MATHS

Syllabus: ***STATISTICS AND PROBABILITY:– 1. MEASURES OF CENTRAL TENDENCY, 2. MEASURES OF DISPERSION, 3. MATHEMATICAL REASONING, 4. SEQUENCE AND SERIES, 5. RANDOM VARIABLES AND DISTRIBUTION 6. PORBABALITY***

1. A man is known to speak the truth 3 out of 4 times. He throws a die & reports that it is a six. The probability that it is actually a six is

   (A) $\frac{3}{8}$ (B) $\frac{1}{5}$ (C) $\frac{3}{4}$ (D) none of these

2. A fair coin is tossed 100 times. The probability of getting tails an odd number of times is

   (A) $\frac{1}{2}$ (B) $\frac{1}{8}$ (C) $\frac{3}{4}$ D) none of these

3. An unbiased die with faces marked 1, 2, 3, 4, 5 & 6 is rolled 4-times. Out of 4 face values obtained, the probability that the minimum face value is not less than two and the maximum face value is not greater than 5 is

   (A) $\frac{16}{81}$ (B) $\frac{1}{81}$ (C) $\frac{80}{81}$ (D) $\frac{65}{81}$

4. 15 persons among whom are A & B, sit down at random at a round table, the probability that there are 4 persons between A & B is

   (A) $\frac{2}{17}$ (B) $\frac{1}{7}$ (C) $\frac{1}{2}$ (D) none of these

5. The probabilities of two events are 0.25 and 0.50. The total probability of both happening together is 0.14. Which of the following is the probability of none of the events happening?

   (A) 0.39 (B) 0.25 (C) 0.11 (D) none of these

6. If $P(A)=\frac{2}{3}, P(B)=\frac{1}{2}$ and $P(A\cup B)=\frac{5}{6}$, then the events A and B are

   (A) mutually exclusive (B) independent
   (C) independent as well as mutually exclusive (D) none of these

7. A fair coin is tossed n times. If the probabilities of getting 4, 5, 6 heads be in A.P, then n is equal to

   (A) 12 (B) 8 (C) 15 (D) 14

8. The probability that a rectangle picked up from a chessboard has the area $6cm^2$ where the distance between consecutive parallel lines on the board is 1 cm, is

   (A) $\frac{3}{56}$ (B) $\frac{3}{28}$ (C) $\frac{9}{56}$ (D) none of these

9. The probability that in a year chosen at random there will be 53 Sunday is

   (A) $\frac{1}{4}$ (B) $\frac{5}{28}$ (C) $\frac{1}{7}$ (D) none of these

10. In the quadratic equation $ax^2+bx+c=0$ the coefficients a, b, c take distinct values from the set {1, 2, 3}. The probability that roots of equation are real is

    (A) $\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) none of these

11. A set 'A' has n elements, let P be the power set of A i.e. set of subsets of A, one set is selected at random from A, the probability that it has two elements is

(A) $\frac{1}{2}$ (B) $\frac{1}{2^{n-1}}$ (C) $\frac{n(n-1)}{2^{n+1}}$ (D) none of these

12. Two distinct digits are chosen at random from the set {1, 2, 3, ……., 8}. The probability of their sum being equal to 5 is

(A) $\frac{1}{14}$ (B) $\frac{3}{28}$ (C) $\frac{5}{8}$ (D) none of these

13. A and B stand in a line at random with 10 other people, the chance that there will be 3 people between them is

(A) $\frac{2}{33}$ (B) $\frac{2}{99}$ (C) $\frac{4}{33}$ (D) none of these

14. Six boys and six girls sit in a row at random, then the probability that six girls sit together is

(A) $\frac{1}{66}$ (B) $\frac{1}{132}$ (C) $\frac{1}{462}$ (D) none of these

15. $E_1, E_2, ..., E_n$ are n independent events such that $P(E_1) = \frac{1}{2i+1}$ for $1 \le i \le n$. The chance that none of $E_1, E_2, ...E_n$ occurs is

(A) $\frac{1}{(n+1)!}$ (B) $2^n \frac{n!}{(2n+1)!}$ (C) $2^{2n} \frac{(n!)^2}{(2n+1)!}$ (D) $2^n \frac{(n!)^2}{(2n+1)!}$

16. A bag contains 16 coins of which four have heads on both sides and the remaining 12 are fair coins. A coin is selected at random and tossed. The chance that a head shows up is

(A) $\frac{1}{2}$ (B) $\frac{5}{16}$ (C) $\frac{5}{8}$ (D) none of these

17. A team of 12 married couples attend a party at which five persons are chosen for a prize. The chance that the selected persons are of the same sex is

(A) $\frac{2 \cdot {}^{12}C_5}{{}^{24}C_5}$ (B) $\frac{{}^{12}C_5}{{}^{24}C_5}$ (C) $\frac{1}{2}$ (D) none of these

18. One boy can solve 60% of the problems in a book and another can solve 80%. The probability that at least one of the two can solve a problem chosen at random from the book is

(A) $\frac{2}{25}$ (B) $\frac{23}{25}$ (C) $\frac{4}{5}$ (D) $\frac{9}{10}$

19. Three dice are rolled. The probability that different numbers will appear on them is

(A) $\frac{2}{3}$ (B) $\frac{4}{9}$ (C) $\frac{5}{9}$ (D) $\frac{2}{9}$

20. A speaks truth in 60% cases and B speaks truth in 70% cases. The probability that they will say the same thing while describing single event is

(A) 0.56 (B) 0.54 (C) 0.38 (D) 0.94

21. From a pack of 52 cards two cards are drawn at random, the probability that both cards are diamonds is

(A) $\frac{1}{16}$ (B) $\frac{1}{17}$ (C) $\frac{1}{18}$ (D) $\frac{1}{19}$

22. Twenty-five coins are tossed simultaneously. The probability that the fifth coin will fall with head upwards, is

(A) $\frac{5}{25}$ (B) $\frac{5}{2^{25}}$ (C) $\frac{1}{2}$ (D) none of these

23. If two squares are chosen at random on a chess board, the probability that they have a side in common is

(A) $\frac{1}{9}$ (B) $\frac{4}{9}$ (C) $\frac{3}{7}$ (D) $\frac{1}{18}$

24. In a bag there are 15 red and 5 white balls. Two balls are chosen at random and is found to be red. The probability that the second one is also red is

(A) $\frac{12}{19}$ (B) $\frac{13}{19}$ (C) $\frac{14}{19}$ (D) $\frac{15}{19}$

25. A die is thrown three times and the sum of three numbers obtained is 15. The probability of first throw being 4 is

(A) $\frac{1}{18}$ (B) $\frac{1}{5}$ (C) $\frac{4}{5}$ (D) $\frac{17}{18}$

26. If A and B are two events such that $P(A)=\frac{1}{2}$ and $P(B)=\frac{2}{3}$, then

(A) $P(A\cup B)\geq\frac{2}{3}$ (B) $P(A\cap B)>\frac{1}{3}$ (C) $P(A\cap B)>\frac{1}{2}$ (D) $P(A'\cap B)>\frac{1}{2}$

27. A class consists of 80 students, 25 of them are girls and 55 boys. If 10 of them are rich and the remaining poor and also 20 of them are intelligent and others are not, then probability of selecting an intelligent rich girl is

(A) $\frac{5}{128}$ (B) $\frac{25}{128}$ (C) $\frac{5}{512}$ (D) none of these

28. A number of six digits is written down at random. Probability that sum of digits of the number is even is

(A) $\frac{1}{2}$ (B) $\frac{3}{8}$ (C) $\frac{3}{7}$ (D) none of these

29. A number of five digits is formed by using the digits 0, 1, 2, 3, 4, no digit being repeated in any number. The probability that it is a number divisible by 4 is

(A) $\frac{1}{3}$ (B) $\frac{5}{16}$ (C) $\frac{1}{4}$ (D) $\frac{4}{15}$

30. A fair die is thrown until a score of less than 5 points is obtained. The probability of obtaining not less than 2 points on the last throw is

(A) $\frac{3}{4}$ (B) $\frac{5}{6}$ (C) $\frac{4}{5}$ (D) $\frac{1}{3}$

31. The probability of having at least one head in 5 throws of a coin is

(A) $\frac{5}{32}$ (B) $\frac{31}{32}$ (C) $\frac{1}{32}$ (D) none of these

32. In bag A there are 5 white and 3 black balls. In bag B there are 3 white and 1 black balls. One ball is chosen at random from any bag and found to be white then the probability that it is from bag B is

(A) $\frac{5}{11}$ (B) $\frac{6}{11}$ (C) $\frac{3}{8}$ (D) none of these

33. A special die with numbers − 3, − 2, − 1, 0, 1 , 2 on its faces is thrown thrice then probability that the sum of the numbers appeared on faces is equal to zero is

(A) $\frac{25}{36}$ (B) $\frac{25}{6^3}$ (C) $\frac{55}{6^3}$ (D) none of these

34. Two cards are drawn from a pack of 52 cards one by one without replacement then probability of getting king and queen of different colour is

(A) $\frac{4}{26\times 51}$ (B) $\frac{4}{13\times 51}$ (C) $\frac{8}{13\times 51}$ (D) none of these

35. The distinct numbers are chosen from the set {1, 2, …6}. The probability that the product of two numbers is the third one is

(A) 1.2 (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) none of these

36. A and B are two events such that P(A) = 0.2 and $P(A \cup B) = 0.7$. If A and B are independent events then P(B′) equals

(A) $\frac{2}{7}$ (B) 7.9 (C) $\frac{3}{8}$ (D) none of these

37. If $P(A \cup B) = \frac{5}{6}$, $P(A \cap B) = \frac{1}{3}$ and $P(\bar{B}) = \frac{1}{2}$, then which of the following is not true

(A) $P(A) = \frac{2}{3}$ (B) $P(B) = \frac{1}{2}$

(C) P (A) and P (B) are independent events (D) none of these

38. The probability that the roots of the equation $x^2 + nx + \frac{n}{2} = 0$ are real, where $n \in N$ and $n \le 8$ is

(A) $\frac{1}{2}$ (B) $\frac{7}{8}$ (C) $\frac{4}{5}$ (D) $\frac{3}{5}$

39. Three fair dice are rolled once. If on any two 4 comes, then the probability that on the third 5 will appear, is

(A) $\frac{7}{8}$ (B) $\frac{1}{3}$ (C) $\frac{1}{72}$ (D) $\frac{3}{16}$

40. The total number of squares of any size (side being natural numbers) in a rectangle of $m \times n (m<n)$ $(m,n \in N)$ is

(A) $\frac{m}{6}(m+1)(3n-m+1)$ (B) $\frac{m}{2}(m+1)$

(C) $\frac{(m+1)(m+2)}{4}$ (D) None of these

41. Let S be the set of all functions from the set A to the set A. If n (A) = k, then n (S) is

(A) k ! (B) k^k (C) $2^k - 1$ (D) 2^k

42. India play two matches each with West Indies and Australia .In any match the probabilities of India getting points 0, 1 and 2 are 0.45, 0.05 and 0.50 respectively. Assuming that the outcomes are independent, the probability of India getting at least 7 points is

(A) 0.8750 (B) 0.0875 (C) 0.0625 (D) 0.0250

43. One hundred identical coins, each with probability p, showing up heads are tossed once. If $0 < p < 1$ and the probability of heads showing on 50 coins is equal to that of heads showing on 51 coins, then the value of p is

(A) 1/2 (B) 49/101 (C) 50/101 (D) 51/101

44. A four figure number is formed of the figures 1,2,3,5, with no repetitions. The probability that the number is divisible by 5 is

(A) 3/ 4 (B) 1/ 4 (C) 1/8 (D) None of these

45. A bag contains 4 tickets numbered 1, 2,3,4 and another bag contains 6 tickets numbered 2,4,6,7,8,9 .One bag is chosen and a ticket is drawn . The probability that the ticket bears the number 4 is

(A) 1/48 (B) 1/8 (C) 5/24 (D) None of these

46. A and B play a game of tennis. The situation of the game is as follows; if one scores two consecutive points after a deuce he wins; if loss of a point is followed by win of a point, it is deuce. The chance of a server to win a point is 2/3. The game is at deuce and A is serving. Probability that A will win the match is, (serves are changed after each game)

(A) 3/5 (B 2/5 (C) 1/2 (d) 4/5

47. A die is thrown three times and the sum of three numbers obtained is 15. The probability of first throw being 4 is

(A) 1/18 (B) 1/5 (C) 4/5 (D) 17/18

48. Six different balls are put in three different boxes, no box being empty. The probability of putting balls in the boxes in equal numbers is,

(A) 3/10 (B) 1/6 (C) 1/5 (D) none of these

49. If P (B) $=\frac{3}{4}P(\bar{A}\cap B\cap\bar{C})=\frac{1}{3}P(A\cap B\cap\bar{C})=\frac{1}{3}$. Then P (B $\cap$C) is

(A) $\frac{1}{12}$ (B) $\frac{3}{4}$ (C) $\frac{5}{12}$ (D) $\frac{23}{96}$

50. Consider a set 'P' containing n elements. A subset 'A' of 'P' is drawn and thereafter set 'P' is reconstructed. Now one more subset 'B' of 'P' is drawn. Probability of drawing sets A and B so that A $\cap$ B has exactly one element is

(A) $(3/4)^n$ (B) n. $(3/4)^{n-1}$ (C) n. $(3/4)^n$ (D) none of these

51. A fair die is thrown until a score of less than 5 points is obtained. The probability of obtaining not less than 2 points on the last thrown is

(A) 3/4 (B) 5/6 (C) 4/5 (D) 1/3

52. A fair die is tossed eight times. Probability that on the eighth throw a third six is observed is,

(A) ${}^8C_3\frac{5^5}{6^8}$ (B) $\frac{{}^7C_2.5^5}{6^8}$ (C) $\frac{{}^7C_2.5^5}{6^7}$ (D) none of these

53. If the papers od 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

(A) 2/ 7 (B) 32/ 343 (C) 12/ 49 (D) 6/49

54. In a bag there are 15 red and 5 white balls. Two balls are chosen at random and one is found to be red. The probability that the second one is also red is

(A) 12/19 (B) 13/19 (C) 14/19 (D) 15/19

55. Let E and F be two independent events. The probability that both E and F happen is $\frac{1}{12}$ and the probability that neither E nor F happen is $\frac{1}{2}$, then

(A) P (E) $=\frac{1}{3},\ P(F)=\frac{1}{4}$ (B) P (E) = $\frac{1}{2},\ P(F)=\frac{1}{6}$

(C) P (E) $=\frac{1}{6},\ P(F)=\frac{1}{2}$ (D) none of these

56. Three persons A_1, A_2 and A_3 are to speak at a function along with 5 other persons. If the person speak in random order, the probability that A_1 speaks before A_2 and A_2 speaks before A_3 is'

(A) 1/6 (B) 3/5 (C) 3/8 (D) none of these

57. Two persons A, and B, have respectively n + 1 and n coins, which they toss simultaneously. Then probability P that A will have more heads then B

(A) P $>\frac{1}{2}$ (B) P = $\frac{1}{2}$ (C) $\frac{1}{4}<P<\frac{1}{2}$ (D) $0<P<\frac{1}{4}$

