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Department of Mathematics, 2020-2021

Class XI

APPLIED MATHEMATICS (241) 21.02.2021
REVISION WORKSHEET

Based on the information given below answer the following (Qn. 1 to 4).

An item is manufactured by three machines M_1 , M_2 and M_3 . Out of the total number of items manufactured during a specified period, 50% are manufactured on M_1 , 30% on M_2 and 20% on M_3 . 2% of the items produced on M_1 and 2% of items produced on M_2 and 3% of these produced on M_3 are defective. All the items are stored at one godown.

1. What is the probability of selecting an item not produced by machine M_3 ?
2. What is the probability of selecting an item produced by M_1 or M_3 ?
3. One item is selected at random and found to be defective. What is the probability that it was manufactured on machine M_2 ?
4. One item is selected at random and found to be defective. What is the probability that it was manufactured on either M_1 or on M_3 ?
5. If quartiles $Q_1 = 57$, $Q_2 = 59$ and $Q_3 = 63$, then Bowle's coefficient of skewness
A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{1}{4}$ D. $\frac{3}{4}$
6. If Karl Pearson's coefficient of skewness is -0.4, mean = 45 and median is 48 then standard deviation is
A. 22.5 B. 22 C. 20 D. 18
7. Which of the following statement is false:
A. Exclusive events may be exhaustive
B. Sum of probabilities of individual outcomes of a random experiment is 1
C. Independent events are mutually exclusive
D. $P(S) = 1$
8. First central moment of a given number of observations is
A. 1 B. 2 C. -1 D. 0
9. Coefficient of kurtosis of n observations is 3.5 then the frequency curve is
A. Insufficient value to decide B. mesokurtic
C. Leptokurtic D. Platykurtic

10. Given:

Events A and B are such that $P(A) = \frac{1}{2}$, $P(B) = p$ and $P(A \cup B) = \frac{3}{5}$
then value of p if A and B are independent.

- A. $\frac{1}{4}$ B. $\frac{2}{5}$ C. $\frac{1}{5}$ D. $\frac{3}{4}$

11. If x represents the sum of two binary numbers 11001 and 10001 expressed in decimal system then x = _____

- A. 22002 B. 32 C. 42 D. 28

12. Find the probability of selecting three black cards at random from a pack of 52 cards.

- A. $\frac{26 \times 25 \times 24}{52 \times 51 \times 50}$ B. $\frac{26 \times 26 \times 26}{52 \times 52 \times 52}$ C. $\frac{26 \times 26 \times 25}{52 \times 51 \times 50}$ D. $\frac{26 \times 25 \times 24}{52 \times 52 \times 52}$

13. Two students A and B appeared in an examination. The probability that A will qualify the examination is 0.05 and that B will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that both A and B will not qualify the examination?

- A. 0.13 B. 0.17 C. 0.87 D. 0.05

14. Mean = median = mode. Then frequency curve is

- A. Positively skewed B. Symmetric C. Negatively skewed D. None of these

15. Which of the following is correct?

- A. $3\text{median} = 2\text{mean} + \text{mode}$
B. $3\text{mean} = 2\text{median} + \text{mode}$
C. $\text{Mode} = 3\text{median} - 2\text{mean}$
D. $2\text{mean} = 3\text{median} - \text{mode}$

16. 48, 37, 35, 46, 39, 55, 89, 67, 55, 46. Find Percentile rank of score 55

- A. 70 B. 80 C. 85 D. 65

17. If $y = (2x + 3)^{10}$, then $\frac{dy}{dx}$ at $x = -1$

18. $f(x) = \begin{cases} 3x + 1, & x < 0 \\ x^2, & 0 \leq x \leq 3 \\ 3x & x > 3 \end{cases}$, then find $f(-1) + f(1) - f(4)$

19. $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^4 - 16} = \underline{\hspace{2cm}}$.

