## PROFESSIONAL SECTION

## (REVISED)

51/10/2023

### Time Table - S. Y. B. Sc. (I.T.) Semester-III (Regular) Oct-2023

| Sr. No. | Date | Day | Name of the Subjects | Time | Duration |
|---|---|---|---|---|---|
| 1 | 02-11-2023 | Thursday | Data Structures | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 2 | 03-11-2023 | Friday | Computer Networks | **02:00 pm to 04:30 pm** | 2 ½ Hrs |
| 3 | 06-11-2023 | Monday | Applied Mathematics | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 4 | 07-11-2023 | Tuesday | Python Programming | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 5 | 08-11-2023 | Wed | Operating System | 11:30 am to 02:00 pm | 2 ½ Hrs |

### Time Table - S. Y. B. Sc. (Data Sc) Semester-III (Regular) Oct-2023

| Sr. No. | Date | Day | Name of the Subjects | Time | Duration |
|---|---|---|---|---|---|
| 1 | 02-11-2023 | Thursday | Data Structures & Algorithm using Python | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 2 | 03-11-2023 | Friday | Economics | **02:00 pm to 04:30 pm** | 2 ½ Hrs |
| 3 | 06-11-2023 | Monday | Liner Algebra & Discrete Mathematics | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 4 | 07-11-2023 | Tuesday | Research Methods & Ethics | 11:30 am to 02:00 pm | 2 ½ Hrs |
| 5 | 08-11-2023 | | Data Warehousing & Mining | 11:30 am to 02:00 pm | 2 ½ Hrs |

Note:   1) Students without valid I-Card are not allowed to sit for the Semester End Examination.
2) Seating arrangement will be displayed later on notice board.
3) Mobile phones are not allowed in the examination hall.


Prof. Shahid Pervez
Chairman, Exam Comm.
Professional Courses

Prof. (Dr.) Hanif Lakdawala
Asst. Director
Professional Courses

Prof. (Dr.) Shaukat Ali
Principal

# Department of B. Sc. (Data Science)

Note: 1) All questions are compulsory.

2) Figures to the right indicate marks.

**Q1.**   **Attempt any THREE:**   [15]

a.   What is asymptotic notation? Explain Big O, Omega and Theta notations.

b.   Write a short note on built-in data type in python.

c.   What is algorithm? Write its characteristics.

d.   Write and explain Divide and Conquer algorithm.

e.   What is time and space complexity? Explain best case analysis with example.

f.   Write a python program that implements various operations on array.

**Q2.**   **Attempt any THREE:**   [15]

a.   What is string? Explain some basic string function with suitable example.

b.   What is variable in python? Explain the scope of variable.

c.   Explain 'for' loop with suitable example.

d.   Write a note on set? Also write methods and operations performed on set.

e.   What is searching? Explain linear search in unordered list.

f.   Write a python program that implements different operations on list.

**Q3.**   **Attempt any THREE:**   [15]

a.   Write and explain doubly linked list node structure.

b.   Explain singly circular linked list with suitable diagram.

c.   Explain various operations performed in doubly linked list.

d.   Write and explain the node structure of singly linked list.

e.   What is linked list traversal?  Explain delete operation in it.

f.   Write a python program that demonstrates working of stack. (push, pop)

**Q4.**   **Attempt any THREE:**   [15]

a.   What is peek operation in stack? Write the applications of stack.

b.   Differentiate between stack and queues.

c.   What is stack? Explain push and pop operation in stack.

d.   Write and explain the enqueue and dequeue operations in queue.

e.   What is queue? Explain list based queues with an example

f.   Write a python program that implements linear search.

**Q5.**   **Attempt any THREE:**   [15]

a.   What is bubble sort? Explain with example.

b.   What is searching? Explain binary search with example.

c.   Write the advantages and disadvantages of linear search.

d.   Differentiate between linear search and binary search.

e.   Explain the working of linear search.

f.   Write a python program that implement selection sort.