58. On a toss of two dice, A throws a total of 5, then the probability that he will throw another 5 before he throws 7, is

(A) $\frac{1}{9}$ (B) $\frac{1}{6}$ (C) $\frac{2}{5}$ (D) $\frac{5}{36}$

59. One of two events must occur. If the chance of one is $\frac{2}{3}$ of the other, then odd in favour of the other are

(A) 1 : 3 (B) 3 : 1 (C) 2 : 3 (D) none of these

60. A draws two cards with replacement from a pack of 52 cards and B throws a pair of dice what is the chance that A gets both cards of same suit and B gets total of 6

(A) $\frac{1}{144}$ (B) $\frac{1}{4}$ (C) $\frac{5}{144}$ (D) $\frac{7}{144}$

61. If A and B are two events such that P(A) = 1/2 and P(B) = 2/3, then
(A) $P(A\cup B) \geq 2/3$ (B) $P(A\cap B') \leq 1/3$
(C) $1/6 \leq P(A\cap B) \leq 1/2$ (D) $1/6 \leq P(A'\cap B) \leq 1/2$

62. A fair coin is tossed 99 times. Let X be the number of times heads occurs. Then P(X=r) is maximum when r is
(A) 49 (B) 52 (C) 51 (D) None of these

63. The numbers 1, 2, 3,……..,n are arrange in random order . the probability that the digits 1, 2,3………k(k<n) appear as neighbours in that order is
(A) $\frac{1}{n!}$ (B) $\frac{k!}{n!}$ (C) $\frac{(n-k)!}{n!}$ (D) None of these

64. Entries of a 2 × 2 determinant are chosen from the set {1, 1}. The probability that determinant has zero value is
(A) 1/4 (B) 1/3 (C) 1/2 (D) none of these

65. A reputed coaching employed 8 professors in the staff. Their respective probabilities of remaining in employment for three years are $\frac{2}{10}, \frac{3}{10}, \frac{4}{10}, \frac{5}{10}, \frac{6}{10}, \frac{7}{10}, \frac{8}{10}, \frac{9}{10}$. The probability that after 3 years at least six of these still work in the coaching.
(A) 0.15 (B) 0.19 (C) 0.3 (D) none of these

66. A business man is expecting two telephone calls. Mr Walia may call any time between 2 p.m and 4 p.m. while Mr Sharma is equally likely to call any time between 2.30 p.m. and 3.15 p.m. The probability that Mr Walia calls before Mr Sharma is
(A) 1/18 (B) 1/6 (C) 1/6 (D) none of these

67. Let X be a set containing n elements. If two subsets A and B of X are picked at random, the probability that A and B have the same number of elements is
(A) $\frac{^{2n}C_n}{2^{2n}}$ (B) $\frac{1}{^{2n}C_n}$ (C) $\frac{1.3.5......(2n-1)}{2^n.(n!)}$ (D) $\frac{3^n}{4^n}$

68. For any two events A and B in a sample space
(A) $P(A/B) \geq \frac{P(A)+P(B)-1}{P(B)}$, $P(B) \neq 0$, is always true

(B) $P(A\cap B) = P(A) - P(\bar{A}\cap\bar{B})$ does not hold.

(C) $P(A\cup B) = 1 - P(\bar{A})\,P(\bar{B})$, if A and B are independent.

(D) $P(A\cup B) = 1 - P(\bar{A})\,P(\bar{B})$, if A and B are disjoint

69. A die is thrown a fixed number of times. If probability of getting even number 3 times is same as the probability of getting even number 4 times, then probability of getting even number exactly once is
(A) 1/4 (B) 3/128 (C) 5/64 (D) 7/128

70. A man is know to speak the truth 3 out if 4 times. He throws a die and reports that it is a six. The probability that it is actually a six is
(A) 3/8 (B) 1/5 (B) 3/4 (D) None of these

71. Three of six faces of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral equal to
(A) $\frac{1}{2}$ (B) $\frac{1}{5}$ (C) $\frac{1}{10}$ (D) $\frac{1}{20}$

72. A fair coin is tossed repeatedly. If tail appear on 1^{st} four tosses, then the probability of head appearing on 5^{th} toss equals to
(A) $\frac{1}{2}$ (B) $\frac{1}{32}$ (C) $\frac{31}{32}$ (D) $\frac{1}{5}$

73. A number is chosen at random from the numbers 10 to 99. By seeing the number a man will laugh if product of the digits is 12. If he choose three numbers with replacement then the probability that he will laugh at least once is

(A) $1-\left(\frac{3}{5}\right)^3$ (B) $\left(\frac{43}{45}\right)^3$ (C) $1-\left(\frac{4}{25}\right)^3$ (D) $1-\left(\frac{43}{45}\right)^3$

74. Let E and F be two independent events. The probability that both E and F happen is 1/12 and the probability that neither E nor F happens is ½ then

(A) P(E) = 1/3, P(F) = 1/4 (B) P(E) = 1/2, P(F) = 1/6
(C) P(E) = 1/6, P(F) = 1/2 (D) P(E) = 1/4, P(F) = 1/3

75.. An ordinary cube has four faces, one face market 2 another marked 3. Then the probability of obtaining a total of exactly 12 in five throws is

(A) $\frac{5}{1296}$ (B) $\frac{5}{1944}$ (C) $\frac{5}{2592}$ (D) none of these

76. A bag has 13 red, 14, green and 15 black balls. The probability of getting exactly 2 black on pulling out 4 balls is P_1. Now the number of each colour ball is doubled and 8 balls are pulled out. The probability of getting exactly 4 blacks is P_2 then

(A) $P_1 = P_2$ (B) $P_1 > P_2$ (C) $P_1 < P_2$ (D) can't say

77. A coin is tossed repeatedly. The probability of getting a result in the fifth toss different from those obtained in the first four tosses is

(A) 1/16 (B) 1/32 (C) 15/16 (D) none of these

78. If 'head' means one and 'tail' means two , then coefficient of quadratic equation $ax^2 + bx + c = 0$ are chosen by tossing three fair coins. The probability that roots of the equations are imaginary is

(A) 5/8 (B) 3/8 (C) 7/8 (D) 1/8

79. If x and y are independent binomial variates A (5, 1/2) and B (7, 1/2), then P (x + y = 3) is equal to

(A) $\frac{55}{1024}$ (B) $\frac{55}{512}$ (C) $\frac{11}{256}$ (D) none of these

80. Suppose n (≥ 3) persons are sitting in a row. Two of them are selected at random. The probability that they are not together is

(A) $1-\frac{2}{n}$ (B) $\frac{2}{n-1}$ (C) $1-\frac{1}{n}$ (D) None of these

81. If n integers taken at random are multiplied together, then the probability that the last digit of the product is 1, 3, 7 or 9 is

(A) $\frac{2^n}{5^n}$ (B) $\frac{8^n-2^n}{5^n}$ (C) $\frac{4^n-2^n}{5^n}$ (D) None of these

82. A natural number is selected at random from the set X = {x; 1 ≤ x ≤ 100}. The probability that the number satisfies the inequation $x^2 - 13x - 30 < 0$, is

(A) 9/50 (B) 3/20 (C) 2/11 (D) none of these

83. Fifteen coupons are numbered 1, 2, 3, - - - 15. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on the selected coupon is 9, is

(A) $\left(\frac{9}{16}\right)^6$ (B) $\left(\frac{8}{15}\right)^7$ (C) $\left(\frac{3}{5}\right)^7$ (D) none of these

84. Two subsets A and B of a set containing n elements are chosen at random. The probability that $A \subseteq B$ is

(A) $\frac{1}{2}$ (B) $\frac{2^n}{n!}$ (C) $\left(\frac{2}{3}\right)^n$ (D) $\left(\frac{3}{4}\right)^n$

85. A bag contains four tickets marked with numbers 112, 121, 211, 222. One ticket is drawn at random from the bag. Let E_i (i = 1,2,3) denote the event that ith digit on the ticket is 2. Then
(A) E_1 and E_2 are independent (B) E_2 and E_3 are independent
(C) E_3 and E_1 are independent (D) E_1, E_2, E_3 are independent

86. A drawer contains 5 brown socks and 4 blue socks well mixed. A man reaches the drawer and pulls out 2 socks at random. What is the probability that they match?
(A) 4/9 (B) 5/8 (C) 5/9 (D) 7/12

87. If m rupee coins and n ten paise coins are placed in a line, then the probability that the extreme coins are ten paise coins is
(A) $^{(m+n)}C_m$ (B) $\frac{n(n-1)}{(m+n)(m+n-1)}$ (C) $^{(m+n)}P_m$ (D) $^{(m+n)}P_n$

88. A and B are two events. The probability that at most one of A, B occurs is
(A) $1- P(A\cap B)$ (B) $P(A') + P(B') - P(A'\cap B')$
(C) $P(A') + P(B') + P(A\cup B) -1$ (D) $P(A\cap B') + P(A'\cap B) + P(A'\cap B')$

89. Let A and B be two events such that $P\left(A\cap B^1\right)=0.20,\ P\left(A^1\cap B\right)=0.15,\ P\left(A^1\cap B^1\right)=0.1$ then P(A/B)=
(A) 11/14 (B) 2/11 (C) 2/7 (D) 1/7

90. Two numbers are chosen from {1, 2, 3, 4, 5, 6} one after another without replacement, then find the probability that one of the smallest value is less than 4, is
(A) $\frac{4}{5}$ (B) $\frac{1}{15}$ (C) $\frac{1}{5}$ (D) $\frac{14}{15}$

91. An unbiased die with faces marked 1, 2, 3, 4, 5, 6 is rolled four times. Out of four face value obtained, the probability that minimum face value is not less than 2 and the maximum face value is not greater than 5 is equal to
(A) $\frac{16}{81}$ (B) $\frac{1}{81}$ (C) $\frac{80}{81}$ (D) $\frac{65}{81}$

92. Suppose there is a set contains 11 elements a_1, a_2, ……… a_{11}. A subset P of A is chosen at random. The set A is reconstructed by replacing the elements of the subset of P. A subset Q of A is again chosen atrandom, then the probability then P and Q are values intersecting set is
(A) $\frac{3}{4}$ (B) $\left(\frac{3}{4}\right)^2$ (C) $\left(\frac{3}{4}\right)^{11}$ (D) $\left(\frac{1}{4}\right)^{11}$

93. There are n persons ($n \geq 3$), among whom are A and B, who are made to stand in a row in random order. Probability that there is exactly one person between A and B is
(A) $\frac{n-2}{n(n-1)}$ (B) $\frac{2(n-2)}{n(n-1)}$ (C) 2/n (D) none of these

94. If three distinct numbers are chosen randomly from the first 100 natural numbers, then the probability that all three of them are divisible by both 2 and 3 is
(A) 4/25 (B) 4/35 (C) 4/33 (D) 4/1155

95. If $-\frac{1-3p}{2}, \frac{1+4p}{3}$ and $\frac{1+p}{6}$ are the probability of three mutually exclusive and exhaustive, then the set of all values of p is
(A) [0, 1] (B) $\left[-\frac{1}{4}, \frac{1}{3}\right]$ (C) $\left[0, \frac{1}{3}\right]$ (D) $(0, \infty)$

96. Out of 21 tickets marked with number from 1 to 21, three are drawn at random. The chance that the number on them are in A.P., is
(A) 10/133 (B) 9/133 (C) 9/1330 (D) None of these

97. If a party of n persons sit at a round table, then the odds against two specified individuals sitting next to each to each other are
(A) $2 : (n-3)$ (B) $(n-3) : 2$ (C) $(n-2) : 2$ (D) $2 : (n-2)$

98. 'n' positive integers taken at random are multiplied together then the probability that the last digit of the product is zero is__

(A) $\frac{10^n - 4^n}{10^n}$ (B) $\frac{10^n - 8^n + 5^n}{10^n}$

(C) $\frac{10^n - 5^n + 4^n}{10^n}$ (D) $\frac{10^n - 8^n - 5^n + 4^n}{10^n}$

99. If A,B,C are three events such that $P(A)=0.3, P(B)=0.4, P(C)=0.8, P(A\cap B)=0.08, P(A\cap C)=0.28$, $P(A\cap B\cap C)=0.09$, $P(B\cap C)=x$. If probability of getting atleast one event of A,B,C is greater than or equal to 0.75 then

(A) $0.23 \le x \le 0.48$ (B) $0.58 \le x \le 0.72$ (C) $0.28 \le x \le 0.52$ (D) $0.27 \le x \le 0.56$

100. 5 girls and 10 boys sit at random in a row having 15 chairs numbered as 1 to 15 then the probability that end seats are occupied by the girls and between any two girls odd number of boys sit, is

(A) $\frac{8\times 10!5!}{15!}$ (B) $\frac{16\times 10!5!}{15!}$ (C) $\frac{20\times 10!5!}{15!}$ (D) $\frac{35\times 10!5!}{15!}$

101. 5 boys and 6 girls sit in a row randomly, then probability that all girls sit together is

(A) $\frac{(6!)^2}{11!}$ (B) $\frac{(5!)6!}{11!}$ (C) $\frac{(5!)^2}{11!}$ (D) $\frac{(5!)^2 6!}{11!}$

102. A card is selected at random from a pack of well shuffled 52 cards. Then probability that it belongs to red coloured suit is

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

103. An experiment has 10 equally likely outcomes. Let A and B be two non-empty events of the experiment. If A consists of 4 outcomes, the number of outcomes that B must have so that A and B are independent, is

(A) 2, 4 or 8 (B) 3, 6 or 9 (C) 4 or 8 (D) 5 or 10

104. The minimum number of times a fair coin must be tossed so that the probability of getting at least one head is at least 0.8 is

(A) 3 (B) 6 (C) 5 (D) 7

105. A man alternately tosses a coin and throws a dice beginning with the coin. The probability that he gets a head in the coin before he gets a 5 or 6 in the dice is

(A) 0.75 (B) 0.50 (C) 0.333 (D) None of these

106. Two number are selected randomly from the set $S=\{1,2,3,4,5,6\}$ without replacement one by one. The probability that minimum of the two number is less than 4 is

(A) 0.0667 (B) 0.933 (C) 0.20 (D) 0.80

107. A fair die is tossed repeatedly until a six is obtained. Let X denote the number of tosses required. The conditional probability that $X \ge 6$ given X > 3 equals

(A) 0.579 (B) 0.116 (C) 0.139 (D) 0.694

108. If four vertices of a regular octagon are chosen at random, then the probability that the quadrilateral formed by them is a rectangular is

(A) $\frac{1}{8}$ (B) $\frac{2}{21}$ (C) $\frac{1}{32}$ (D) $\frac{2}{35}$

109. Six fair dice are thrown independently. The probability that there are exactly 2 different pairs (A pair is an ordered combination like 2,2,1,3,5,6) is

(A) $\frac{8}{72}$ (B) $\frac{26}{72}$ (C) $\frac{25}{144}$ (D) $\frac{5}{36}$

110. If the letters of the word MATHEMATICS are arranged arbitrarily, the probability that c comes before E, E before H, H before I and I before S is

