CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF PROCUREMENT AND LOGISTICS MANAGEMENT

BPLM 102: MANAGEMENT MATHEMATICS

STREAMS: BPLM Y1S1

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 24/3/2021   **8.30 AM – 10.30 AM**

INSTRUCTIONS:
- Answer Question ONE and any other TWO questions
- Do not write on the question paper

QUESTION ONE

a) Define the following terms as used in business mathematics
  i. Single ton set   [2 Marks]
  ii. Finite set   [2 Marks]
  iii. Ordinary annuity   [2 Marks]
  iv. Simple interest   [2 Marks]

b) A salesman daily wages is composed of a fixed amount and a variable component, which is dependent on the number of ice cream units sold. If he sells 10 units on a given day, he earns sh.600 while when he doubles his sales his earnings increase only by sh.100.

Required:
  i) Fixed daily earnings   [3 Marks]

  ii) Level of commission per unit sold and hence the sales man total earnings if he sells 30 units of ice cream.   [3 Marks]

  iii) On a given day the salesman is determined to earn sh.3500. Suppose on the previous day he had guaranteed orders of 20 units, how many more must he sell in order to achieve his target earnings?   [3 Marks]

c)   Maswali Mengi deposited Sh. 52,000 in a fixed deposit account at a compound interest of 12% per annum compounded quarterly. Determine;

i) Accumulated amount to the nearest thousands after 5 years.   [3 Marks]

ii) The time it will take for the amount to double.   [4 Marks]

d)   The monthly number of clients in Fimtec ltd follows an arithmetic progression model. The total number of clients in the first 4 and 8 months are 1,270 and 3,260 respectively. Determine the number of clients in the 10$^{\text{th}}$ month.   [6 Marks]

QUESTION TWO

a)   The relationship between total cost and output in XYZ Ltd was found to be linear. It would cost shs.5, 350 to produce 2,000 units and shs.6,100 to produce 2,500 units in a week. What are the variable costs and fixed weekly costs of production?   [4 Marks]

b)   The demand function faced by a firm is p=200-3Q where p is the price per unit. The Total   cost function of a commodity is given as $TC = 80Q - Q^2 + 75$ where Q is the quantity produced in units. The total cost would be Ksh.775 when 10 units of the commodity are produced.

Required:

i) The total revenue function for the commodity   [2 Marks]
ii) The break-even point of the firm   [4 Marks]
iii) Price per unit at the break-even point   [3 Marks]

c)   Given that A, B and C are subsets of the universal set U= {X: x is an integer less than 10 but greater than 1}and that A = {2, 4, 6, 7, 9}, B= { 2, 3, 5, 8, 9} and C= { 3, 4, 5, 6, 8,9}

Determine the composition of the following sets;
i. $B^C \cap C$ [2 Marks]
ii. $A \cap B \cap C$ [2 Marks]
iii. $n\{ A \cup B \cup C\}$ [2 Marks]

QUESTION THREE
a) Wakili intends to have Kshs. 8,500,000 at the end of the 10$^{\text{th}}$ year. To accumulate this sum he decides to save in a bank a certain amount at the end of each year for the next 9 years. If the bank pays 10 per cent per annum compound interest, how much should he save each year?
          [4 Marks]

b) Chuka Daily distributes three types of magazines namely; Newline (N), Informer (1) and Update (U). The management is intending to expand its market to Embu county and hence recently conducted a market survey to determine the magazine preferences among 200 households in Embu town. The following results were obtained from the survey.

96 households read the Newsline magazine.
36 household read the informer magazine.
52 households read the Update magazine.
16 households read the Newsline and the Update magazines.
16 households read the Newsline and the Informer magazines.
6 households read the Update and the Informer magazines.
48 households read none of the three magazines.

Required; clearly showing your workings;
      i) Present this information on a venn diagram   [3 Marks]
      ii) Determine the number of households who read all the 3 magazines.   [3 Marks]
      iii) How many households read atleast 2 magazines   [2 Marks]
      iv) How many households read Informer but not Newsline   [2 Marks]

c)   Use the binomial theorem to find the first three terms in ascending powers of x of $\left(1 - \frac{x}{2}\right)^5$
     Hence use your expansion to estimate the value of (0.94)5.   [6 Marks]

QUESTION FOUR

a)   The number of items produced each day by an assembly line worker, x days after an initial training period is modeled by; $Y = 120 - 80e^{-.030x}$ Where y= number of items completed per day and x= number of day   after the initial training of a worker.

Required:
      i) The number of units produced by an assembly line worker per day, 10 days after
         training.   [2 Marks]
      ii) After how many days will the production be 90 units.   [4 Marks]

b)   Divan Sacco provides low cost retail lending services. Lydia wishes to borrow a loan at the prevailing market interest rate of 9% per annum on reducing balance method. The loan is to be repaid in equal annual installments of sh. 1,285.40 and the repayment period is 5 years.

Determine;

(i) The amount of loan a client can borrow now (To the nearest hundreds)   [3 Marks]

(ii) Prepare the respective loan amortization schedule that would guide Lydia in loan
repayment.   [5 Marks]

c)   An wedding subcommittee of 7 members is to be constituted from among 8 youths, 5
church elders and the pastor. In how many ways can the committee be formed such that;
(i) No restriction on which category is to be included among the 14 members.[2 Marks]

(ii) The Pastor must be included.   [2 Marks]

(iii) Pastor and 3 youths must be included   [2 Marks]

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