Secondary Education Examination
Model Question - 2078
Grade: 12

Time: 3 hrs Applied Mathematics (Ama. 404) **F.M.:** 75

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt **All** Questions.

Group 'A' $[11 \times 1 = 11]$

Rewrite the correct option in your answer sheet.

1. The most appropriate distance between Baglung and Jumla based on the given scale is

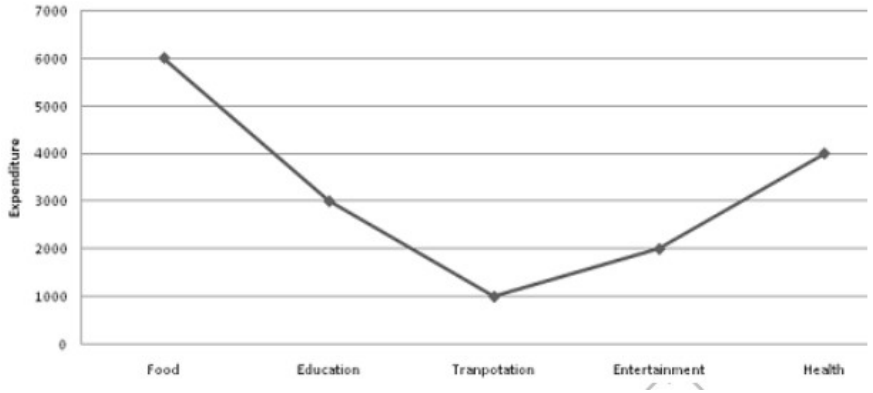
A. 80 km B. 40 km C. 60 km D. 110 km

OR

If a teacher wants to make an equal group of students keeping 50% high achieving students in one group and the remaining 50% students are low achieving in another group. Which of the following statistical measure would fit the best?

A. Mean B. Mode C. S.D. D. Median

2. The following graph represents expenditures (in Rs) of a family under different headings



What is the percentage of the expenditure under entertainment assuming that these five are only the headings of expenditure?

A. $\frac{25}{2}$ B. $\frac{21}{2}$ C. $\frac{31}{5}$ D. $\frac{2}{25}$

OR

A person invests 20% of his/her income for entertainment this year which is equivalent to Rs. 20000. And, it is sure that his annual income increases by 20% each year. Then how much amount would he/she spend next year on entertainment?

A. 24000 B. 40000 C. 20000 D. 22000

3. A person needs to select 4 types of fruits out of 6 types (apple, banana, orange, grapes, mango, and pineapple) available to her/him in which pineapple is compulsory. In how many ways can the person make up her/his selection?

A. 6 B. 5 C. 24 D. 10

4. A farmer produces and sells her/his own production. She/he sold paddy in Nrs. 2000 per quintals, corn in Nrs. 1500 per quintals and

wheat per Nrs. 1600 per quintals. Which one of the following describes the best model for the farmer's annual revenue? (x, y, z represents the quantity produced for paddy, corn and wheat respectively)

A. $2000x + 1500y + 1600z$

B. $2000 + 1500 + 1600$

C. $2000x \times 1500y \times 1600z$

D. $x + y + z$

5. If two children are born in a family, then the probability of having both sons is

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

6. The value of 0! is

A. 1 B. 0 C. $-\infty$ D. 10

7. If events A and B are independent cases, then

A. $P(A \cap B) = P(A) + P(B)$

B. $P(A \cap B) = 0$

C. $P(A \cap B = P(A).P(B)$

D. $P(A) = P(B)$

8. The objective function in LPP problems is.....

A. The linear function that used for only maximize the function

B. The linear function that used for only minimize the function

C. The linear function used for optimizing the function

D. The linear function that is formed from the given constraints.

9. The following is a payoff (in rupees) table for three strategies and two states of nature:

Strategies	State of Nature	
	N_1	N_2
S_1	40	60
S_2	10	-20
S_3	-40	150

Select a strategy using the decision of Maximin criteria

A. S_1 B. S_2 C. S_3 D. N_1

10. X, Y, Z are three partners in a business. They invested Rs. 1200, Rs. 2400 and Rs. 3000 respectively. How much amount will X gets in the case of having a profit of Rs. 990 based on their investment?