(A) $\frac{1}{75}$ (B) $\frac{1}{24}$ (C) $\frac{1}{120}$ (D) $\frac{1}{720}$

111. Two squares of $|x|$ are chosen at random on a chessboard. What is the probability that they have a side in common?

(A) $\frac{1}{18}$ (B) $\frac{64}{4032}$ (C) $\frac{63}{64}$ (D) $\frac{1}{9}$

112. In a game of chance a player throws a pair of dice and scores points equal to the difference between the numbers on the two dice. Winner is the person who scores exactly 5 points more than his opponent. If two players are playing this game only one time, then the probability that neither of them wins is

(A) $\frac{1}{54}$ (B) $\frac{1}{108}$ (C) $\frac{53}{54}$ (D) $\frac{107}{108}$

113. If a and b are randomly chosen from the set $\{1,2,3,4,5,6,7,8,9\}$, then the probability that the expression $ax^4+bx^3+(a+1)x^2+bx+1$ has positive values for all real values of x is

(A) $\frac{34}{81}$ (B) $\frac{31}{81}$ (C) $\frac{32}{81}$ (D) $\frac{10}{27}$

114. A word of atleast 5 letters is made at random from 3 vowels and 3 consonants, all the letters being different. The probability then no consonant falls between any two vowels in the word is

(A) $\frac{9}{20}$ (B) $\frac{9}{10}$ (C) $\frac{7}{10}$ (D) $\frac{11}{20}$

115. Matrices of order 3×3 are formed by using the elements of the set $A=\{-3,-2,-1,0,1,2,3\}$. Then probability that matrix is either symmetric or skew symmetric is

(A) $\frac{1}{7^6}+\frac{1}{7^3}$ (B) $\frac{1}{7^9}+\frac{1}{7^3}-\frac{1}{7^6}$ (C) $\frac{1}{7^3}+\frac{1}{7^9}$ (D) $\frac{1}{7^3}+\frac{1}{7^6}-\frac{1}{7^9}$

116. A box contain 10 tickets numbered from 1 to 10. Two tickets are drawn one by one without replacement. The probability that the difference between the first drawn ticket number and second is not less than 4" is

(A) $\frac{7}{30}$ (B) $\frac{14}{30}$ (C) $\frac{11}{30}$ (D) $\frac{10}{30}$

117. Three vertices are chosen randomly from the seven vertices of a regular 7-sided polygon. The probability that they form the vertices of an isosceles triangle is

(A) $\frac{1}{7}$ (B) $\frac{1}{3}$ (C) $\frac{3}{7}$ (D) $\frac{3}{5}$

118. Given four pair of gloves, they are distributed to four persons. Each person is given a right-handed and left-handed glove, then probability that no person gets a pair is

(A) $\frac{3}{8}$ (B) $\frac{5}{8}$ (C) $\frac{1}{4}$ (D) $\frac{3}{4}$

119. The probability that $\sin^{-1}(\sin x)+\cos^{-1}(\cos y)$ is an integer $x,y\in\{1,2,3,4\}$

(A) $\frac{1}{16}$ (B) $\frac{3}{16}$ (C) $\frac{15}{16}$ (D) $\frac{14}{16}$

120. Of all the mappings that can be defined from the set $A:\{1,2,3,4\}\to B:\{5,6,7,8,9\}$, a mapping is randomly selected. The chance that the selected mapping is strictly monotonic is.

(A) $\frac{1}{125}$ (B) $\frac{2}{125}$ (C) $\frac{3}{25}$ (D) $\frac{6}{25}$

121. 5 different balls are placed in 5 different boxes randomly. Find the probability that exactly two boxes remain empty. Given each box can be hold any number of balls.

(A) $\frac{24}{125}$ (B) $\frac{12}{25}$ (C) $\frac{96}{625}$ (D) None of these

122. 10 different books, and 2 different pens are given to 3 boys so that each gets equal number of things. The probability that the same boy does not receive both the pens is

(A) $\frac{5}{11}$ (B) $\frac{7}{11}$ (C) $\frac{9}{11}$ (D) $\frac{6}{11}$

123. Let a function $f: x \to y$ is defined where $x = \{0,1,2,3,....9\}; y = \{0,1,2,.....100\}$ and $f(5) = 5$ then probability that the function of type $f: x \to B$ where $B \subseteq Y$ is of bijective in nature is

(A) $\frac{10!}{\sum_{r=1}^{101} r^9 . {}^{100}C_{r-1}}$ (B) $\frac{{}^{101}C_9 .9!}{\sum_{r=1}^{101} r^{10} . {}^{100}C_r}$ (C) $\frac{{}^{100}C_9 .9!}{\sum_{r=1}^{101} r^{10} . {}^{101}C_r}$ (D) $\frac{{}^{100}C_9 .9!}{\sum_{r=1}^{101} r^9 . {}^{100}C_{r-1}}$

124. Two distinct number a and b are chosen randomly from the set $\{2, 2^2, 2^3, ...2^{25}\}$. Then the probability that $\log_a^b$ is an integer is

(A) $\frac{131}{300}$ (B) $\frac{31}{300}$ (C) $\frac{21}{200}$ (D) $\frac{62}{300}$

125. Given that $x \in [0,1]$ and $y \in [0,1]$. Let A be the event of selecting a point (x, y) satisfying $y^2 \geq x$ and B be the event selecting a point (x, y) satisfying $x^2 \geq y$, then

(A) $P(A \cap B) = \frac{1}{3}$ (B) $A \subset B$ (C) $2P(A) = 3P(B)$ (D) $P(B) < P(A)$

126. A and B are events such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$. If a and b are the possible minimum and maximum values of $P(A \cap B)$, then the value of $a + b$ is

(A) 0.5 (B) 0.8 (C) 0.9 (D) 1

127. If A and B are two events such that $P(A \cap B) = 0.3$ and $P(A' \cap B') = 0.6$ then the value of $P(A \cap B' or\ A' \cap B)$ is equal to

(A) 0.9 (B) 0.7 (C) 0.3 (D) 0.1

128. The probability that a dealer will sell at least 20 TV sets during a day is 0.45 and the probability that he will sell less than 24 TV sets is 0.74. The probability that he will sell 20,21,22 or 23 TV sets during the day is

(A) 0.19 (B) 0.29 (C) 0.333 (D) 0.81

129. A die is thrown 31 times. The probability of getting 2,4 or 5 almost 15 times is

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{1}{5}$ (D) $\frac{1}{2}$

130. The records of a hospital show that 10% of the cases of a certain disease are fatal. If 6 patients are suffering from the disease, then the probability that only three will die is

(A) 1458×10^{-5} (B) 1458×10^{-6} (C) 41×10^{-6} (D) 8748×10^{-5}

131. The probabilities of A, B and C solving a problem indepently are respectively $\frac{1}{4}, \frac{1}{5}, \frac{1}{6}$. If 21 such problems are given to A, B and C then the probability that at least 11 problems can be solved by them is

(A) ${}^{21}C_{11}\left(\frac{1}{2}\right)^{11}$ (B) $\left(\frac{1}{2}\right)$ (C) $\left(\frac{1}{2}\right)^{11}$ (D) None of these

132. A fair coin is tossed until one of the two sides occurs twice in a row. The probability that the number of tosses required is even is

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

133. A man throws a die until he gets a number greater than 3. The probability that he gets 5 in the last throw is

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{1}{6}$ (D) $\frac{1}{36}$

134. Suppose A and B are two events with $P(A)=0.5$ and $P(A\cup B)=0.8$. Let $P(B)=P$ if A and B are mutually exclusive and $P(B)=Q$ if A and B are independent, then

(A) $p=q$ (B) $p=2q$ (C) $2p=q$ (D) $p+q=1$

135. A fair die is tossed repeatedly. A wins if it is 1 or 2 on two consecutive tosses and B wins if it is 3,4,5, or 6 on two consecutive tosses, the probability that A wins if the die is tossed indefinity is

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$ (C) $\frac{5}{21}$ (D) $\frac{2}{5}$

136. Assume that the birth of a boy or girl to a couple to be equally likely, mutually exclusive, exhaustive and independent of the other children in the family. For a couple having 6 children, the probability that their "three oldest are boys" is

(A) $\frac{20}{64}$ (B) $\frac{1}{64}$ (C) $\frac{8}{64}$ (D) None of these

137. For two events A and B, if $P(A)=P(A/B)=\frac{1}{4}$ and $P(B/A)=\frac{1}{2}$, then which of the following is not true?

(A) A and B are independent (B) $P\left(\frac{A'}{B}\right)=\frac{3}{4}$

(C) $P\left(\frac{B'}{A'}\right)=\frac{3}{4}$ (D) None of these

138. A box contain 4 white and 3 black balls. Another box contain 3 white and 4 black balls. A die is thrown. If it exhibits a number ≤ 3. The ball is drawn from the first box. Otherwise, a ball is drawn from the second box. A ball drawn is found to be black the probability that it has been drawn from the second box is

(A) $\frac{3}{7}$ (B) $\frac{4}{7}$ (C) $\frac{6}{17}$ (D) $\frac{8}{17}$

139. The probability of solving a problem correctly by A and B are $\frac{1}{8}$ and $\frac{1}{12}$ respectively. Given that they obtain the same answer after solving a problem and probability of a common mistake by them is $\frac{1}{1001}$, then the probability that their solution is correct is (Assuming that if they commit different mistake, then their answers will differ)

(A) $\frac{77}{96}$ (B) $\frac{14}{15}$ (C) $\frac{2}{5}$ (D) $\frac{13}{14}$

140. The probability of event A is $\frac{3}{4}$ the probability of event B, given that event A occurs is $\frac{1}{4}$. The probability of event A, given that event B occurs is $\frac{2}{3}$. The probability that neither event occur is

(A) $\frac{1}{6}$ (B) $\frac{27}{112}$ (C) $\frac{5}{32}$ (D) $\frac{1}{8}$

141. An urn contains three white, six red and four black balls. Two balls are selected at random. What is the probability that one ball is red and other is white, given that they are of different colour?

(A) $\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) None of these

142. Let A, B, C are 3 events such that $P(A/B)=\frac{1}{5};P(B)=\frac{1}{2};P(A/C)=\frac{2}{7}$ and $P(C)=\frac{1}{2}$ then $P(B/A)$ is

(A) $\frac{4}{11}$ (B) $\frac{5}{11}$ (C) $\frac{6}{11}$ (D) $\frac{7}{17}$

143. Let A and B be two independent events such that $P(A)=\frac{1}{3}$ and $P(B)=\frac{1}{6}$ then, which of the following is true?

(A) $P(A/B')=\frac{1}{3}$ (B) $P(A/B)=\frac{2}{3}$ (C) $P(A/B')=\frac{1}{3}$ (D) $P(A/A\cup B)=\frac{1}{4}$

144. In a box, there are 20 cards, out of which 10 are labeled as A and the remaining 10 are labeled as B. Cards are drawn at random, one after the other and with replacement, till a second A-card is obtained. The probability that the second A-card appears before the third B-card is.

(A) $\frac{13}{16}$ (B) $\frac{15}{16}$ (C) $\frac{9}{16}$ (D) $\frac{11}{16}$

145. Let A and B be two events such that the probability that exactly one of them occurs is $\frac{2}{5}$ and the probability that A or B occurs is $\frac{1}{2}$, then the probability of both of them occur together is

(A) 0.02 (B) 0.10 (C) 0.01 (D) 0.20

146. If 10 different balls are to be placed in 4 distinct boxes at random, then the probability that two of these boxes contain exactly 2 and 3 balls is.

(A) $\frac{965}{2^{11}}$ (B) $\frac{965}{2^{10}}$ (C) $\frac{945}{2^{10}}$ (D) $\frac{945}{2^{11}}$

147. In a work shop these are five machines and the probability of any one of them to be out of service on a day is $\frac{1}{4}$. If the probability that atmost two machines will be out of service on the same day is $\left(\frac{3}{4}\right)^3_k$ then k is equal to.

(A) $\frac{17}{2}$ (B) $\frac{17}{4}$ (C) $\frac{17}{8}$ (D) 4

148. If $P(A)=\frac{2}{3}, P(B)=\frac{1}{2}$ and $P(A\cup B)=\frac{5}{6}$ then events A and B are

(A) mutually exclusive
(B) Independent as well as mutually exhaustive
(C) Independent
(D) Dependent only on A

149. A person can kill a bird with probability $\frac{3}{4}$. He tries 5 times. What is the probability that he may not kill the bird

(A) $\frac{243}{1024}$ (B) $\frac{781}{1024}$ (C) $\frac{1}{1024}$ (D) $\frac{1023}{1024}$

150. A fair coin is tossed repeatedly. If tail appears on first four tosses then the probability of head appearing on fifth toss equals

(A) $\frac{1}{2}$ (B) $\frac{1}{32}$ (C) $\frac{31}{32}$ (D) $\frac{1}{5}$

151. A coin is tossed 4 times. The probability that atleast one head turns up is

(A) $\frac{1}{16}$ (B) $\frac{2}{16}$ (C) $\frac{14}{16}$ (D) $\frac{15}{16}$

152. In a lottery there were 90 tickets numbered 1 to 90. Five tickets were drawn at random. The probability that two of the tickets drawn numbers 15 and 89 is

(A) $\frac{2}{801}$ (B) $\frac{2}{823}$ (C) $\frac{1}{267}$ (D) $\frac{1}{623}$

153. Out of 30 consecutive numbers, 2 are chosen at random. The probability that their sum is odd is

(A) $\frac{14}{29}$ (B) $\frac{16}{29}$ (C) $\frac{15}{29}$ (D) $\frac{10}{29}$

154. An urn contains nine balls of which three are red, four are blue and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colours is

(A) $\frac{1}{3}$ (B) $\frac{2}{7}$ (C) $\frac{1}{21}$ (D) $\frac{2}{23}$

155. A, B, C are any three events. If p(s) denotes the probability of s happening then $P(A\cap(B\cup C))=$

(A) $P(A)+P(B)+P(C)-P(A\cap B)-P(A\cap C)$

(B) $P(A)+P(B)+P(C)-P(B)P(C)$

(C) $P(A\cap B)+P(A\cap C)-P(A\cap B\cap C)$
(D) None of these

156. A dip is thrown. Let A be the event that the number obtained is 9 seater than 3. Let B be the event that the number obtained is less than 5, then $P(A\cup B)$ is

(A) 0 (B) 1 (C) 2/5 (D) 3/5

157. An experiment has 10 equally likely outcomes. Let A and B be non-empty events of the experiment. If A consists of 4 out comes, the number of out comes that B must have so that A and B are independent, is

(A) 2,4 or 8 (B) 3,6 or 9 (C) 4 or 8 (D) 5 or 10

158. A random variable X has the following probability distribution

$X=x_i$	1	2	3	4
$P(X=x_i)$	0.1	0.2	0.3	0.4

The mean and the standard deviation are respectively.

