BJNP

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Knowledge is Discipline

Learning with the Speed of Mumbai and the Tradition of Kota

Max. Marks: 100 **Date: 13.11.2022**

ARJUNA BATCH

MATHEMATICS : REVISION TEST 2 (SET A)

Topics: Complex Number, Permutation and Combination and Probability

1. For k = 1, 2, 3 the box B_k contains k red balls and (k + 1) white balls. Let $P(B_1) = \frac{1}{2}$, $P(B_2) = \frac{1}{3}$, $P(B_3) = \frac{1}{6}$. A box is selected at random and a ball is drawn from it. If a red ball is drawn then the probability that it had come from box B_2 is

   (a) $\frac{35}{78}$ (b) $\frac{14}{39}$ (c) $\frac{10}{13}$ (d) $\frac{12}{13}$

2. The probability that A can solve a problem is 2/3 and B can solve is 3/4. If both of them attempt the problem, what is the probability that the problem get solved

   (a) 11/12 (b) 7/12 (c) 5/12 (d) 9/12

3. If $|z - 1| < 2|z - 2|$ then the locus of $z = x + iy$ is

   (a) $x^2 + y^2 + 3x - 2 = 0$ (b) $3x^2 + 3y^2 - 14x + 15 > 0$

   (c) $3x^2 + 3y^2 - 14x + 15 < 0$ (d) $3x^2 + 3y^2 - 14x + 15 = 0$

4. If a random variable X follows B.D. with mean 2.4 and variance 1.44, the number of independent trials n is

   (a) 10 (b) 8 (c) 6 (d) 2

5. The number of ways can a collection of 30 books be divided into two groups of 10 and 20 so that the first group always contains a particular book is

   (a) $^{29}C_{29}$ (b) $^{29}C_{20}$ (c) $^{29}C_{10}$ (d) $^{29}C_9 \times {}^{29}C_{20}$

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6. The number of 6 digit numbers which contains only odd digits and all the odd digits must appear is

(a) $\frac{5}{2}\angle 6$ (b) $\angle 6$ (c) $\frac{1}{2}\angle 6$ (d) $\frac{5}{2}\angle 5$

7. The value of $\sqrt{15+8i}+\sqrt{15-8i}$ is equal to

(a) 15 (b) 8 (c) 23 (d) 7

8. The number of arrangements of the letters of the word BANANA in which N's do not appear adjacently is

(a) 40 (b) 60 (c) 80 (d) 100

9. If the events A and B are mutually exclusive events such that P(A) = $\frac{3x+1}{3}$ and P(B) = $\frac{1-x}{4}$, then the set of possible values of x lies in the interval:

(a) [0, 1] (b) $\left[\frac{1}{3},\frac{2}{3}\right]$ (c) $\left[-\frac{1}{3},\frac{5}{9}\right]$ (d) $\left[-\frac{7}{9},\frac{4}{9}\right]$

10. Let A, B, C be three mutually independent events.

Statement-I : A and B $\cup$ C are independent.

Statement-II: A and B $\cap$ C are independent.

Select the correct answer.

(a) Statement-I statement is true, Statement-II is a correct explanation for statement-I

(b) Statement-I is true, Statement-II is true, Statement-II is not correct explanation for statement-I

(c) Statement-I is true; Statement-II is false

(d) Statement-I is false, Statement-II is true

11. If α and β are two different complex numbers with $|\beta| = 1$, then $\left|\frac{\beta-\alpha}{1-\bar{\alpha}\beta}\right|$ is equal to

(a) $\frac{1}{2}$ (b) 0 (c) –1 (d) 1

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12. I : If a and b are positive real numbers then $\sqrt{-a} \times \sqrt{-b} = \sqrt{ab}$

II : The Arg $\left[\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right]$ is 120°

Which of the statements are true.

(a) Only II (b) Only II (c) Both I and II (d) Neither I nor II

13. Four digit numbers formed with 1, 2, 4, 6, 8 without repetition are formed in ascending order. Then the rank of 4618 is

(a) 31 (b) 62 (c) 124 (d) 248

14. A box contain 10 mangoes out of which 4 are rotten. Two mangoes are taken together. If one of them is found to be good, the probability that the other is rotten is

(a) $\frac{5}{13}$ (b) $\frac{7}{13}$ (c) $\frac{8}{13}$ (d) $\frac{9}{13}$

15. The number of onto functions that can be defined from A = {a, b, c, d, e} to {1, 2} is

(a) 30 (b) 0 (c) 60 (d) 32

16. Three dice are rolled. If no two dice shows the same face, the probability that one is an ace

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{8}$

17. If 4 dice are rolled, the number of ways of getting the sum "10" is

(a) 56.0 (b) 64.0 (c) 72.0 (d) 80.0

18. A tosses 2 coines while B tosses 3. The probability that B obtains more number of heads is

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

19. If z is a complex number satisfying the relation $|z + 1| = z + 2(1 + i)$ then z is

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(a) $\frac{1}{2}(1+4i)$ (b) $\frac{1}{2}(3+4i)$ (c) $\frac{1}{2}(3-4i)$ (d) $\frac{1}{2}(1-4i)$