A. 280 B. 180 C. 360 D. 450

11. The pay off table best describes.....

A. The benefit obtained from the given combination of decision alternative and state of nature

B. The loss obtained from the given combination of decision alternative and state of nature

C. The total revenue obtained from the given combination of decision alternative and state of nature

D. The cost obtained from the given combination of decision alternative and state of nature

Group 'B' $[8 \times 5 = 40]$

12. In order to find the correlation coefficient between the variables X and Y from 12 pair of records, the following results were found:

$$\Sigma x = 30, \Sigma y = 30, \Sigma x^2 = 670, \Sigma y^2 = 285 \text{ and } \Sigma xy = 334$$

Later, on subsequent verification, it was found that the pairs $X = 15$ and $Y = 5$ were copied wrong instead of the correct values $X = 10$ and $Y = 12$. Now, find the corrected value of the correlation coefficients. [5]

13. A rectangular plot of length 200m and breadth 150m has a crossroad from the middle of the length and breadth with the width of 7m, on the one side of the crossroad width of 1m should be left for the drain. How many pieces of land can be made of area 684.5m2 each? [5]

14. The following table presents the rate of income tax according to the government rule. If a person earns Rs. 7,50,000 in a year, calculate the following:

Tax Banding	Tax rates	
Individual	FY 2020 - 21	
(a) Band 1	First 400,000	1%*
(b) Band 2	Next 100,000	10%
(c) Band 3	Next 2000,000	20%
(d) Band 4	Next 1,300,000	30%
(e) Additional Tax	Remaining above 2,000,000	36%**

(a) How much income tax should the person pay? [3]

(b) It is offered that 33% of the annual income is not taxable if it is saved in CIT fond. Also, Maximum Rs. 2,50,000 per annum is also not taxable if it is deducted for the insurance policy. If a person is interested to utilize any one policy, which option do you suggest so as to pay the minimum tax amount? [2]

15. A person has taken a loan of Rs. 500,000 from a bank with an interest rate of 15% per annum and invested in a business. It is already fixed that the person gets 40% profit each year from her/his business and, the loan will be reduced each year by the profit amount. How much loan will be left after 3 years?

16. An investor on the share market is given the following investment alternatives and percentage rates of return.

Share related to	Market Conditions		
	Low	Medium	High
Hydropower	7%	10%	15%
Banking Sector	-10%	12%	25%
Insurance Company	-12%	18%	30%

(a) If a person wants to get certain rates of returns in all the market conditions, which of the above sectors do you suggest for the investor and why? [1]

(b) While observing the past 300 days, 150 days have been medium market conditions and 60 days have high market conditions and the remaining days have low market conditions. Based on these data, state the optimum investment strategy for the investment. [4]

17. What condition should be added to selecting objects for making it arranging the objects?A student is required to answer 6 out of 10 questions which are divided into 2 groups each containing 5 questions and she/he is not permitted to attempt more than 4 from any group. In how many different ways can she/he make up her/his choice? [1 + 4]

18. A problem is given to three students A, B, C whose chance of solving it by A is 50%, by B is 75% and by C is just 25%. Find the probability that the problem is solved. [5]

19. The following table describes the production of wheat (in quintals) corresponding to the amount of rainfall (in mm) of certain land in the last few years:

Rainfall	0.8	1	1.4	1.8
Production	25	30	32	38

Now, estimate the production corresponding to the rainfall 2 mm. [5]

Group 'C' $[3 \times 8 = 24]$

20. The following table shows the result of the SEE examination of a school in recent 3 years. Answer the questions given below:

Year	Grade A+	Grade A	Grade B+	Grade B	Grade B -
2072	15	25	30	18	25
2073	20	18	35	26	20
2074	18	22	28	20	26

(a) Suggest the best year for the school on the basis of the performance. [2]

(b) Suggest the worst year for the school on the basis of the performance. [2]

(c) Represent the data into a suitable diagram. [4]

21. A cuboid-shaped room is to be decorated by coloring in five faces whereas the bottom face is to be marbleized. The rate of coloring on the top surface is Rs. 105 per square feet whereas the rate of coloring for the four walls is Rs. 90 per square feet. And the rate of marbling for the bottom face is 110 per square feet.

(a) Create the mathematical model to calculate the total cost of decorating the room in the function of length, breadth and height of the room. [6]

(b) If the length, breadth and height of the room are 15 feet, 12 feet, 10 feet respectively, calculate the total cost for decorating the room. [2]

22. The following table describes the total stationery items (basket of goods) brought and rate in different years:

Items	Years					
	2017		2018		2019	
	Quantities	Rate	Quantities	Rate	Quantities	Rate
Pen	12	8	12	10	10	12
Pencil	6	4	4	5	6	5

Calculate the inflation rate from 2017 to 2018 and 2018 to 2019 taking 2017 as the base year with the help of the Consumer Price Index (CPI) and describe it. [3 + 3 + 2]

Ambik