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

159. If $(1+3p)/3;(1-p)/4$ and $(1-2p)/2$ are the probabilities of three mutually exclusive events, then the set of all values of P is

(A) $\frac{1}{3} \le p \le \frac{1}{2}$ (B) $\frac{1}{3} < p < \frac{1}{2}$ (C) $\frac{1}{2} < p < \frac{2}{3}$ (D) $\frac{1}{2} < p < \frac{2}{3}$

160. A coin is tossed men times where $m \ge n.$ The probability of getting atleast m consecutive heads is

(A) $\frac{n+1}{2^{m+1}}$ (B) $\frac{n+2}{2^{m+1}}$ (C) $\frac{m+2}{2^{n+1}}$ (D) None of these

161. Six cards and six envelopes are numbered 1,2,3,4,5 and cards are to be placed in envelopes so that each envelope contain exactly one card and no card is placed in the envelope bearing the same number and more over the card numbered 1 is always placed in envelope numbered 2. Then the number of ways it can be done is

(A) 264 (B) 265 (C) 53 (D) 67

162. The probability of guessing correctly at least 8 out of 10 answers on a true false type examination is

(A) $\frac{7}{64}$ (B) $\frac{7}{125}$ (C) $\frac{45}{1024}$ (D) $\frac{7}{41}$

163. Two events E and F are independent. If $P(E)=0.3$ and $P(E \cup F)=0.5$ then $P(E/F)-P(F/E)$ equal to

(A) $\frac{2}{7}$ (B) $\frac{3}{35}$ (C) $\frac{1}{70}$ (D) $\frac{1}{7}$

164. If M and N are any two events, the probability that at least one of them occurs is

(A) $P(M)+P(N)-2P(M \cap N)$ (B) $P(M)+P(N)-P(M \cap N)$

(C) $P(M)+P(N)+P(M \cap N)$ (D) $P(M)+P(N)+2P(M \cap N)$

165. Three numbers are chosen from 1 to 20. Find the probability that they are not consecutive.

(A) $\frac{186}{190}$ (B) $\frac{187}{190}$ (C) $\frac{188}{190}$ (D) $\frac{18}{^{20}C_3}$

166. A man takes a step forward with probability 0.4 and one step backward with probability 0.6 then the probability that at the end of eleven steps he is one step away from the starting point

(A) $^{11}C_5 \times (0.48)^5$ (B) $^{11}C_6 \times (0.24)^5$ (C) $^{11}C_5 \times (0.12)^5$ (D) $^{11}C_6 \times (0.72)^6$

167. A multiple choice examinations has 5 questions. Each question has three alternative answers of which exactly one is correct the probability that a student will get 4 (or) more correct answers just by guessing is

(A) $\frac{7}{3^5}$ (B) $\frac{13}{3^5}$ (C) $\frac{11}{3^5}$ (D) $\frac{10}{3^5}$

168. If X follows a binomial distribution with parameters n=6 and P and $4(P(X=4))=P(X=2)$ then $P=$___

(A) 1/2 (B) 1/4 (C) 1/6 (D) 1/3

169. The probability of a bomb hitting a bridge is $\frac{1}{2}$ and two direct hits are needed to destroy it. The least number of bombs required so that the probability of the bridge being destroyed is greater than 0.9, is

(A) 8 (B) 7 (C) 6 (D) 9

170. A pair of fair dice is thrown independently three times probability of getting a score of 9 exactly twice is

(A) $\frac{1}{729}$ (B) $\frac{8}{9}$ (C) $\frac{8}{729}$ (D) $\frac{8}{243}$

171. In an entrance test there are multiple choice questions. There are four possible answers to each question of which one is correct. The probability that a student knows the answer to question is 90%. If he gets the correct answer to a question, then the probability that he was guessing is

(A) $\frac{37}{6}$ (B) $\frac{1}{37}$ (C) $\frac{36}{37}$ (D) $\frac{1}{9}$

172. For a biased die the probability for different forces to turn up are given below

Face:	1	2	3	4	5	6
Probability:	0.1	0.32	0.21	0.15	0.05	0.17

(A) (B) (C) (D)

The die is tossed and you are told that either face 1 or 2 has turned up. Then the probability that it is face 1, is

(A) $\frac{5}{21}$ (B) $\frac{5}{22}$ (C) $\frac{4}{21}$ (D) None of these

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

(A) $\frac{35}{78}$ (B) $\frac{14}{39}$ (C) $\frac{10}{13}$ (D) $\frac{12}{13}$

174. One Indian and four American men and their wives are to be seated randomly around a circular table. Then the conditional probability that the Indian man is seated adjacent to his wife given that such American man is seated adjacent to his wife is

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{2}{5}$ (D) $\frac{1}{5}$

175. If A and B are two events such that $P(A) \neq 0$ and $P(B) \neq 1$ then $P\left(\frac{\overline{A}}{\overline{B}}\right) =$

(A) $1 - P\left(\frac{A}{B}\right)$ (B) $1 - P\left(\frac{\overline{A}}{B}\right)$ (C) $\frac{1 - P(A \cup B)}{P(\overline{B})}$ (D) $\frac{P(\overline{A})}{P(\overline{B})}$

176. In a class of 125 students 70 passed in mathematics, 55 in statistics and 30 in both. The probability that a student selected at random from the class has passed in only one subject is

(A) $\frac{13}{25}$ (B) $\frac{3}{25}$ (C) $\frac{17}{25}$ (D) $\frac{8}{25}$

177. The two events A and B have probability 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.14. Then the probability that neither A not B occurs is

(A) 0.39 (B) 0.25 (C) 0.904 (D) None of these

178. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}, P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{1}{4}$, where $\overline{A}$ stands for complement of event A. Then events A and B are

(A) independent but not equally likely
(B) mutually exclusive and independent
(C) equally likely and mutually exclusive
(D) equally likely but not independent

179. The probability of happening at least one of the events A and B is 0.6. If the events A and B happens simultaneously with the probability 0.2 then $P(\overline{A}) + P(\overline{B}) =$

(A) 0.4 (B) 0.8 (C) 1.2 (D) 1.4

180. If A and B are any two events, then the probability that exactly one of them occur is

(A) $P(A) + P(B) - P(A \cap B)$
(B) $P(A) + P(B) - 2P(A \cap B)$
(C) $P(A) + P(B) - P(A \cup B)$
(D) $P(A) + P(B) - 2P(A \cup B)$

181. If odds against solving a question by three students are $2:1, 5:2$ and $5:3$ respectively, then probability that the question is solved only by one student is

(A) $\frac{31}{56}$ (B) $\frac{24}{56}$ (C) $\frac{25}{56}$ (D) None of these

182. A box contains 10 mangoes out of which 4 are rotten 2 mangoes are taken out together. If one of them is found to be good, the probability that the other is also good is

(A) $\frac{1}{3}$ (B) $\frac{8}{15}$ (C) $\frac{5}{18}$ (D) $\frac{2}{3}$

183. Three of the six vertices of a regular hexagon are chosen at random. The probability that the triangle with these there vertices is equilateral, is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{5}$ (C) $\frac{1}{10}$ (D) $\frac{1}{20}$

184. The letter of the word "ASSASSIN" are written down random in a row. The probability that no two S occurred together is

(A) $\frac{1}{35}$ (B) $\frac{1}{14}$ (C) $\frac{1}{15}$ (D) None of these

185. Let two fair six-faced dice A and B be thrown simultaneously. If E_1 is the event that die A shows up four, E_2 is the event that die B shows up two and E_3 is the event that the sum of number on both dice is odd. Then which of the following statements is NOT true.

(A) E_2 and E_3 are independent (B) E_1 and E_3 are independent

(C) E_1, E_2 and E_3 are independent (D) E_1 and E_2 are independent

186. An unbiased die is tossed until a number greater then appears. The probability that an even number of tosses is needed is

(A) $\frac{1}{2}$ (B) $\frac{2}{5}$ (C) $\frac{1}{5}$ (D) $\frac{2}{3}$

187. In order to get at least a head with probability the number of times a coin needs to be tossed is

(A)3 (B) 4 (C) 5 (D) None of these

188. Seven chits are numbered 1 to 7. Three are drawn one by one with replacement. The probability that the least number on any selected chit is 5, is

(A) $1-\left(\frac{2}{7}\right)^4$ (B) $4\left(\frac{2}{7}\right)^4$ (C) $\left(\frac{3}{7}\right)^3$ (D) None of these

189. For any two independent events E_1 and E_2 $P\left\{\left(E_1 \cup E_2\right) \cap \left(\bar{E}_1 \cap \bar{E}_2\right)\right\}$ is

(A) $\leq \frac{1}{4}$ (B) $> \frac{1}{4}$ (C) $\geq \frac{1}{2}$ (D) None of these

190. In a single throw of two dice, the probability of obtaining total of 7 (or) 9, is

(A) $\frac{5}{18}$ (B) $\frac{1}{6}$ (C) $\frac{1}{9}$ (D) None of these

191. There are 4 envelopes with addresses and 4 concerning letters. The probability that letter does not go into concerning proper envelope, is ____

(or) There are four letters and four addressed envelopes. The chance that all letters are not dispatched. In the right envelope is ____

(A) $\frac{19}{24}$ (B) $\frac{21}{23}$ (C) $\frac{23}{24}$ (D) $\frac{1}{24}$

192. Five horses are in a race. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is

(A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{1}{5}$ (D) $\frac{2}{5}$

193. Three identical dice are rolled. The probability that same number will appear on each of them will be

(A) $\frac{1}{6}$ (B) $\frac{1}{36}$ (C) $\frac{1}{18}$ (D) $\frac{3}{28}$

194. Two dice are thrown. The probability that the sum of the points on two dice will be 7, is __

(A) $\frac{5}{36}$ (B) $\frac{6}{36}$ (C) $\frac{7}{36}$ (D) $\frac{8}{36}$

195. Let S be the sample space of random experiment of throwing simultaneously two unbiased dice with six faces (numbered, to 6) and let $E_k = \{(a,b) \in S : ab = k\}$ for $k \geq 1$

If $P_k = P(E_k)$ for $k \geq 1$, then the correct among the following is

(A) $P_1 < P_{36} < P_4 < P_6$ (B) $P_{36} < P_6 < P_2 < P_4$ (C) $P_1 < P_{11} < P_4 < P_6$ (D) $P_{36} < P_{11} < P_6 < P_4$

196. The probability of happening an event A in one trial is 0.4 the probability that the event A happens at least once in three independent trials is ____

(A) 0.936 (B) 0.784 (C) 0.904 (D) 0.216

197. Three letters are to be sent to different persons and addresses on the three envelopes are also written. Without looking at the addressed the probability that the letters go into the right envelope is equal to

(A) $\frac{1}{27}$ (B) $\frac{1}{9}$ (C) $\frac{4}{27}$ (D) $\frac{1}{6}$

198. The probability that a number selected at random from the number $1,2,3,....99,100$ is a prime is

(A) 0.4 (B) 0.25 (C) 0.45 (D) 0.43

199. Two card are drawn successively with replacement from pack of 52 cards. The probability of drawing two aces is

(A) $\frac{1}{169}$ (B) $\frac{1}{221}$ (C) $\frac{1}{2052}$ (D) $\frac{4}{663}$

200. In a box containing 100 eggs, 10 eggs are rotten. The probability that out of a sample of 5 eggs none is rotten if the sampling is with replacement is

(A) $\left(\frac{1}{10}\right)^5$ (B) $\left(\frac{1}{5}\right)^5$ (C) $\left(\frac{9}{5}\right)^5$ (D) $\left(\frac{9}{10}\right)^5$

201. If X is a poisson variate such that $P(X=1) = P(X=2)$ then $P(X=4)$ is equal to

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

202. Two aero planes I and II bomb a target in succession. The probabilities of I and II scoring a hit correctly are 0.3 and 0.2, respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is

(A) 0.06 (B) 0.14 (C) 0.2 (D) 0.7

203. It is given that the events A and B are such that $P(A) = \frac{1}{4}, P(A/B) = \frac{1}{2}$ and $P(B/A) = \frac{2}{3}$ then $P(B)$ is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{6}$

204. If A and B are events such that $P(A \cup B) = 3/4, P(A \cap B) = 1/4, P(\bar{A}) = 2/3$ then $P(\bar{A} \cap B)$ is

(A) $5/12$ (B) $3/8$ (C) $5/8$ (D) $1/4$

205. In a box has 100 pens of which 10 are defective, then what is the probability that out of a sample of 5 pens drawn one by one with replacement atmost one is defective

(A) $\left(\frac{9}{10}\right)^5$ (B) $\frac{1}{2}\left(\frac{9}{10}\right)^4$ (C) $\frac{1}{2}\left(\frac{9}{10}\right)^4$ (D) $\left(\frac{9}{10}\right)^5+\frac{1}{2}\left(\frac{9}{10}\right)^4$

206. Suppose a random variable X follows the binomial distribution with parameters n and p, where $0<p<1$, if $p(x=r)/p(x=n-r)$ is independent of n, and r, then p is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{5}$ (D) $\frac{1}{7}$

207. In a college, 30% of students fail in physics, 25% fail in mathematics and 10% fail in both. One student is chosen at random. The probability that she fails in physics, if she has failed in mathematics is

(A) $\frac{1}{10}$ (B) $\frac{2}{5}$ (C) $\frac{9}{20}$ (D) $\frac{1}{3}$

PHYSICS

Syllabus: ***MODEREN PHYSICS:– 1. ELECTROMAGNETIC WAVES, 2. DUAL NATURE OF MATTER, 3. ATOMS 4. NUCLEI, 5. SEMICONDUCTORS AND COMMUNICATION SYSTEMS***

1. If λ is decay constant of a nucleus . Find the probability that a nucleus will not decay during the time interval from t= 0 secto t= t_0 sec?