20. A box X contains 2 white and 3 black balls and another bag Y contains 4 while and 2 black balls. One bag is selected at random and a ball is drawn from it. Then the probability for the ball chosen be white is

(a) $\frac{2}{15}$ (b) $\frac{7}{15}$ (c) $\frac{8}{15}$ (d) $\frac{14}{15}$

21. Five coins whose faces are marked 2 and 3 are thrown. The chance of obtaining a total is 12 is

(a) $\frac{11}{16}$ (b) $\frac{15}{16}$ (c) $\frac{5}{16}$ (d) $\frac{1}{16}$

22. The additive inverse of $(1 + 2i)(3 – 4i)$ is

(a) $11 + 2i$ (b) $11 – 2i$ (c) $–11 + 2i$ (d) $–11 – 2i$

23. A speaks truth in 4 out of 5 times. A die is tossed. If A reports that there is 4 on the die, then the probability that there was 4 on the die, is

(a) $\frac{2}{3}$ (b) $\frac{4}{9}$ (c) $\frac{1}{3}$ (d) $\frac{2}{9}$

24. A and B play a game in which A's chance of winning is $\frac{1}{5}$. In a series of 6 games, the probability that A will win all the 6 games is

(a) ${}^6C_2\left(\frac{1}{5}\right)^6$ (b) ${}^6C_6\left(\frac{1}{5}\right)^6\left(\frac{4}{5}\right)^0$ (c) $\left(\frac{4}{5}\right)^6$ (d) ${}^6C_5\left(\frac{1}{5}\right)^6$

25. If the range of random variable $X = \{0, 1, 2, \ldots.\}$ and $P(X = k) = \frac{c(k+1)}{2^k}$ for $k = 0, 1, 2, \ldots$ then $c =$

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{5}$

26. If ${}^nP_4 = 30240$, ${}^nC_r = 252$ then the ordered pair (n, r) =

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(a) (12, 6) (b) (10, 5) (c) (9, 4) (d) (16, 7)

27. Let S = {1, 2, …., 20}. A subset B of S is said to be "nice", if the sum of the elements of B is 203. Then the probability that a randomly chosen subset of S is "nice" is

(a) $\frac{6}{20^{20}}$ (b) $\frac{5}{2^{20}}$ (c) $\frac{4}{2^{20}}$ (d) $\frac{7}{2^{20}}$

28. The sum of two natural numbers is 20. Find the chance that their product less than 50 is

(a) $\frac{4}{19}$ (b) $\frac{3}{19}$ (c) $\frac{2}{19}$ (d) $\frac{1}{19}$

29. The conjugate of $(1 + 2i)(2 - 3i)$ is

(a) $-4 + i$ (b) $-4 - i$ (c) $(8 + i)$ (d) $(8 - i)$

30. If a, b and c are the greatest value of ${}^{19}C_p$, ${}^{20}C_q$ and ${}^{21}C_r$ respectively then

(a) $\frac{a}{11} = \frac{b}{22} = \frac{c}{42}$ (b) $\frac{a}{22} = \frac{b}{11} = \frac{c}{42}$ (c) $\frac{a}{22} = \frac{b}{42} = \frac{c}{11}$ (d) $\frac{a}{21} = \frac{b}{11} = \frac{c}{22}$

31. If α and β are real then $\left|\frac{\alpha + i\beta}{\beta - i\alpha}\right| =$

(a) Lies between 0 and 1 (b) 1

(c) > 1 (d) 0

32. A dice is thrown $2n + 1$ times, $n \in N$. The probability that faces with even numbers show up odd number of times is

(a) $\frac{2n+1}{4n+3}$ (b) less than $\frac{1}{2}$

(c) greater than $\frac{1}{2}$ (d) Equals to $\frac{1}{2}$

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33. The value of $\left[\frac{1+\cos\frac{\pi}{8}+i\sin\frac{\pi}{8}}{1+\cos\frac{\pi}{8}-i\sin\frac{\pi}{8}}\right]^8$

(a) $1+i$ (b) $1-i$ (c) 1 (d) -1

34. If a polygon of n sides has 54 diagonals, then n is equal to

(a) 12 (b) 11 (c) 13 (d) 14

35. A husband and wife appear in an interview for two vacancies in the same post. The probability of husbands selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. The probability that both of them will be selected is

(a) $\frac{24}{35}$ (b) $\frac{2}{7}$ (c) $\frac{1}{35}$ (d) $\frac{2}{35}$

36. If $x = -5 + 4i$ then $x^4 + 9x^3 + 35x^2 - x + 4 =$

(a) 170 (b) 160 (c) –170 (d) –160

37. The number of natural numbers less than 7,000 which can be formed by using the digits 0, 1, 3, 7, 9 (repetition of digits allowed) is equal to