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# Department of B. Sc. (Data Science)

APCCE / Class: SYDS / SEM-III / SUB: ECONOMICS / DUR 2 ½ Hrs. / Mks: 75 / DT. _____

Note: 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Mixing of sub-questions is not allowed and try to accommodate whole QP in single page.

| Q1. | | Attempt any THREE: | [15] |
|---|---|---|---|
| | a. | Explain what is Economics and Difference Between Micro and Macro Economics? | |
| | b. | Explain the difference policy proposals economic system? | |
| | c. | What is the Production Possibility Frontier (PPF)? | |
| | d. | What is the Production Possibility Curve (PPC)? | |
| | e. | Explain the Unattainable choices with the diagrams? | |
| | f. | Jane's marginal benefit per day from drinking coke is given in the table below. This shows that she values the first coke she drinks at $20, the second at $12, and so on. If the price of coke is $7, the optimal number of cokes that a Jane should Drink is: | |

| | MARGINAL BENEFIT (WTP) |
|---|---|
| 1ST DRINK | $20 |
| 2ND DRINK | $12 |
| 3RD DRINK | $6 |
| 4TH DRINK | $2 |

| Q2. | | Attempt any THREE: | [15] |
|---|---|---|---|
| | a. | Explain Law of Demand and Supply | |
| | b. | Explain Importance and Facts about law of Demand? | |
| | c. | Explain Law of Demand Exception? | |
| | d. | Explain the causes of shift in Demand? | |
| | e. | Explain the change in Quantity Demanded vs Shift in Demand? | |
| | f. | Explain the causes of shift in Supply? | |

| Q3. | | Attempt any THREE: | [15] |
|---|---|---|---|
| | a. | Explain the types of unemployment? | |
| | b. | What is GDP? Explain briefly? | |
| | c. | Explain the difference between the Household Survey and Payroll Survey? | |
| | d. | Explain Nominal GDP vs Real GDP? | |
| | e. | Explain the International Sector? | |
| | f. | Who is in the Labor Force? | |

| Q4. | | Attempt any THREE: | [15] |
|---|---|---|---|
| | a. | Explain Real vs Nominal Income and Earnings? | |
| | b. | Explain difference between Real and Nominal Rate of Interest? | |
| | c. | Explain Cost and Causes of Inflation? | |
| | d. | What is Fiscal Policy? | |
| | e. | What is Automatic Stabilizer? | |
| | f. | Difference between Debt and Deficits of government? | |

| Q5. | | Attempt any THREE: | [15] |
|---|---|---|---|
| | a. | Difference between fiat and commodity money? | |
| | b. | Explain what is money? | |
| | c. | Explain types of money aggregates? | |
| | d. | Explain types of money? | |
| | e. | Explain Measuring money? | |
| | f. | Explain Fiduciary money? | |

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# Department of B. Sc. (Data Science)

APCCE / Class: SYDS / SEM-III / SUB: ECONOMICS / DUR 2 ½ Hrs. / Mks: 75 / DT. _____

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| | MARGINAL BENEFIT (WTP) |
|---|---|
| 1$^{ST}$ DRINK | $20 |
| 2$^{ND}$ DRINK | $12 |
| 3$^{RD}$ DRINK | $6 |
| 4$^{TH}$ DRINK | $2 |

| Q2. | | Attempt any THREE: | [15] |
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| | a. | Explain Law of Demand and Supply | |
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| | c. | Explain Law of Demand Exception? | |
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| | b. | Explain difference between Real and Nominal Rate of Interest? | |
| | c. | Explain Cost and Causes of Inflation? | |
| | d. | What is Fiscal Policy? | |
| | e. | What is Automatic Stabilizer? | |
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| | b. | Explain what is money? | |
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| | d. | Explain types of money? | |
| | e. | Explain Measuring money? | |
| | f. | Explain Fiduciary money? | |

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**Department of B.Sc. (Data Science)**

APCCE / CLASS : SYDS / SEM -III / SUB: Linear Algebra and Discrete Mathematics / Dur : $2\frac{1}{2}$ Hrs. /
MARKS : 75   DATE : 06/11/2023

Note : 1) All questions are compulsory.
     2) Figures to the right indicate marks.
     3) Mixing of sub-questions is not allowed and try to accommodate whole QP in single page.

**Q1.**    Attempt any THREE:                                               [15]

    a.   If $A = \begin{vmatrix} 1 & 3 \\ 4 & 1 \\ 1 & 2 \end{vmatrix}$ $B = \begin{vmatrix} 2 & 1 \\ -1 & 3 \\ 4 & 2 \end{vmatrix}$ and $C = \begin{vmatrix} 0 & 2 \\ 1 & -3 \\ 7 & 2 \end{vmatrix}$ then verify $A-(B-C)=(A-B)-C$.

    b.   If A and B are Hermitian matrices then prove that AB+BA is Hermitian and AB-BA is skew Hermitian matrix.

    c.   Solve inverse matrix $a = \begin{vmatrix} -3 & 4 \\ 2 & 5 \end{vmatrix}$

    d.   Explain Linear dependence & Linear independence of vector.

    e.   Explain Diagonal matrix and Row matrix with example.