(A) $\mathbf{1-e^{-\lambda t_0}}$ (B) $\mathbf{e^{-\lambda t_0}}$ (C) $\frac{\mathbf{e^{\lambda t_0}}}{\mathbf{e^{\lambda t_0}}-1}$ (D) $\mathbf{e^{\lambda t_0}}$

2. The binding energy per nucleon for C^{12} is 7.68 Mev and that for C^{13} is 7.47 Mev. The energy required to remove a neutron from C^{13} is

(A) 4.95 Mev (B) 0.63 Mev (C) 0.065 Mev (D) 5.49 Mev

3. A radio nuclide with half-life T days emits β -particles of average kinetic energy E joule. This radionuclide is used as source in a machine which generates electric energy with efficiency η . The no.of moles of the nuclide required to generate electrical energy at an initial rate P is (Avogadro no. =N)

(A) $\frac{PT\ln 2}{\eta NE}$ (B) $\frac{PT}{\eta NE}$ (C) $\frac{PT}{\eta NE\ln 2}$ (D) None of these

4. The atomic mass no. of He is 4 and that for sulphur is 32. The ratio between radius of sulphur nucleus to that of helium {R sulphur / R helium } is

(A) 2 (B) $2\sqrt{2}$ (C) 4 (D) 8

5. Assuming a stream of neutrons of each particle with a kinetic energy of 531.25 x 10^{-23} J. If the half-life of neutrons is 700 seconds. What fractions of neutrons will decay just before they travel a distance 10 Km ?mass of neutron =1.7 x 10^{-27} Kg nearly and $2^{-1/175}$= 0.996

(A) 0.038 (B) 0.004 (C) 0.996 (D) *None of these*

6. A Li^7 target is bombarded with a proton beam current of 10^{-4}A for 1 hour to produce Be^7 of radio activity 1.8 x 10^8 disintegrations per second. Assuming that one Be^7 radioactive nucleus is produced by bombarding 1000 protons, find its half-life? Assume that new formed isotope is stable

(A) 12.5x10^6 sec (B) 8.63x10^6 sec (C) 3.8 x 10^4 sec (D) None of these

7. An $\alpha-particle$ with K.E. T= 5.3 Mev initiates a nuclear reaction $Be^9+{}_2\alpha^4\rightarrow C^{12}+{}_0n^1$ with energy yield Q=+5.7 Mev. Then the K.E.of neutron outgoing at the right angle to the motion direction of the $\alpha-particle$ will be [Initially Be^9 is at rest]

(A) 2.5 Mev (B) 4.5 Mev (C) 8.5 Mev (D) None of these

8. The half –life of I^{131} is 8 days. Given a sample of I^{131} at time t=0, we can assert that
(A) No nucleus will decay before t =4 days
(B) No nucleus will decay before t =8 days
(C) No nucleus will decay before t =2 days
(D) A given nucleus may decay at any time after t =0

9. A radioactive nucleus can decay by two different processes. The half-life for
The first process is 2t and that for the second process is t. Then effective disintegration constant of the nucleus is

(A) $\frac{3}{2t\ln 2}$ (B) $\frac{3\ln 2}{2t}$ (C) $\frac{\ln 2}{3t}$ (D) $\frac{3\ln 2}{t}$

10. The amount of energy that will be reduced in completely fusion1kg of $^{235}_{92}U$ is
(A) 8.6×10^{10} J (B) 7.8×10^{12} J (C) 8.2×10^{13} J (D) 9.2×10^{12} J

11. A radioactive sample with half-life = T emits α - particles. Its total activity is A_i at some time and A_t at a later time. The number of α - particles emitted by the sample between these two points in time is
(A) $A_i – A_t$ (B) $\frac{T}{\ln 2}(A_i - A_t)$ (C) $\frac{\ln 2}{T}(A_i - A_t)$ (D) $\frac{T}{\ln 2}\left[\frac{1}{A_t} - \frac{1}{A_i}\right]$

12. The energy released in the fission reaction $_{92}U^{236} \rightarrow _{46}X^{117} + _{46}Y^{117} + 2\ _0n^1$, given that the binding energy per nucleon of X and Y is 8.5 MeV and that of $_{92}U^{236}$ is 7.6 MeV, is nearly
(A) 220 MeV (B) 180 MeV (C) 195 MeV (D) 190 MeV

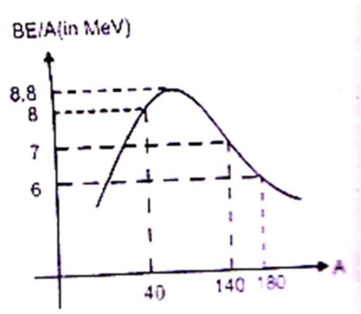
13. The activity of a radioactive substance decreases to one third of original activity (I_0) in a period of 9 years. After a further of 9 years its activity will be
(A) I_0 (B) (2/3) I_0 (C) I_0 / 9 (D) I_0 / 6

14. If the binding energy per nucleon in $_3Li^7$ and $_2He^4$ nuclei are 5.60 MeV and 7.06 eV respectively, then in the reaction: p + $_3Li^7 \longrightarrow 2\ _2He^4$, energy of proton must be:
(A) 39.2 MeV (B) 28.24 MeV (C) 17.28 MeV (D) 1.46 MeV

15. What is the energy released in process $3\,_2He^4 \longrightarrow {}_6C^{12}$?
(Mass of $_2He^4$ = 4.002604 amu)
(A) 7.27 MeV (B) 9.38 MeV (C) 6.09 MeV (D) 10.9 MeV

16. The rate of decay of a radioactive element at any instant is 10^3 disintegrations per second. If the half-life of the elements is 1 s, then the rate of decay after 1 s will be
(A) 500 s^{-1} (B) 1000 s^{-1} (C) 250 s^{-1} (D) 2000 s^{-1}

17. A heavy nucleus x(A=180) breaks into two nuclei y(A=140) and z (A= 40). Energy released during fission reaction is:



(A) 110MeV (B) 220MeV
(C) 200MeV (D) Energy is not released

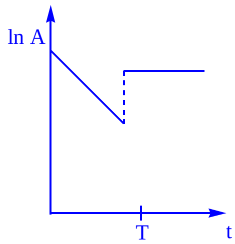
18. In a certain hypothetical radioactive decay process, species A decays into species B and species B decays into species C according to the reactions

$$A \to 2B + particles + energy : \quad B \to 3C + particles + energy$$

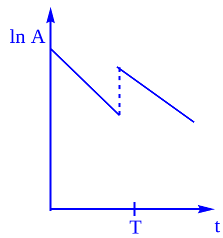
The decay constant for the species A is $\lambda_1 = 1\sec^{-1}$ and that for the species B is $\lambda_2 = 100\sec^{-1}$, initially 10^4 moles of the species of A were present while there was none of B and C. It was found that species B reaches its maximum number at a time $t = 2ln(10)\sec$. Then value of the maximum number of moles of B is

(A) 2 (B) 3 (C) 4 (D) 6

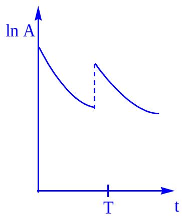
19. At time t = 0, some radioactive gas is injected into a sealed vessel. At time T, some more of the same gas is injected into the same vessel. The graph representing the variation of the logarithm of the activity A of the gas with time t is



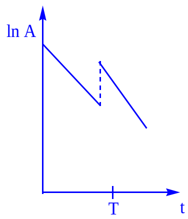
(A)



(B)



(C)



(D)

20. The mass of proton is 1.0073 u and that of neutron is 1.0087 u (u=atomic mass unit). Mass of helium nucleus =4.0015 u. the binding energy of the

^4_2He *nucleus is approximately* $(1u = 931 MeV/c^2)$

(A)29 MeV (B) 26 MeV (C) 27 MeV (D) 28 MeV

21. A body of mass M_0 is placed on a smooth horizontal surface. The mass of body is decreasing exponentially with disintegration constant λ. Assuming that the mass is ejected backward with a relative velocity u, and initially the body was at rest, find the velocity of body after time t.(assume the decay of mass is similar to that of natural radio activity)

(A) $ue^{-\lambda t}$ (B) $u\lambda t$ (C) $\frac{u(\ln 2)\lambda}{t}$ (D) $(u_e t)\frac{(\ln 2)}{\lambda t}$

22. Initially only radioactive element A is present, which disintegrated into another stable element B. After 6 hrs the ratio of atoms of A and B is found to be 1: 7. Half-life of A is

(A) 3hr (B) 2 hr (C) 1.5 hr (D) 2.5hr

23. The decay constant of ^{198}Au is λ. The probability that ^{198}Au nucleus will decay in one second will be

(A) λ (B) $1/\lambda$

(C) $1 - \lambda$ (D) ${}_{92}U^{236} \to {}_{46}X^{117} + {}_{46}X^{117} + 2{}_0n^1$

24. The energy released in the fission reaction ${}_{92}U^{236} \to {}_{46}X^{117} + {}_{46}X^{117} + 2{}_0n^1$ given that the binding energy per nucleon of X and Y is 8.5 MeV and that of ${}_{92}U^{236}$ is 7.6 MeV, is nearly

(A) 220MeV (B) 180MeV (C) 195MeV (D) 190MeV

25. A sample contains number of stable nuclei equal to N_S number of unstable nuclei equal to N_u. After a time T the activity of the sample decreased to one third of the initial activity. While the total number of nuclei (excluding decayed nuclei) became half. The ratio N_s/N_u initially is

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

26. Nuclei of radioactive element A are produced at rate 't^2' at an time t. The element A has decay constant λ .Let N be the number of nuclei of element A at any time time $t = t_0, \frac{dN}{dt}$ is minimum, then the number of nuclei of element A at time $t = t_0$ is

(A) $\frac{2t_0 - \lambda t_0^2}{\lambda^2}$ (B) $\frac{t_0 - \lambda t_0^2}{\lambda^2}$ (C) $\frac{2t_0 - \lambda t_0^2}{\lambda}$ (D) $\frac{t_0 - \lambda t_0^2}{\lambda}$

27. A stationary radioactive nucleus of mass 210units disintegers into an aplha particle of mass 4 units and residual nucleus of mass 206 units-if kinetic energy of alpha particle is E, the kinetic energy of residual nucleus is

(A) $\left(\frac{2}{105}\right)E$ (B) $\left(\frac{2}{103}\right)E$ (C) $\left(\frac{103}{105}\right)E$ (D) $\left(\frac{103}{2}\right)E$

28. Energy required to remove one electron from neutral helium atom is E_1eV. Energy required to remove both electrons form a neutral helium atom is

(A) $2E_1$ eV (B) $3E_1$ eV (C) $(E_1 + 54.4)$eV (D) $(E_1 + 13.6)$eV

29. A radioactive nucleus can decay by two different processes. The half-life for the first process is 2t and that for the second process is t. Then effective disintegration constant of the nucleus is

(A) $\frac{3}{2tIN2}$ (B) $\frac{3IN2}{2t}$ (C) $\frac{IN2}{3t}$ (D) $\frac{3IN2}{t}$

30. A transmitting antenna is at a height of 40 m and the receiving antenna is at a height of 60 m. The maximum distance between them for satisfactory communication is nearly

(A) 22.5 km (B) 27.5 km (C) 50 km D) 25 km

31. If height of transmitting tower increases by 30% then the area to be covered increases by

A) 10% B) 21% C) 30% D) 60%

32. A. T.V. tower is 10 m tall. If the area around the tower has a population density of $100\pi km^{-2}$, then the population covered by the broadcasting tower is about (Re = 6400 km)

A) 128000 B) 64000 C) 256000 D) 32000

33. A 600 W carrier is modulated to a depth of 75% by a 400 Hz sine wave. The total antenna power is

A) 769 W B) 796 W C) 679 W D) 637.5 W

34. An audio signal of frequency 20 Hz is to be radiated directly from transmitting antenna into the space. Then the approximate length of antenna is Km is

A) 3.75 B) 37.5 C) 375 D) 3750

35. The height of transmitting antenna of the TV telecast is to cover a radius of 128 km is

A) 79 m B) 1280 m C) 1560 m D) 1050 m

36. A TV transmitting antenna is 3200 m tall. If the receiving antenna is 320 m tall. If the receiving antenna is on the ground the service area is

A) 144 πsq.km B) 12 πsq.km C) 32 πsq.km D) 4096πsq.km

37. The maximum distance between the transmitting and receiving TV towers is D. If the heights of both transmitting and receiving tower are doubled then the maximum distance between them becomes

A) D B) $\sqrt{2}$ D C) 2D D) D/2

38. A audio signal $15\sin 2\pi(1500t)$ amplitude modulates $60\sin 2\pi(10^5)t$. The depth of modulation is

A) 20% B) 25% C) 40% D) 50%

39. How many AM broad cast stations can be accumulated in a 100 kHz band width if the highest frequency modulating a carrier is 5 kHz?

A) 20 B) 10 C) 5 D) 15

40. How many 500 kHz waves can be on a 10 km transmission line simultaneously?
A) 1.667 B) 1.667 C) 16.67 D) 1667

41. Identify the mathematical expression for amplitude modulated wave
A) $A_c \sin\left[\left\{\omega_c + k_1 v_m(t)\right\} t + \phi\right]$ B) $A_c \sin\left[\left\{\omega_c + t + \phi + k_2 v_m(t)\right\}\right]$
C) $\left\{A_c + k_2 v_m(t)\right\} \sin(\omega_c t + \phi)$ D) $A_c v_m(t) \sin(\omega_c t + \phi)$

42. The frequency, used for TV broadcasting is
A) VLF B) HF C) UHF D) EHF

43. Fraction of total power carried by side bands in AM is
A) $\frac{2}{2+\mu^2}$ B) $\frac{\mu^2}{2+\mu^2}$ C) μ^2 D) $\frac{1}{\mu^2}3$

44. A sky wave with a frequency 55 *MHz* is incident on *D*-region of earth's atmosphere at 45^o. The angle of refraction is (electron density for *D*-region is 400 $electron/cm^3$)
(A) 60° (B) 45° (C) 30° (D) 15°

45. In a diode AM-detector, the output circuit consist of $R = 1k\Omega$ and $C = 10\ pF$. A carrier signal of 100 *kHz* is to be detected. Is it good
(A) Yes (B) No
(C) Information is not sufficient (D) None of these

46. Consider an optical communication system operating at λ~800 *nm*. Suppose, only 1% of the optical source frequency is the available channel bandwidth for optical communication. How many channels can be accommodated for transmitting audio signals requiring a bandwidth of 8 *kHz*
(A) 4.8×10^8 (B) 48 (C) 6.2×10^8 (D) 4.8×10^5

47. A photodetector is made from a semiconductor $In_{0.53}Ga_{0.47}As$ with $E_g = 0.73\ eV$. What is the maximum wavelength, which it can detect
(A) 1000 *nm* (B) 1703 *nm* (C) 500 *nm* (D) 173 *nm*

48. A transmitter supplies 9 *kW* to the aerial when unmodulated. The power radiated when modulated to 40% is
(A) 5 *kW* (B) 9.72 *kW* (C) 10 *kW* (D) 12 *kW*

49. The antenna current of an AM transmitter is 8 *A* when only carrier is sent but increases to 8.96 *A* when the carrier is sinusoidally modulated. The percentage modulation is
(A) 50% (B) 60% (C) 65% (D) 71%

50. The total power content of an AM wave is 1500 *W*. For 100% modulation, the power transmitted by the carrier is
(A) 500 *W* (B) 700 *W* (C) 750 *W* (D) 1000 *W*

51. The total power content of an AM wave is 900 *W*. For 100% modulation, the power transmitted by each side band is
(A) 50 *W* (B) 100 *W* (C) 150 *W* (D) 200 *W*

52. The modulation index of an FM carrier having a carrier swing of 200 *kHz* and a modulating signal 10 *kHz* is
(A) 5 (B) 10 (C) 20 (D) 25

53. A 500 *Hz* modulating voltage fed into an FM generator produces a frequency deviation of 2.25 *kHz*. If amplitude of the voltage is kept constant but frequency is raised to 6 *kHz* then the new deviation will be
(A) 4.5 *kHz* (B) 54 *kHz* (C) 27 *kHz* (D) 15 *kHz*

54. The audio signal used to modulate $60 \sin(2\pi \times 10^6 t)$ is $15 \sin 300\pi t$. The depth of modulation is
(A) 50% (B) 40% (C) 25% (D) 15%

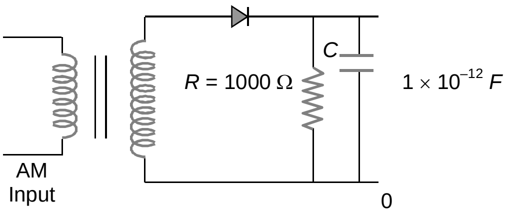
55. The bit rate for a signal, which has a sampling rate of 8 *kHz* and where 16 quantisation levels have been used is
(A) 32000 *bits/sec* (B) 16000 *bits/sec* (C) 64000 *bits/sec* (D) 72000 *bits/sec*