20. Find the equation of a line passing through (1, 2) and (2, 5)

21. Find the equation passing through (1, 2) and parallel to the line whose equation is $2x + 3y - 7 = 0$

22. Find the distance to the line $3x + 4y - 10 = 0$ from the origin

23. If ACDF is coded as ZXWU, then how will you code EFGH?

24. Write the equation $2x-3y-6=0$ in intercept form.
25. Write centre and radius of a circle whose equation is given by $x^2 + y^2 -16x - 12y =0$
26. Write sample space: A die is thrown and then two coins are thrown if the die shows an even number. How many outcomes are there in sample space?
27. If Mean and variance of a set of observations is 50 and 25 respectively, then write mean, variance and standard deviation in the following cases.
- Each observation is multiplied by 4
 - Each observation is increased by 5
28. Find a). mean
b). median
c) mean deviation from mean.
d) mean deviation from median:
- 5, 5, 8, 3, 4, 7, 2, 5, 4, 7.
29. Rohan's salary for the FY 2019-20 is ₹6,50,000. He paid LIC premium ₹ 40000, NPS ₹1500 per month, tuition fee ₹3000 per month and donated ₹7000 to PMNRF. Find the income tax to be paid.
30. The sums of n terms of two arithmetic progressions are in the ratio $2n + 1: 3n + 2$. Find the ratio of their 10th terms.
31. Find a GP if 4th term is $5/27$ and 7th term is $5/729$.
32. If AM of two numbers = 12.5 and GM = 10, find the numbers
33. Identify the type of OR
You may select Mathematics or Psychology along with a Language.
34. Write converse and contra positive:
If x is an odd number, then square of x is an odd number.
35. If $y = \frac{3x + 2}{4x - 1}$, then find $\frac{dy}{dx}$ at $x = 0$
36. If $y = (x + 2)(x^2 + 1)$, then find $\frac{dy}{dx}$ at $x = 1$
37. $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^2 - x - 2} = \underline{\hspace{2cm}}$.
38. $\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^2 + x - 2} = \underline{\hspace{2cm}}$.
39. $\lim_{x \rightarrow 0} \frac{\sqrt{4 + 4x} - 2}{x} = \underline{\hspace{2cm}}$.
40. Mr. X lives in Mumbai and consumes 45 SCM gas in 60 days. In Mumbai, the gas charges are ₹ 30 per unit if the consumption is up to 0.6 SCM /day and ₹45 per unit if the consumption above 0.6 SCM/day. If VAT on PNG is 12.5%, calculate the bill amount.

41. A shopkeeper bought a fridge from a wholesaler at a discount of 20% of the listed price of ₹ 25000. The shopkeeper sells that TV to a consumer at the listed price. If the sales are intra-state and the rate of GST is 18%, then find the following:
- The tax (under GST) paid by the wholesaler to the central Government.
 - The total price including tax (under GST) paid by the consumer.
42. $A = \{x: x^2 - 5x + 6 = 0\}$ and $B = \{x: 1 < x < \frac{7}{2}, x \in N\}$. Write roster form of A and B. Then
- A proper subset of B
 - B proper subset of A
 - A and B are disjoint set
 - A = B
43. Which statement is correct?
- All relations are functions
 - Number of relations is equal to the product of number of elements of domain and codomain.
 - Number of functions is equal to the number of subsets of cross product.
 - All functions are relations
44. Which of the following is not a function?
- $f(x) = \sqrt{x}: N \text{ to } N$
 - $g(x) = x^2: N \text{ to } N$
 - $h(x) = x, R \text{ to } R$
 - $p(x) = 1, R \text{ to } R$
45. If $f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ a - bx, & x > 1 \end{cases}$ is continuous at $x = 1$, then value of a and b .
- $a=0, b=0$
 - $a=4, b=0$
 - $a=0, b=4$
 - $a=4, b=4$
46. Add the binary numbers and write decimal form: $101 + 1001$
- 5
 - 102
 - 14
 - 21
47. Which of the following is a leap year?
- 1900
 - 1800
 - 2021
 - 2020
48. Write domain and range: $R = \{(1, 2), (2, 2), (3, 2), (4, 2)\}$

49. If $n(A) = 5$, and $n(B) = 3$, then number of relations from A to B = _____
50. Find the mean of first n natural numbers
51. Evaluate: $1101_{(2)} - 101_{(2)}$ and write in decimal form
52. Simplify: $\log 25 + \log 4 - \log 20 - \log 5$
53. Write $A = \left\{ \frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \dots \right\}$ in the set builder form.
54. A completes a work in 10 days and B completes the same work in 30 days. How many days will it take if they work together
55. Find domain and range of the real functions: $|x + 2| + 3$
56. If $(2x-1, 3y+2x) = (5, 0)$, find the values of x and y .
57. Find domain and range of the real function: $\sqrt{2 + x}$
58. How many ways 5-member team can be selected from 5 girls and 7 boys if the team requires at least 2 girls.
59. How many ways the letters of the word GEOMETRY can be arranged? How many of these words are with all vowels together?
60. Write the domain: $f(x) = \frac{1}{x^2-4}$
61. Write roster form of $\{x: x \in Z: x^3 - 4x = 0\}$
62. Find the angle between the hands at 3: 25
63. If $f(x) = \frac{3x+2}{2x-3}$ then find $f(0) + f(3)$
64. If $A = \{1, 2, 3\}$ and $B = \{2, 3, 4, 5\}$ then $B - A =$ _____
65. Evaluate: x if $n(A \cup B) = 70$, $n(A) = 55$, $n(B) = 20$ and $n(A \cap B) = x$.
66. The average of 40 numbers is 20 and the average of 20 other numbers is 35, Find the average of 60 numbers.

