end{bmatrix}$ is

(A) $\frac{1}{10}\begin{bmatrix}-1 & 3\\ 4 & -2\end{bmatrix}$

(B) $\frac{1}{10}\begin{bmatrix}3 & -1\\ -2 & 4\end{bmatrix}$

(C) $\frac{1}{10}\begin{bmatrix}3 & -1\\ -4 & 2\end{bmatrix}$

(D) $\frac{1}{10}\begin{bmatrix}-1 & 3\\ -2 & 4\end{bmatrix}$

31. $\frac{d}{dx}\left(\sqrt{x}\right)$ is

(A) $\frac{1}{2\sqrt{x}}$

(B) $\frac{\sqrt{x}}{2}$

(C) $\sqrt{\frac{x}{2}}$

(D) $\frac{2}{\sqrt{x}}$

32. $\frac{d}{dx}(\tan^2 x)$ is

(A) $2 \tan x$
(B) $2 \tan x.\sec^2 x$
(C) $2\tan x + \sec^2 x$
(D) None of the above

33. If $f(x)=\frac{x}{x+1}$, then f'(2) is

(A) $\frac{2}{3}$

(B) $\frac{10}{9}$

(C) $\frac{1}{9}$

(D) None of the above

34. If y = cosec x – cot x, then $\frac{dy}{dx}$ will be

(A) cosec x (cosec x – cot x)
(B) cosec x (cosec x + cot x)
(C) cot x (cosec x + cot x)
(D) cot x (cosec x – cot x)

35. If $y = at^2$ and $x = 2at$, then $\frac{dy}{dx}$ is equal to

(A) t^2
(B) t
(C) $2a$
(D) at

36. If y = sin $3x$, then $\frac{d^2y}{dx^2}$ will be

(A) 9 sin $3x$
(B) 9 cos $3x$
(C) –9 sin $3x$
(D) cos $3x$

37 If $y^2 = 4x$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{2}{y}$

(B) $\frac{y}{2}$

(C) $2y$
(D) None of the above

38. A function $y = f(x)$ will be minimum if

(A) $\frac{d^2y}{dx^2} = 0$

(B) $\frac{d^2y}{dx^2} < 0$

(C) $\frac{d^2y}{dx^2} > 0$

(D) None of the above

39. $f(x) = x^3 - 6x^2 + 4$ has minimum value at

(A) $x = 0$
(B) $x = 4$
(C) $x = 2$
(D) $x = 1$

40. Function $f(x) = x^3 - 3x + 4$ has minimum value at

(A) $x = -1$
(B) $x = 2$
(C) $x = 1$
(D) $x = -2$

41. $\int \frac{4+3\sin x}{\cos^2 x}\,dx$ =

(A) $4\tan x + 3\sec x + c$

(B) $4\sec x + 3\tan x + c$

(C) $3\tan x + 4\sec x + c$

(D) $3\sec x + 4\tan x + c$

42. $\int \frac{dx}{x\sqrt{x^2-1}}$ =

(A) $\tan^{-1} x + c$

(B) $\cos^{-1} x + c$

(C) $\sec^{-1} x + c$

(D) $\text{cosec}^{-1} x + c$

43. $\int \frac{1-\cos 2x}{1+\cos 2x}\,dx$ =

(A) $\tan x + x + c$

(B) $\cot x + x + c$

(C) $\tan x - x + c$

(D) $\cot x - x + c$

44. $\int \cot x\,dx$ =

(A) $\log \sin x + c$

(B) $\log \cos x + c$

(C) $\log \tan x + c$

(D) None of the above

45. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$ =

(A) $2e^{\sqrt{x}} + c$

(B) $-2e^{\sqrt{x}} + c$

(C) $e^{\sqrt{x}} + c$

(D) None of the above

46. $\int \log x\,dx$ =

(A) $\log x - x + c$

(B) $x \log x - x + c$

(C) $\log x + x + c$

(D) $x \log x + x + c$

47. $\int_1^2 x^2\,dx$ =

(A) $\frac{8}{3}$

(B) $\frac{7}{3}$

(C) $\frac{5}{3}$

(D) $\frac{1}{3}$

48. $\int_{\frac{-\pi}{4}}^{\frac{\pi}{4}} x^5 \cos^2 x\,dx$ =

(A) 0

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$

(D) None of the above

33. If $f(x) = \frac{x}{x+1}$, then $f'(x)$ ...

49. The area bounded by the curve $y = x$, line $x = 2$ and X-axis is

(A) $\frac{1}{2}$ square unit

(B) $\frac{3}{2}$ square unit

(C) 2 square unit

(D) 1 square unit

50. The value of the integral $\int_{-4}^{4} (ax^3 + bx + c)\, dx$ depends on

(A) c only

(B) b and c

(C) a, b and c

(D) a and c

$2x + 3y = 10$

$3x + y = 8 \times 3$

$2x + 3y = 10$

$9x + 3y = 24$

$-7x = -14$

$x = \frac{-14}{-7} = 2$

$3x + 3y = 10$

$3 \times 2 + 3y = 10$

$6 + 3y = 10$

$9 \times 2 + 3y = 24$

$18 + 3y = 24$

$18 - 24 + 3y$

$6y + 3y$

$3y = 6$

$y = \frac{6}{3} = 2$

$x = 2 \quad y = 2$

SECTION–B
खण्ड–ब

Marks : 50
Time : 1½ Hours

After depositing O.M.R. Sheet of Section–A with invigilator, the candidates are required to answer *one* question from each unit of Section–B (each question in 250 words) in a separate Answer-book provided to them. All questions carry equal marks.

खण्ड-अ की ओ.एम.आर. शीट पर्यवेक्षक को जमा कराने के पश्चात् परीक्षार्थी खण्ड-ब की प्रत्येक इकाई से **एक** प्रश्न का उत्तर दी गई उत्तर-पुस्तिका में देंगे। प्रत्येक प्रश्न का उत्तर लगभग 250 शब्दों में दिया जाना है। सभी प्रश्नों के अंक समान हैं।

UNIT–I

1. Solve :

$$2x + 3y = 10$$

$$3x + y = 8.$$

2. Find the equation of line which passes through (1, –1) and making an angle 45° with X-axis.

UNIT–II

3. Add :

$x^3 + 3x^2 + 5x + 6$, $2x + 5$ and $x^3 + x + 6$.

4. Using factorisation solve :

$6x^2 + 5x - 6 = 0.$

UNIT–III

5. What should be added to $-15 + 4i$ to obtain $(3 - 2i)$?

6. Solve using Quadratic formulae :

$x^2 - 4\sqrt{2}\,x + 6 = 0$

UNIT–IV

7. If A = {1, 2, 3, 5, 6}, B = {2, 3, 6, 7}, and C = {1, 3, 5, 7, 8}

Find (i) A ∪ (B ∩ C) (ii) A – (B – C).

8. If $f(x) = \frac{x^3}{3} + \frac{x^2}{2} - x + 16$, find $f'(-1)$.

UNIT–V

9. Integrate

$$\int e^{5x+7}\,dx.$$

10. Solve : $\int_0^{\frac{\pi}{2}} \frac{\cos x\,dx}{(1+\sin x)(2+\sin x)}$.