56. An amplitude modulated wave is modulated to 50%. What is the saving in power if carrier as well as one of the side bands are suppressed
(A) 70% (B) 65.4% (C) 94.4% (D) 25.5%

57. In AM, the centpercent modulation is achieved when
(A) Carrier amplitude = signal amplitude (B) Carrier amplitude ≠ signal amplitude
(C) Carrier frequency = signal frequency (D) Carrier frequency ≠ signal frequency

58. A ground receiver station is receiving a signal at (i) 5 *MHz* and transmitted from a ground transmitter at a height of 300 *m*, located at a distance of 100 *km* from the receiver station. The signal is coming via. Radius of earth = 6.4×10^6 *m*. N_{max} of isosphere = 10^{12} m^3
(A) Space wave (B) Sky wave propagation
(C) Satellite transponder (D) All of these

59. In the given detector circuit, the suitable value of carrier frequency is



(A) $<< 10^9$ *Hz* (B) $<< 10^5$ *Hz* (C) $>> 10^9$ *Hz* (D) None of these

60. The impedance of coaxial cable, when its inductance is 0.40 μH and capacitance is 1×10^{-11} *F*, can be
(A) $2 \times 10^2\ \Omega$ (B) $100\ \Omega$ (C) $3 \times 10^3\ \Omega$ (D) $3 \times 10^{-2}\ \Omega$

61. A wave is represented as $e = 10 \sin(10^8 t + 6 \sin 1250\, t)$
then the modulating index is
(A) 10 (B) 1250 (C) 10^8 (D) 6

62. An optical fibre communication system works on a wavelength of 1.3 μm. The number of subscribers it can feed if a channel requires 20 *kHz* are
(A) 2.3×10^{10} (B) 1.15×10^{10} (C) 1×10^5 (D) None of these

63. In an FM system a 7 *kHz* signal modulates 108 *MHz* carrier so that frequency deviation is 50 *kHz*. The carrier swing is
(A) 7.143 (B) 8 (C) 0.71 (D) 350

64. In a radio receiver, the short wave and medium wave stations are tuned by using the same capacitor but coils of different inductance L_s and L_m respectively then
(A) $L_s > L_m$ (B) $L_s < L_m$ (C) $L_s = L_m$ (D) None of these

65. The electron density of E, F_1, F_2 layers of ionosphere is 2×10^{11}, 5×10^{11} and 8×10^{11} m^{-3} respectively. What is the ratio of critical frequency for reflection of radiowaves
(A) 2 : 4 : 3 (B) 4 : 3 : 2 (C) 2 : 3 : 4 (D) 3 : 2 : 4

66. A carrier is simultaneously modulated by two sine waves with modulation indices of 0.4 and 0.3. The resultant modulation index will be
(A) 1.0 (B) 0.7 (C) 0.5 (D) 0.35

67. Mean optical power launched into an 8 *km* fibre is 120 μW and mean output power is 4 μW, then the overall attenuation is (Given log 30 = 1.477)
(A) 14.77 *dB* (B) 16.77 *dB* (C) 3.01 *dB* (D) None of these

68. A antenna current of an AM broadcast transmitter modulated by 50% is 11 *A*. The carrier current is
(A) 10.35 *A* (B) 9.25 *A* (C) 10 *A* (D) 5.5 *A*

69. Because of tilting which waves finally disappear
(A) Microwaves (B) Surface waves (C) Sky waves (D) Space waves

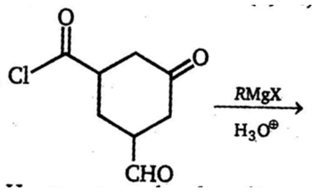
70. A transmitter transmits a power of 10 *kW* when modulation is 50%. Power of carrier wave is
(A) 5 *kW* (B) 8.89 *Kw* (C) 14 *kW* (D) 5.7 *kW*

71. A telephone link operating at a central frequency of 10 *GHz* is established. If 1% of this is available then how many telephone channel can be simultaneously given when each telephone covering a band width of 5 *kHz*
(A) 2×10^4 (B) 2×10^6 (C) 5×10^4 (D) 5×10^6

CHEMISTRY

Syllabus: ***SECOND YEAR ORGANIC CHEMISTRY:–*** ***1.HALO - ALKANES AND HALOARENES, 2. ORGANIC COMPOUNDS CONATINING C,H AND O (ALCOHOLS,PHENOLS,ETHER) , ALDEHYDES AND KETONES, CARBOXYLIC ACIDS 3.ORGANIC COMPOUNDS CONTAINING NITROGENAMINES DIAZONIUM SALTS CYANIDES AND ISO-CYANIDES, 4. POLYMERS , 5. BIOMOLECULES 6. CHEMISTRY IN EVERY DAY LIFE***

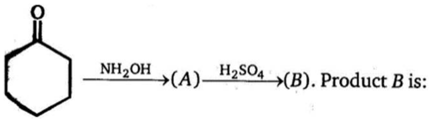
1.

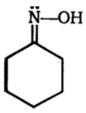


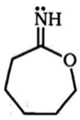
How many molecules of RMgX will be consumed in the above given reaction?

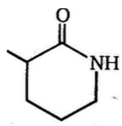
(A) 2 (B) 4 (C) 5 (D) 6

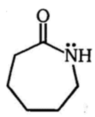
2.



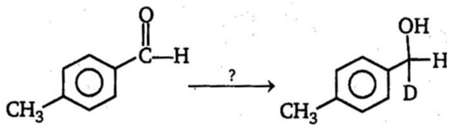
(A) 

(B) 

(C) 

(D) 

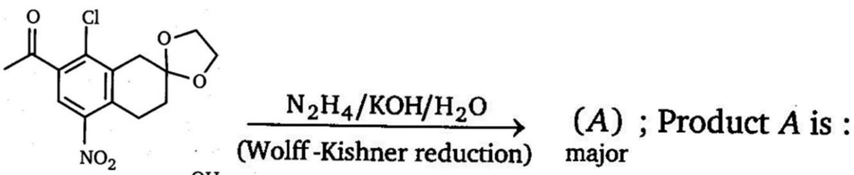
3. Which of the following reagents is best used for the conversion shown below?

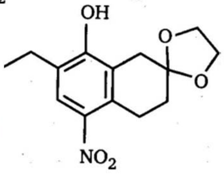


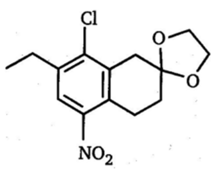
(A) 1.$NaBH_4$ / 2. D_3O^+ (B) 1.$NaBD_4$ / 2. H_3O^+

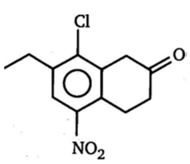
(C) 1.$LiAlH_4$ / 2. D_3O^+ (D) 1.$LiAlH_4$ / 2. H_3O^+

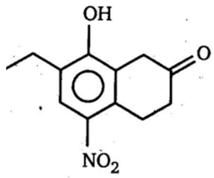
4.

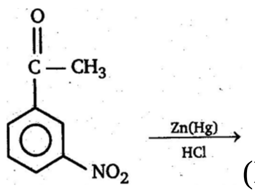


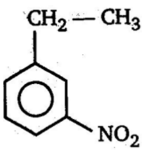
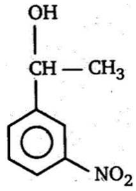
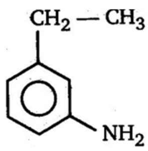
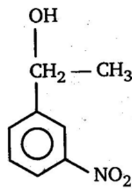
(A) 

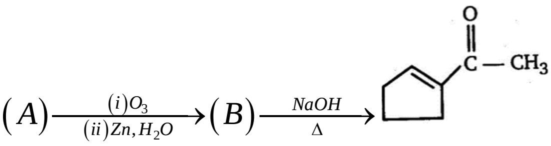
(B) 

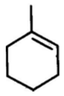
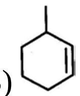
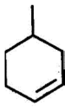
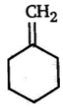
(C) 

(D) 

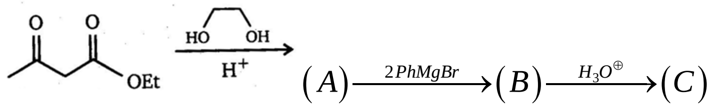
5.  (B); Product of the Clemmensen reduction is :

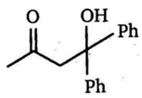
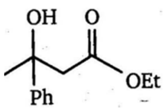
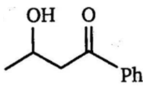
(A) 
(B) 
(C) 
(D) 

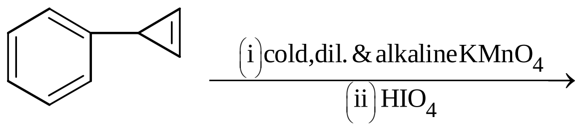
6.  the reactant (A) will be :

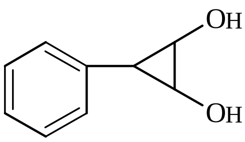
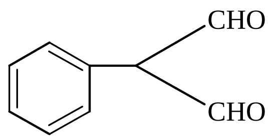
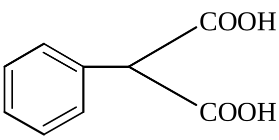
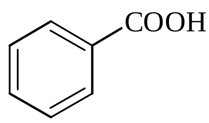
(A) 
(B) 
(C) 
(D) 

7. End product (C) of the reaction is :

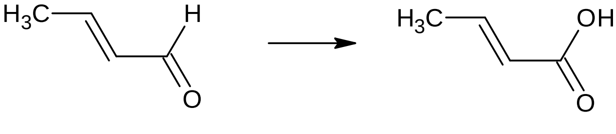


(A) 
(B) 
(C) 
(C) None of these

8.  P. The compound P should be

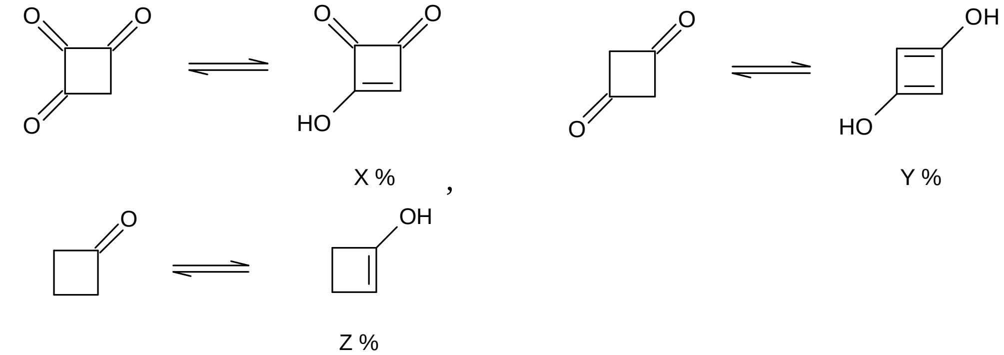
(A) 
(C) 
(B) 
(D) 

9. Best reagent used for the following convertion is :



(A) PCC / CH_2Cl_2 (B) $K_2Cr_2O_7 / H_2SO_4$ (C) $I_2 / NaOH$ (D) Tollen's reagent

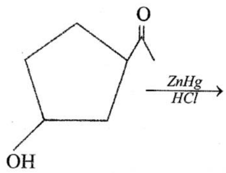
10.



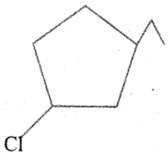
The correct order of % enol x, y, z is:

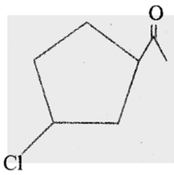
(A) x > y > z (B) z > y > x (C) y > x > z (D) x > z >y

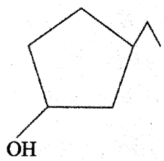
11.

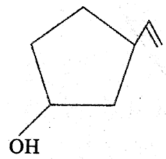


Product

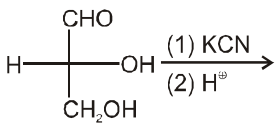
(A) 

(B) 

(C) 

(D) 

12.



Products

Products obtained in the reaction is-

(A) Diastereomer (B) Racemic mixture

(C) Meso compound (D) Optically pure enantiomer

13. $Ph-CH=CH-\underset{\underset{O}{\|}}{C}-H \xrightarrow{\text{(i) } CH_3CH_2MgBr} \xrightarrow{\text{(ii) } H_3O^{\oplus}} (X) \xrightarrow{Cu,\ \Delta} (Y)$

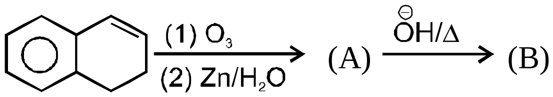
(A) X is 1, 4-addition product ; Y is $Ph-\underset{\underset{O}{\|}}{C}-CH=CH-CH_2-CH_3$

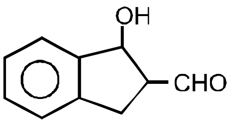
(B) X is 1, 2-addition product ; Y is $Ph-CH=CH-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

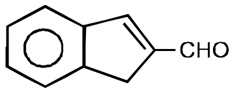
(C) X is 1, 4-addition product ; Y is $Ph-CH=CH-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

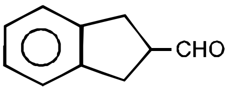
(D) X is 1, 2-addition product ; Y is $Ph-\underset{\underset{O}{\|}}{C}-CH=CH-CH_2-CH_3$

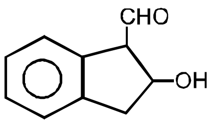
14. In the given reaction sequence B is

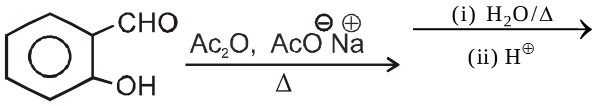


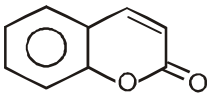
(A) 

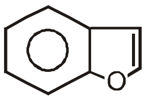
(B) 

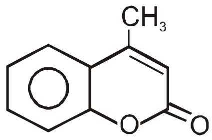
(C) 

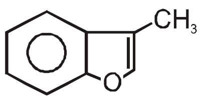
(D) 

15. 