(a) 375 (b) 275 (c) 274 (d) 374

38. A random variable x has the following probability distribution:

X	1	2	3	4	5	6	7
P(X)	2k	k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Determine $P(X > 6)$

(a) $\frac{14}{100}$ (b) $\frac{15}{100}$ (c) $\frac{16}{100}$ (d) $\frac{17}{100}$

39. A number n is choosen at random from S = {1, 2, 3, .., 50}. Let

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$A = \left\{ n \in S : n + \frac{50}{n} > 27 \right\}$

$B = \{ n \in S : n \text{ is a prime} \}$ and

$C = \{ n \in S : n \text{ is a square} \}$

The correct order of their probabilities is

(a) $P(A) < P(B) < P(C)$ (b) $P(A) > P(B) > P(C)$

(c) $P(B) < P(A) < P(C)$ (d) $P(A) > P(C) > P(B)$

40. If z is purely imaginary and Im(z) > 0, then amp(z) =

(a) π (b) $\frac{\pi}{2}$ (c) 0 (d) $-\frac{\pi}{2}$

41. If $a = \text{cis } \alpha$, $b = \text{cis } \beta$, $c = \text{cis } \gamma$ and $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 1$ then $\cos(\alpha + \beta) + \cos(\beta - \gamma) + \cos(\gamma - \alpha) =$

(a) 0 (b) 1 (c) –1 (d) 2

42. If $z_1 = \cos\theta_1 + i \sin\theta_1$, $z_2 = \cos\theta_2 + i \sin\theta_2$ then $z_1 z_2$ is

(a) $\cos(\theta_1, \theta_2) + i \sin(\theta_1 . \theta_2)$ (b) $\cos(\theta_1 - \theta_2) - i \sin(\theta_1 - \theta_2)$

(c) $\cos(\theta_1 . \theta_2) - i \sin(\theta_1 . \theta_2)$ (d) $\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2)$

43. The number of ways in which 6 things can be divided

Statement I : into 2 equal groups is 10

Statement II : among 2 persons equally is 20.

Which of the above statements is true.

(a) Only I is true (b) Only II is true

(c) Both I and II are true (d) Neither I nor II true

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44. There are 10 true-false questions in an examination. The number of ways in which these questions can be answered is

(a) 240 (b) 20 (c) 1024 (d) 100

45. An urn contains 5 red and 2 green balls. A ball is drawn at random from the urm. If the drawn ball is green, then a red ball is added to the urn and if the drawn ball is red, then a green ball is drawn at random from it. The probability that the second ball is red, is

(a) $\frac{32}{49}$ (b) $\frac{17}{49}$ (c) $\frac{15}{49}$ (d) $\frac{36}{49}$

46. Assuming the balls to the identical except for difference in colours, the number of ways in which one or more balls can be selected from 10 white, 9 green and 7 black balls is

(a) 880 (b) 629 (c) 630 (d) 879

47. If arg z = $\pi / 4$ then

(a) Re z^2 = 1 mz^2 (b) I $mz^2 = 0$ (c) Re $z^2 = 0$ (d) Re z = 0

48. Six persons A, B, C, D, E and F are to be seated at a circular table facing towards the centre. Then the number of ways that can be done if A must have either E or F on his immediate right and E must have either F or D on his immediate right, is

(a) 18 (b) 30 (c) 12 (d) 24

49. Number of different matrices that can be formed with elements 0, 1, 2 or 3 each matrix having 4 elements is

(a) 3×2^4 (b) 2×4^4 (c) 3×4^4 (d) 2^4

50. If $P(B) = \frac{3}{5}$, $P(A|B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$, then $P(A \cup B)' + P(A' \cup B) =$

(a) $\frac{1}{5}$ (b) $\frac{4}{5}$ (c) $\frac{1}{2}$ (d) 1

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MATHEMATICS : REVISION TEST 2 (SET A)

Topics: Complex Number, Permutation and Combination and Probability

Answer Key

1.	(b)	2.	(a)	3.	(b)	4.	(c)	5.	(b)
6.	(a)	7.	(b)	8.	(a)	9.	(c)	10.	(b)
11.	(d)	12.	(b)	13.	(b)	14.	(c)	15.	(a)
16.	(c)	17.	(d)	18.	(c)	19.	(d)	20.	(c)
21.	(c)	22.	(d)	23.	(b)	24.	(b)	25.	(c)
26.	(b)	27.	(b)	28.	(a)	29.	(d)	30.	(a)
31.	(b)	32.	(d)	33.	(d)	34.	(a)	35.	(c)
36.	(d)	37.	(d)	38.	(d)	39.	(b)	40.	(b)
41.	(b)	42.	(d)	43.	(c)	44.	(c)	45.	(a)
46.	(d)	47.	(c)	48.	(a)	49.	(c)	50.	(d)