**Q2.**    Attempt any THREE:                                               [15]

    a.   Are the following vectors linearly dependent. If so, find the relation between them.
        (3,2,7) (2,4,1) (1,-2,6)

    b.   Find inner product of a & b and a.
        $a = [i+1 \quad -2-i \quad 3]^T$, $b = [2i+2 \quad i-1 \quad 3i]$

    c.   Solve the following linear system of homogenous equation.
        x+2y+3z+t=0 ;x+y-z-t=0 ; 3x-y+2z+3t=0

    d.   Show $V=R^3 = \{ \begin{vmatrix} x \\ y \\ z \end{vmatrix}$ x, y, z $\epsilon$ R } is a vector space over R & and the set W={ $\begin{vmatrix} s \\ t \\ 0 \end{vmatrix}$ ; s, t are
real } is a subspace of v.

    e.   Explain vector space with its properties.

**Q3.**    Attempt any THREE:                                               [15]

    a.   Solve the following system of linear homogenous equation.
        3x+y-z=0 ;4x-2y-3z=0 ; 2x+4y+z=0

    b.   Find the eigen value and eigen vector of the eigen matrices. $A = \begin{vmatrix} 1 & -2 \\ -5 & 4 \end{vmatrix}$

    c.   Consider a 2X2 matrix defined by 'A' as show below. Analyze whether the given matrix A is an orthogonal or not.
        $A = \begin{vmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{vmatrix}$

    d.   Show that the identify matrix I is similar only to itself.

    e.   If $A = \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$ $B = \begin{vmatrix} 2 & 4 \\ -1 & 0 \end{vmatrix}$ find AB & BA if it exists.

Q4. Attempt any THREE: [15]

a. Diagonalize the following matrices find the modal matrix $p = \begin{vmatrix} 5 & 4 \\ 1 & 2 \end{vmatrix}$

b. Diagonalize the matrix A and hence find $A^5$ where $A = \begin{vmatrix} 4 & 1 \\ 3 & 2 \end{vmatrix}$

c. Consider two bases B= {$b_1,b_2$} and C={$c_1,c_2$} for a vector space that $b_1=4c_1+4c_2$ and $b_2=-6c_1+c_2$ suppose $x=3b_1+b_2$ i.e. $[x]_B = \begin{vmatrix} 3 \\ 1 \end{vmatrix}$ find $[x]_c$

d. Explain Monic Polynomial.

e. Explain orthogonal Matrix properties.

Q5. Attempt any THREE: [15]

a. Find the minimal polynomial of the matrix A and show that A is derogatory.

$$A = \begin{vmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & 4 & 4 \end{vmatrix}$$

b. Explain Minimal polynomial properties.

c. Find the determinants of the matrix below.

$$A = \begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$$

d. Is the following matrix positive definite?

$$\begin{vmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{vmatrix}$$

e. For what numbers b is the following matrix positive semidefinite?

$$\begin{vmatrix} 2 & -1 & b \\ -1 & 2 & -1 \\ b & -1 & 2 \end{vmatrix}$$

****** ALL THE BEST ******

Note: 1) All questions are compulsory.
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| Q1. | Attempt any THREE: | [15] |
|---|---|---|
| | a. | Define the term "Research" with its objective. | |
| | b. | What are the different types of research? Explain each in brief. | |
| | c. | Explain difference between research methods and methodology. | |
| | d. | How does one go about developing working hypotheses? | |
| | e. | Explain Simple random sampling and Systemic Sampling. | |
| | f. | How to prepare the report or thesis? Explain. | |

| Q2. | Attempt any THREE: | [15] |
|---|---|---|
| | a. | What are the techniques involved in defining research problem? | |
| | b. | Explain the features of good research design. | |
| | c. | Write short notes on Dependent and independent variables. | |
| | d. | What are the criteria for selecting sampling procedure? | |
| | e. | Explain nominal scale. | |
| | f. | Write short notes on significance of research. | |

| Q3. | Attempt any THREE: | [15] |
|---|---|---|
| | a. | What is scaling? Explain in brief. | |
| | b. | What do you mean by Sources of Error in Measurement? Explain. | |
| | c. | Write short notes on:<br>1. IEEE    2. SCOPUS | |
| | d. | List and explain sponsor's ethics in detail. | |
| | e. | Explain technical report. | |
| | f. | Explain the meaning of interpretation. Also explain why interpretation is needed? | |

| Q4. | Attempt any THREE: | [15] |
|---|---|---|
| | a. | What is variable? Explain in detail. | |
| | b. | Explain different role of hypothesis. | |
| | c. | Write short notes on models in research with proper example. | |
| | d. | What is UGC-CARE? Explain in detail. | |
| | e. | What are the precautions to be taken when preparing the reports? | |
| | f. | Explain different steps in writing research report. | |

| Q5. | Attempt any THREE: | [15] |
|---|---|---|
| | a. | What do you mean by Ethical Treatment of Participants? Explain in brief. | |
| | b. | Draw and explain Ethical Issues and the Research Process diagram and explain. | |
| | c. | How to maintain Professional Standards in research? Explain. | |
| | d. | Write notes on concept. | |
| | e. | Explain E-Research in detail. | |
| | f. | What do you mean by Virtual ethnography? Explain. | |