(A) 

(B) 

(C) 

(D) 

16. In Cannizzaro reaction given below

$$2Ph\,CHO \xrightarrow{:\overset{\ominus}{O}H} PhCH_2OH\ ^{+}$$ the slowest step is :

(A) the transfer of hydride to the carbonyl group

(B) the abstraction of proton from the carboxylic group

(C) the deprotonation of $PhCH_2OH$

(D) the attack of : $\overset{\ominus}{O}H$ at the carboxyl group

17. $PhCHO + (CH_3CO)_2O \xrightarrow[(2)\text{hydrolysis},\Delta]{(1)CH_3COONa} A \xrightarrow{HBr} B$

The product B is :

(A) $PhCH = CHCH_2Br$

(B) $PhCH(Br) - CH_2 - COOH$

(C) $PhCH_2\ CH(Br)\ COOH$

(D) $PhCH = CH - COBr$

18. In the given reaction the product is :

$$CH_3-CH_2-\underset{\underset{O}{\|}}{C}-OCH_3 + CH_3-\underset{\underset{O}{\|}}{C}-OCH_3 \xrightarrow[(2)\ CH_3OH]{(1)\ CH_3\overset{\ominus}{O}\ Na^{+}} \xrightarrow[\Delta]{H_2O}$$

(A) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-\underset{\underset{O}{\|}}{C}-OCH_3$

(B) $CH_3-\underset{\underset{O}{\|}}{C}-\overset{\overset{CH_3}{|}}{CH}-COOCH_3$

(C) $H-\underset{\underset{O}{\|}}{C}-CH_2-\overset{\overset{CH_3}{|}}{CH}-COOCH_3$

(D) $CH_3 - \underset{\underset{O}{\|}}{C} - CH_2 - CH_3$

19. What will be the product of the following reaction

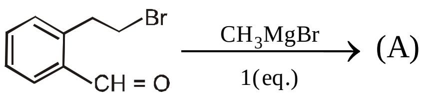
$$Ph-\underset{|\atop Me}{CH}-\underset{\|\atop O}{C}-Me \xrightarrow{RCO_3H} ?$$

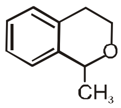
(A) $Ph-\underset{|\atop Me}{CH}-O-\underset{\|\atop O}{C}-Me$

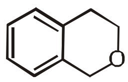
(B) $Ph\underset{\|\atop O}{C}-CH\begin{matrix}Me\\Me\end{matrix}$

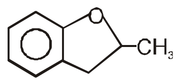
(C) PhCH(Me)OCOOMe

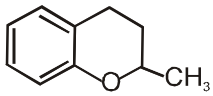
(D) None of these

20. 

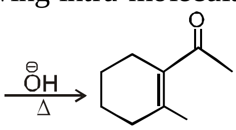
(A) 

(B) 

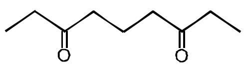
(C) 

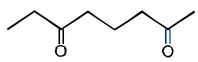
(D) 

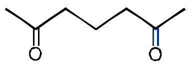
21. Consider following intra-molecular aldol condensation reaction.

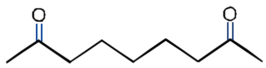


X can be :

(A) 

(B) 

(C) 

(D) 

22. In the given reaction the product is :

$$Ph-CH_2-\underset{\|\atop O}{C}-C_2H_5+CH_3-\underset{\|\atop O}{C}-O-C_2H_5 \xrightarrow[(2)\,CH_3OH]{(1)\,CH_3O^-Na^+} \xrightarrow[\Delta]{H_2O}$$

(A) $Ph-CH_2-\underset{\|\atop O}{C}-CH_2-\underset{\|\atop O}{C}-OCH_3$

(B) $CH_3-\underset{\|\atop O}{C}-\overset{Ph\atop |}{CH}-COOCH_3$

(C) $H-\underset{\|\atop O}{C}-CH_2-\overset{CH_3\atop |}{CH}-COOCH_3$

(D) $CH_3-\underset{\|\atop O}{C}-CH_2-Ph$

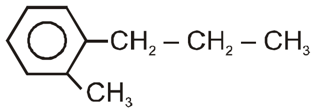
23. $\underset{1mole}{Ph-MgBr}+(CH_3)_2\,CH-\overset{O\atop \|}{C}-Cl \rightarrow [X] \xrightarrow{Zn-Hg/HCl} [Y]$

Identify strucutre of [Y].

(A) $Ph-CH_2-\underset{|\atop CH_3}{CH}-CH_3$

(B) $Ph-\underset{|\atop CH_3}{CH}-CH_2-CH_3$

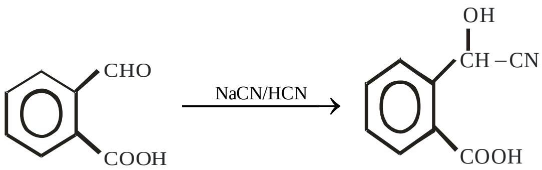
(C) $Ph-\overset{CH_3\atop |}{\underset{|\atop CH_3}{C}}-CH_3$

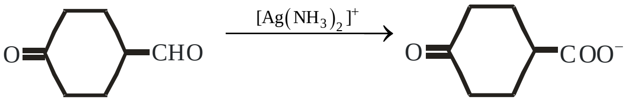
(D) 

24. m-chlorobenzaldehyde on reaction with conc. KOH at room temperature gives :
(A) Potassium m-chlorobenzoate and m-hydroxybenzaldehyde
(B) m-hydroxybenzaldehyde and m-chlorobenzyl alcohol
(C) m-chlorobenzyl and m-hydroxybenzyl alcohol
(D) Potassium m-chlorobenzoate and m-chlorobenzyl alcohol.

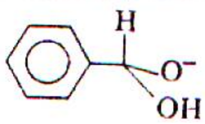
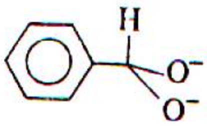
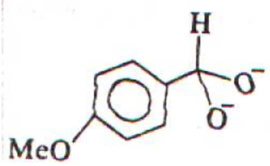
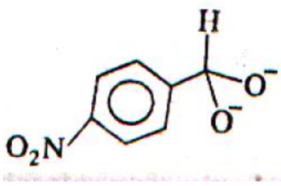
25. Compounds showing Cannizaro's reaction are
(I) CH_3CH_2CHO (II) $CHCl_2CHO$ (III) $(CH_3)_3C-CHO$ (IV) C_6H_5CHO
(A) IV, II, III (B) III, IV (C) I, III, IV (D) I, II, III, IV

26. Which of the following will give yellow precipitate with I_2/NaOH ?
(A) $ICH_2COCH_2CH_3$ (B) CH_3CH_2COOH (C) CH_3CONH_2 (D) All of the above

27. In which of the following, the product given is not correct?
(A) 

(B) 

(C) $C_6H_5CHO + CH_3CH_2CHO \xrightarrow[\Delta]{\text{dil.}OH^-} C_6H_5-CH=\underset{\underset{CH_3}{|}}{C}-CHO$
(D) $C_6H_5-CHO + \text{Semicarbazide} \rightarrow (C_6H_5CH_2NH_2CONH_2)$

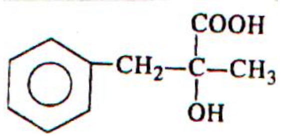
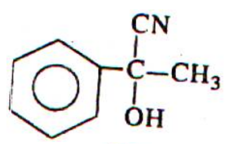
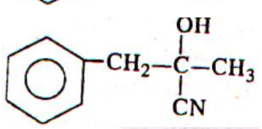
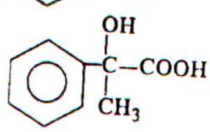
28. In a Cannizzaro reaction, the intermediate that will be best hydride donor is
(A) 
(B) 
(C) 
(D) 

29. The reagent with which both acetaldehyde and acetone react easily is
(A) Fehling's reagent (B) Grignard's reagent
(C) Schiff's reagent (D) Tollen's reagent

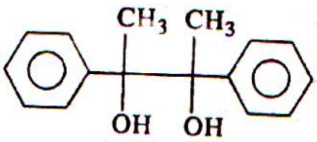
30. A compound A has a molecular formula C_2Cl_3OH. It reduces Fehling's solution and on oxidation, gives a monocarboxylic acid B. A can be obtained by the action of chlorine on ethyl alcohol. A is
(A) chloroform (B) chloral
(C) methyl chloride (D) monochloroacetic acid

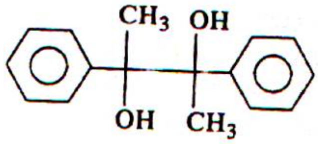
31. In a set of reactions, benzoic acid yielded a product D.

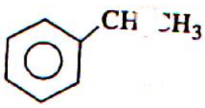
$$C_6H_5COOH \xrightarrow[\text{NaOH+CaO}]{\Delta} A \xrightarrow[\text{anhy. AlCl}_3]{\text{acetyl chloride}} B \xrightarrow{\text{HCN}} C \xrightarrow{\text{HOH}} D$$

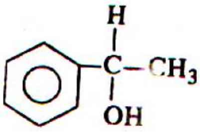
The structure of D would be
(A) 
(B) 
(C) 
(D) 

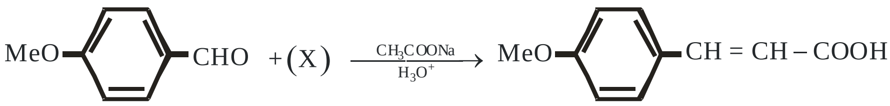
32.  $+ CH_3COCl \xrightarrow[-HCl]{AlCl_3} A \xrightarrow{Mg\text{-}Hg/THF} B$ 'B' is

(A) 

(B) 

(C) 

(D) 

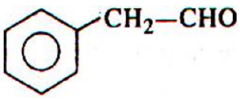
33. 

The compound (X) is

(A) CH_3COOH (B) $BrCH_2$-COOH (CC) $(CH_3CO)_2O$ (D) $CHO-COOH$

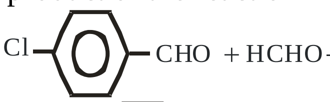
34. Aldol condensation is not given by

(A) CH_3CH_2CHO (B) $CH_2=CH-CHO$

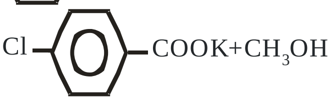
(C) 

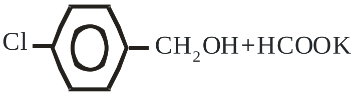
(D) $C_6H_5-\overset{O}{\overset{\|}{C}}-CH_3$

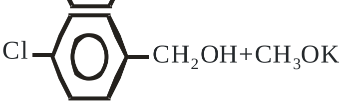
35. The product of the reaction



$+ HCHO \xrightarrow{Conc.KOH}$ are

(A) 

(B) 

(C) 

(D) No reaction occurs.

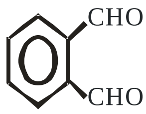
36. Haldol condensation between which of the following compounds followed by dehydration gives methyl oxide?

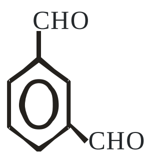
(A) CH_3CHO and CH_3COCH_3 (B) CH_3CHO and CH_3CH_2CHO

(C) CH_3COCH_3 (2 molecules). (D) CH_3CHO (2 molecules)

37. Which of the following does not give intermolecular cannizzaro reaction ?

(A) $\begin{array}{l} CHO \\ | \\ CHO \end{array}$

(B) 

(C) 

(D) 

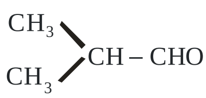
38. Identify the end product $C_6H_5-COCHCl_2 \xrightarrow{(i)NaOH_{aq}/\Delta} A \xrightarrow[H^+]{NaOH/\Delta}$

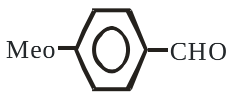
(A) $C_6H_5-\overset{O}{\overset{\|}{C}}-CH_2OH$ (B) $C_6H_5-\overset{OH}{\overset{|}{C}H}-CHO$

(C) $C_6H_5-\overset{OH}{\overset{|}{C}H}-COOH$ (D) $C_6H_5-\overset{O}{\overset{\|}{C}}-COOH$

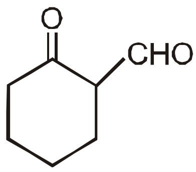
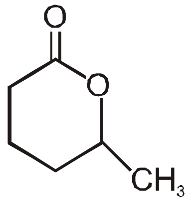
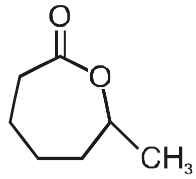
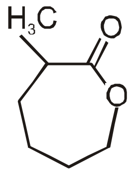
39. Cannizzaro reaction is not given by

(A) CCl_3-CHO (B) HCHO

(C) 

(D) 

40. 2-Methyhlcyclohexanone is allowed to react with metachloroperbenzoic acid. The major product in the reaction is

(A)  (B)  (C)  (D) 

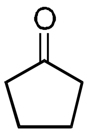
41. Which of the following does not give yellow PPT with $I_2 / NaOH$

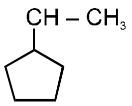
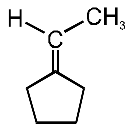
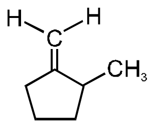
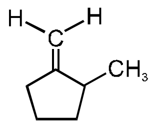
(A) CH_3-CH_2OH (B) $ICH_2-CO-CH_3$ (C) CH_3-CHO (D) Ph–C(=O)–Ph

42. Ph–CH_2–COOEt + EtO–C(=O)–OEt $\xrightarrow[EtOH]{NaOEt}$ (A) $\xrightarrow[H_3O^+,\Delta]{\Delta}$ (B)

Product B is :

(A) Ph–CH_2–COOH (B) Ph–CH_2–COOEt (C) Ph–CH(COOH)COOH (D) None of these

43.  + $(C_6H_5)_3P = CHCH_3 \longrightarrow$

(A)  (B)  (C)  (D) 

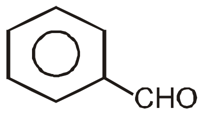
44. $Ph-CHO+CH_3-CO-CH_3 \xrightarrow{NaOH(dil)}$ Product is

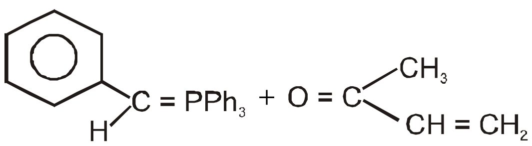
(A) crotonaldehyde (B) Cinnamic acid (C) Cinnamaldehyde (D) Benzylidene acetone

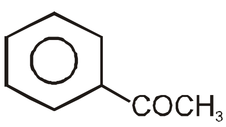
45. An organic compound X on treatment with acidified $K_2Cr_2O_7$ gives compound Y which reacts with I_2 and sodium carbonate to form Triiodomethane. The compound X can be :

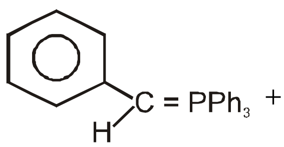
(A) CH_3OH (B) $CH_3C(=O)CH_3$ (C) CH_3CHO (D) $CH_3CH(OH)CH_3$.

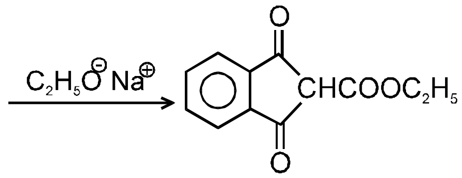
46. Which of the following is possible combination to prepare 1 -phenyl 1,3 butadiene from Wittig reaction ?