67. Find r if $C(8, r) - C(7, 3) = C(7, 2)$

68. Show that the relation R defined by $R = \{(a, b) : a \leq b^3\}$ is not transitive

69. Explain why the relation R on L , the set of all lines in a plane defined as

$$R = \{(L1, L2) : L1 \perp L2, L1, L2 \in L\}$$
 is not an equivalence relation.

70. Write validity of the statement: 100 is divisible by 2, 3 and 5.

Based on the information given below answer the following questions (71 to 75).

There are three coins. One is a two headed coin (having head on both faces), another is a biased coin that comes up heads 75% of the time and third is an unbiased coin. One of the three coins is chosen at random and tossed.

71. What is the probability that selected coin is a two headed coin?

- A. $1/3$ B. $1/2$ C. $3/4$ D. 1

72. What is the probability of getting head if one of the coin is selected and tossed?

- A. $3/4$ B. $1/2$ C. $1/3$ D. 1

73.

If the coin shows heads, what is the probability that it was the two headed coin?

- A. $3/4$ B. $4/9$ C. $5/9$ D. $1/4$

74.

If the coin shows heads, what is the probability that it was not the two headed coin?

- A. $3/4$ B. $4/9$ C. $5/9$ D. $3/4$

75. In a university, out of 100 students, 18 offered Mathematics only; 13 offered Statistics only; 20 offered Economics only; 15 offered Mathematics and Statistics; 20 offered Statistics and Economics; 17 offered Economics and Mathematics and 52 offered Economics. Using Venn diagram, find number of students who

- (i) Offered all the three subjects (ii) Offered Statistics
(iii) Offered Mathematics (iv) did not offer any subject.

ALL THE BEST

Q. No	Answer	Q. No	Answer
1.	0.8	26.	15
2.	0.7	27.	a)200, 400, 20 b) 55, 25, 5
3.	3/11	28.	a) 5, b) 5, c) 1,4 d) 1.4
4.	8/11	29.	0
5.	A	30.	39:59
6.	A	31.	5, 5/3, 5/9, ...
7.	C	32.	20, 5
8.	D	33.	Excusive
9.	C	34.	If x^2 is an odd number, then x is an odd number. If x^2 is not an odd number then x is not an odd number
10.	C	35.	-11
11.	C	36.	8
12.	A	37.	4
13.	C	38.	4/3
14.	B	39.	1
15.	A	40.	1620
16.	A	41.	₹ 1800 and ₹ 29500
17.	10	42.	D
18.	-13	43.	D
19.	5/2	44.	A
20.	$3x - y - 1 = 0$	45.	B
21.	$2x + 3y - 8 = 0$	46.	C
22.	2	47.	D
23.	VUTS	48.	{1, 2, 3, 4} and {2}
24.	$\frac{x}{3} + \frac{y}{-2} = 1$	49.	2^{15}
25.	Centre (8, 6) $r = 10$	50.	$\frac{n + 1}{2}$

Q. No.	Answer	Q. No.	Answer
51.	8	64.	{4, 5}
52.	0	65.	5
53.	$\{\frac{2n-1}{2n+1} : n \in N\}$	66.	25
54.	7.5 days	67.	3 or 5
55.	Domain = R Range = $[3, \infty)$	68.	$(25, 4), (4, 3) \in R$ <i>, but $(25, 3)$ does not belong to R</i>
56.	$x=3, y=0$	69.	Neither reflexive nor transitive
57.	Domain $[-2, \infty)$ Range $[0, \infty)$	70.	False
58.	246	71.	A
59.	20460 2160	72.	A
60.	$R - \{2, -2\}$	73.	B
61.	$\{-1, 0, 1\}$	74.	C
62.	47.5^0	75.	(i) 5 (ii) 43 (iii) 45 (iv) 7
63.	3		