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| | b. | What are the different types of research? Explain each in brief. | |
| | c. | Explain difference between research methods and methodology. | |
| | d. | How does one go about developing working hypotheses? | |
| | e. | Explain Simple random sampling and Systemic Sampling. | |
| | f. | How to prepare the report or thesis? Explain. | |
| | | | |
| Q2. | | Attempt any THREE: | [15] |
| | a. | What are the techniques involved in defining research problem? | |
| | b. | Explain the features of good research design. | |
| | c. | Write short notes on Dependent and independent variables. | |
| | d. | What are the criteria for selecting sampling procedure? | |
| | e. | Explain nominal scale. | |
| | f. | Write short notes on significance of research. | |
| | | | |
| Q3. | | Attempt any THREE: | [15] |
| | a. | What is scaling? Explain in brief. | |
| | b. | What do you mean by Sources of Error in Measurement? Explain. | |
| | c. | Write short notes on: <br> 1. IEEE   2. SCOPUS | |
| | d. | List and explain sponsor's ethics in detail. | |
| | e. | Explain technical report. | |
| | f. | Explain the meaning of interpretation. Also explain why interpretation is needed? | |
| | | | |
| Q4. | | Attempt any THREE: | [15] |
| | a. | What is variable? Explain in detail. | |
| | b. | Explain different role of hypothesis. | |
| | c. | Write short notes on models in research with proper example. | |
| | d. | What is UGC-CARE? Explain in detail. | |
| | e. | What are the precautions to be taken when preparing the reports? | |
| | f. | Explain different steps in writing research report. | |
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| Q5. | | Attempt any THREE: | [15] |
| | a. | What do you mean by Ethical Treatment of Participants? Explain in brief. | |
| | b. | Draw and explain Ethical Issues and the Research Process diagram and explain. | |
| | c. | How to maintain Professional Standards in research? Explain. | |
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| | f. | What do you mean by Virtual ethnography? Explain. | |

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**Q4.** Attempt any THREE: [15]

   a. Diagonalize the following matrices find the modal matrix $p = \begin{vmatrix} 5 & 4 \\ 1 & 2 \end{vmatrix}$

   b. Diagonalize the matrix A and hence find $A^5$ where $A = \begin{vmatrix} 4 & 1 \\ 3 & 2 \end{vmatrix}$

   c. Consider two bases B= {$b_1, b_2$} and C={$c_1, c_2$} for a vector space that $b_1 = 4c_1 + 4c_2$ and $b_2 = -6c_1 + c_2$ suppose $x = 3b_1 + b_2$ i.e. $[x]_B = \begin{matrix} 3 \\ 1 \end{matrix}$ find $[x]_c$

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****** ALL THE BEST ******

## Department of B. Sc. (Data Science)

APCCE / Class: SYDS / SEM-III / SUB: RESEARCH METHOD & ETHICS / DUR 2 ½ Hrs. / Mks: 75 / DT. 01/11/23

Note: 1) All questions are compulsory.
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| Q1. | Attempt any THREE: | [15] |
|---|---|---|
| a. | Define the term "Research" with its objective. | |
| b. | What are the different types of research? Explain each in brief. | |
| c. | Explain difference between research methods and methodology. | |
| d. | How does one go about developing working hypotheses? | |
| e. | Explain Simple random sampling and Systemic Sampling. | |
| f. | How to prepare the report or thesis? Explain. | |

| Q2. | Attempt any THREE: | [15] |
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| a. | What are the techniques involved in defining research problem? | |
| b. | Explain the features of good research design. | |
| c. | Write short notes on Dependent and independent variables. | |
| d. | What are the criteria for selecting sampling procedure? | |
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| f. | Write short notes on significance of research. | |

| Q3. | Attempt any THREE: | [15] |
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| a. | What is scaling? Explain in brief. | |
| b. | What do you mean by Sources of Error in Measurement? Explain. | |
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| d. | List and explain sponsor's ethics in detail. | |
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| f. | What do you mean by Virtual ethnography? Explain. | |

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