(A)  + Ph_3 P = CH – CH = CH_2

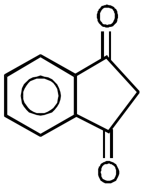
(B) 

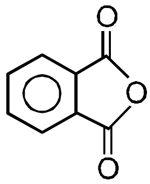
(C)  + Ph_3P = CH – CH = CH_2

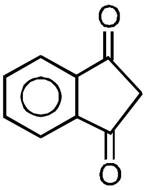
(D)  + $H-\overset{O}{\overset{||}{C}}-CH_2CH=CH_2$

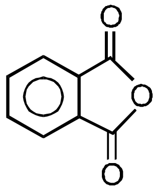
47. In the following reaction, A + B 

A and B respectively are:

(A)  + $CH_3COOC_2H_5$

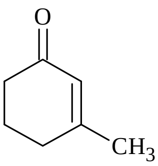
(B)  + $CH_3—OC_2H_5$

(C)  + $C_2H_5O–CO–OC_2H_5$

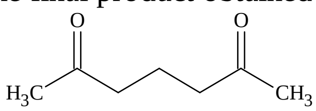
(D)  + $C_2H_5O—CH_2—OC_2H_5$

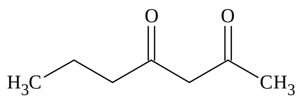
48. Iodoform can be prepared from all except:
(A) Ethyl methyl keton
(B) Isopropyl alcohol
(C) 3–Methyl–2–butanone
(D) Isobutyl alcohol

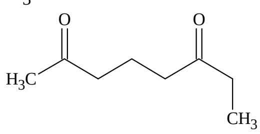
49.

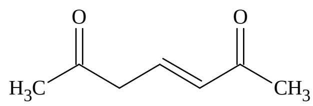


is the final product obtained when one of the following is reacted with base.

(A) 

(B) 

(C) 

(D) 

50. The number of aldol products obtained from the reaction of acetaldehyde with propionaldehyde in the presence of dilute NaOH is
(A) One
(B) two
(C) Three
(D) Four

51. In which of the following reaction new carbon-carbon bond is not formed?
(A) Cannizzaro
(B) Wurtz reaction
(C) Aldol condensation
(D) Friedel-Cradts reaction

52.

$$Ph-\overset{O}{\overset{\|}{C}}-\underset{O}{\underset{\|}{C}}-PH \xrightarrow[\text{MeOH,reflux}]{\text{KOH(aq)}} A \xrightarrow{\text{HCl}} \text{Product}$$

(A) $(Ph)_2C(OH)CHO$
(B) $(Ph)_2C(OH)COOH$
(C) $PhCH_2OH$
(D) $Ph-COOK$

53. An organic compound reacts (i) with metallic sodium to liberate hydrogen and (ii) with Na_2CO_3 solution to liberate CO_2. The compound is
(A) an alcohol
(B) a carboxylic acid
(C) an ether
(D) an ester

54. Acetic acid exists in a dimer state in benzene due to
(A) condensation reaction
(B) hydrogen bonding
(C) presence of carbonyl group
(D) presence of α-hydrogen

55. Which hydrogen atom of acetic acid is replaced by Cl_2 in presence of Red P?
(A) α-hydrogen (B) carboxylic hydrogen
(C) both 1 & 2 (D) oxygen of carboxylic group

56. In the anion $HCOO^-$ the two carbon-oxygen bonds are found to be equal length. What is the reason for it?
(A) The anion $HCOO^-$ has two equivalent resonating structures
(B) The anion is obtained by removal of a proton from the acid molecule
(C) Electronic orbitals of carbon atom are hybridized
(D) The C = O bond is weaker than the C – O bond

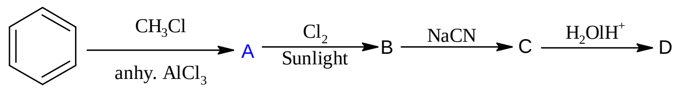
57. 2.3 gm Na is added to 6 gm of CH_3COOH. The Volume of 'H_2' gas liberated at S.T.P.
(A) 1. 12 L (B) 2.24 L (C) 3.36 L (D) 4.48 L

58. α-chloropropanoic acid on treatment with alcoholic KOH followed by acidification gives:
(A) $CH_3-CH(OH)-COOH$ (B) $CH_2=CH-COOH$
(C) $HO-CH_2-CH_2-COOH$ (D) CH_3-CH_2-COOH

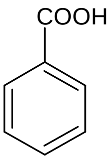
59. $CH_3CN+H_2O\xrightarrow{H^+}A\xrightarrow[Red\ P]{Excess\ Cl_2}B.$ in the above reaction A and B are respectively.
(A) CH_3COOH, CCl_3COOH (B) CH_3CH_2OH, CCl_3CH_2Cl
(C) CH_3CHO, CCl_3CHO (D) CH_3COCH_3, CCl_3COCH_3

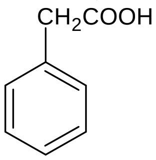
60. The $-COOH$ group in benzene ring is
(A) Ortho directing (B) Para directing
(C) Ortho and para directing (D) Meta directing

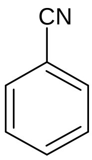
61. $R-COCH_3\xrightarrow{X_2/OH^-}CHCl_3+Carboxylate\ ion\xrightarrow{H^+}Carboxylic\ acid,$ In the above sequence, the carboxylic acid obtained is
(A) CH_3COOH (B) HCOOH (C) RCOOH (D) RCH_2COOH

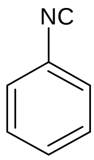
62.


In the above sequence of reactions, D is

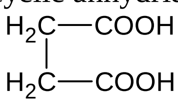
(A) 

(B) 

(C) 

(D) 

63. Which of the following does not undergo Hell-Volhard Zelinsky reaction?
(A) HCOOH (B) CCl_3COOH (C) C_6H_5COOH (D) All

64. Which of the following di-carboxylic acids gives a cyclic anhydride on heating?
(A) $CH_2(COOH)_2$ (B) 

(C) $HOOC(CH_2)_4COOH$ (D) $HOOC(CH_2)_5COOH$

65. $R-CH_2-CH_2OH$ can be converted in $R-CH_2CH_2COOH$. The correct sequence of reagents is
(A) PBr_3, KCN, H_3O^+ (B) PBr_3, KCN, H_2
(C) KCN, H_3O^+ (D) HCN, PBr_3, H_3O^+

66. Which of the following is the strongest base?
(A) Aniline (B) N-Methyl aniline (C) O-methyl aniline (D) Benzylamine

67. Aniline when treated with benzoyl chloride, gives benzanilide the reaction is known as
(A) Perkin (B) Hofmann (C) Schotten baumann (D) Benzoin

68. In the reaction of
$C_6H_5OH\xrightarrow[ZnCl_2]{NH_3}X$; '$X$' may be
(A) $C_6H_5NH_2$ (B) C_6H_5Cl (C) C_6H_5CHO (D) C_6H_5COOH

69. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y \xrightarrow[anhydride]{Acetic} Z$

Z in the above sequence is

(A) $CH_3CH_2CH_2NHCOCH_3$ (B) $CH_3CH_2CH_2NH_2$

(C) $CH_3CH_2CH_2CONHCH_3$ (D) $CH_3CH_2CH_2CONHCOCH_3$

70.

$C_6H_6 \xrightarrow[Conc.\ H_2SO_4,\ 363K]{Conc.\ HNO_3} X \xrightarrow{(NH_4)_2S_x} Y$

In the above reaction sequence, X and Y are

(A) Nitrobenzene, aniline (B) m-Dinitrobenzene, Phenylenediamine

(C) m-Dinitrobenzene, m-Nitroaniline (D) p-Dinitrobenzene, p-Nitroaniline

71. In the given reaction

$CH_3-CH_2-C(CH_3)_2-NH_2 \xrightarrow[Conc.\ HCl]{NaNO_2}$

Product(s). Product(s) will be

(A) $CH_3-CH_2-C(OH)(CH_3)-CH_3$ (B) $CH_3-CH=C(CH_3)-CH_3$

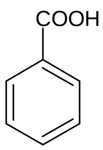
(C) $CH_3-CH_2-C(Cl)(CH_3)-CH_3$ (D) All

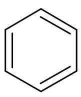
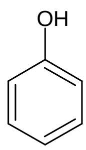
72. Towards electrophilic substitution, the most reactive is

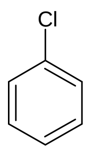
(A) anilinium chloride (B) aniline (C) N-acetylaniline (D) nitrobenzene

73. 'Z' in the following sequence of reaction is

$C_6H_6 \xrightarrow[\Delta]{HNO_3/H_2SO_4} W \xrightarrow{Zn/HCl} X \xrightarrow[HCl,\ 0-5^0C]{NaNO_2} Y \xrightarrow{H_2O/H_3PO_2} Z$

(A) 

(B) 
(C) 

(D) 

74. In the Hofmann's method for separation of 1^0, 2^0 and 3^0 amines, the regent used is

(A) Acetyl chloride (B) Benzenesulphonyl chloride

(C) Diethyl oxalate (D) Nitrous acid

75. In the following reaction, $CH_3NH_2 + CHCl_3 +$ KON Alc. $\rightarrow$ Nitrogen containing compound +KCl + H_2O. The nitrogen containing compound is

(A) $CH_3-NH-CH_3$ (B) $CH_3-C\equiv N$ (C) CH_3-NO_2 (D) $CH_3\overset{+}{N}\equiv\overset{-}{C}$

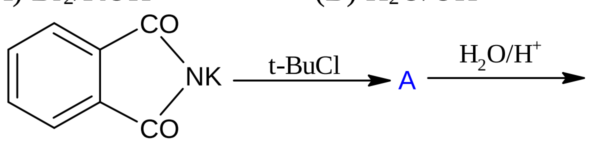
76. The best method for the preparation of primary amine is

(A) $R-X \xrightarrow{NH_3} R-NH_2$ (B) $R-X \xrightarrow[(ii)LiAlH_4]{(i)NaN_3} R-NH_2$

(C) $R-OH \xrightarrow[Al_2O_3/\Delta]{NH_3} R-NH_2$ (D) $R-X \xrightarrow{NaNH_2} R-NH_2$

77. Acetophenone can be converted into amine in a single step by

(A) Br_2/KOH (B) H_2O/OH^- (C) NH_3/H_2, Ni/Δ (D) NH_2OH

78. 

B. The final product is

(A) 1, 3-butadiene (B) t-Bu-NH_2 (CC) isobutene (D) isobutanol

79. An organic compound with molecular formula C_3H_5N on hydrolysis gives an acid. The acid. The acid on heating with N_3H and conc. H_2SO_4 gives

(A) propanamide (B) Ethyl acetate (C) Methyl amine (D) Ethyl amine

80. Ethylamine reacts with nitrous acid to form:
(A) methyl alcohol (B) ethyl alcohol (C) ethane (D) ethyl nitrite

81. The reaction between primary amine, chloroform and few drops of alcoholic KOH is known as:
(A) Hofmann's reaction (B) Reimer-Tiemann's reaction
(C) Carbylamine reaction (D) Kolbe's reaction

82. Gabriel phthalimide synthesis is used in the preparation of:
(A) 1^0 amine (B) 2^0 amine (C) 3^0 amine (D) 4^0 amine

83. In aqueous solution, the strongest base among the following is:
(A) $C_6H_5NH_2$ (B) CH_3NH_2 (C) $(CH_3)_2NH$ (D) $(CH_3)_3N$

84. The final product in the following reaction sequence is:

$$p-Chloroaniline \xrightarrow[0-5^0C]{NaNO_2,\,HCl} ? \xrightarrow{KCN} ? \xrightarrow{LiAlH_4} ?$$

(A) p-chlorobenzamide (B) p-chlorophenol
(C) p-chlorobenzylamine (D) p-chlorobenzyl alcohol

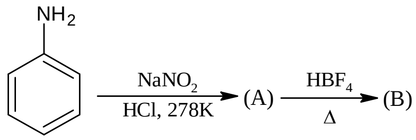
85. Aniline on treatment with aqueous bromine gives:
(A) 2, 4, 6- tribromo aniline (B) *o*-bromo aniline
(C) 2, 4-dibromo aniline (D) *p*-bromo aniline

86. The boiling points of amines and their corresponding alcohol and acids vary in the order:
(A) $RCH_2NH_2 > RCOOH > RCH_2OH$ (B) $RCH_2NH_2 > RCH_2OH > RCOOH$
(C) $RCH_2NH_2 < RCOOH < RCH_2OH$ (D) $RCH_2NH_2 < RCH_2OH < RCOOH$

87. Primary, secondary and tertiary amines can be distinguished by:
(A) Schiff's test (B) Fehling's test (C) Hinsberg's test (D) Tollen's test

88. An organic compound (A) on reduction gives compound (B) which on reaction with $CHCl_3$ and alcoholic KOH gives (C). The compound (C) on catalytic reduction gives N-methyl aniline. The compound (A) is:
(A) methylamine (B) aniline (C) nitromethane (D) nitrobenzene

89. In the chemical reaction,



The compound A and B respectively are:
(A) Nitrobenzene and chlorobenzene
(B) Nitrobenzene and fluorobenzene
(C) Benzene diazonium chloride and fluorobenzene
(D) Phenol and benzene

90. Which is most basic?
(A) Benzylamine (B) *p*-Methyl aniline (C) Aniline (D) *p*-Nitroaniline

91. The nitration (using nitration mixture) of aniline gives:
(A) *p*-nitroaniline (B) *o*-nitroaniline (C) *m*-nitroaniline (D) all of these

92. Chloramphenicol is used in the treatment of which of the following
(A) Typhoid (B) Pneumonia (C) Headache and fever (D) Bronchitis

93. A substance which can act both as antiseptic and disinfectant is
(A) Aspirin (B) Chloroxylenol (C) Bithional (D) Phenol

94. Cocaine is
(A) Vitamin (B) Poison (C) Medicine (D) Antipyretic

95. Penicillin is a
(A) Hormone (B) Antibiotic (C) Antipyretic (D) Vitamin

96. One of the most widely used drug in medicine, iodex is
(A) Methyl salicylate (B) Ethyl salicylate
(C) Acetyl salicylic acid (4) *o*-hydroxy benzoic acid

97. Which of the following is a natural dye

(A) Martius yellow (B) Alizarin (C) Phenolphthalein (D) Orange I

98. Which is an explosive

(A) Toluene (B) R.D.X. (C) *p*-Nitrophenol (D) All of these

99. A certain dye was prepared from a plant grown on a large scale in India. Name the dye

(A) Malachite green (B) Congo red (C) Indigo (D) Turmeric

100. Paracetamol is/are

(A) Both antipyritic and analgesic (B) Analgesic

(C) Antipyritic (D) Antimalaric

101. Which is plant growth inhibitor

(A) Ethylene (B) IAA (C) Abscisic acid (D) Auxins

102. Indigo belongs to the class of

(A) Mordant dyes (B) Vat dye (C) Direct dye (D) Disperse dye

103. Aspirin is a/an

(A) Analgesic and antipyretic (B) Antibiotic

(C) Insecticide (D) Herbicide

104. Artificial sweetener used in soft drinks is

(A) Aspartame (B) Cellulose (C) Fructose (D) Glucose

105. During glycolysis acetyl co-enzyme is formed from

(A) Pyruvate with a loss of carbonyl group (B) Citric acid cycle

(C) Directly from glucose (D) None of these

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