BIT151-2081 ✡

Tribhuvan University

Institute of Science and Technology

2081

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Bachelor Level / First Year/ Second Semester/ Science
Bachelors in Information Technology (BIT 151)
(Microprocessor and Computer Architecture)

Full Marks: 60
Pass Marks: 24
Time: 3 hours

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

Section A

Long Answer Questions.
Attempt any TWO questions. **[2 × 10 = 20]**

1. Draw the block diagram of 8085 microprocessor and define its components. [10]
2. Explain the architectural difference between the SAP 1 and SAP 2 computer? Explain all the addressing modes of 8085 microprocessor with suitable example. [5 + 5]
3. Differentiate between RISC and CISC architecture. Represent $(88)_{10}$ in Signed magnitude, 1's complement and 2's complement format. [4 + 6]

Section B

Short Answer Questions.
Attempt any EIGHT questions. **[8 × 5 = 40]**

4. Write an assembly language program to swap the content of memory location 8000H and 9000H using 8085 microprocessor instructions. [5]
5. Explain different arithmetic and binary micro-operations in brief. [5]
6. What is control unit? Compare between microprogrammed & hardwired control unit. [1 + 4]
7. What is micro program? Write symbolic microprogram for FETCH operation. [1 + 4]
8. What is pipelining? Explain about 4 segment instruction pipelines. [2 + 3]
9. Explain the working procedure of Booth Multiplication algorithm. [5]
10. Explain about memory hierarchy in computer system. [5]
11. Differentiate between I/O mapped (isolated) I/O and memory mapped I/O. [5]
12. Write short notes on (Any two) [2.5 + 2.5]
    a) DMA
    b) Flags in 8085 Microprocessor
    c) Instruction set

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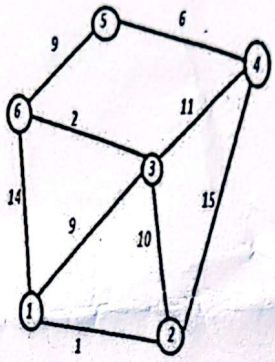
Bachelor Level / First Year/ Second Semester/ Science — Full Marks: 60
Bachelors in Information Technology (BIT152) — Pass Marks: 24
(Discrete Structure) — Time: 3 hours

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

Section A

Long Answer Questions
Attempt any TWO questions. **[2×10 = 20]**

1. Define graph isomorphism with an example. Using Kruskal's algorithm generate the Minimum Spanning Tree from following graph. [5 + 5]



2. What are the uses of randomized algorithm? Find the solution to the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with the initial conditions $a_0 = 2$, $a_1 = 5$ and $a_2 = 15$. [2 + 8]

3. Define Boolean function, exponential function and partial ordering. List the computer representations for following set over universal set U = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}. [6 + 4]
   a. Set that contains even number
   b. Set that contains multiple of 5
   c. Set that contains number greater than 7
   d. Set that contains prime number

Section B

Short Answer Questions
Attempt any EIGHT questions. **[8×5=40]**

4. Define proposition. Convert the following sentences to predicate. [1 + 4]
   a. Some kind hearted peoples do still exist.
   b. Student who study hard and do the homework get good marks in exam.

5. Prove that $1^3 + 2^3 + 3^3 + ... + n^3$ is a perfect square using mathematical induction. [5]

6. Find the multiplicative inverse of 6 in Z_{25} using Extended Euclidean Algorithm. [5]

7. State generalized Pigeonhole principle. How many ways can you draw four digits integers without repetition of the digit. [2.5 + 2.5]

8. Explain any two ways of representing the graph. [5]

9. Compute the value of 8 MOD 8, -9 MOD 4, 7 MOD 17, 6 MOD 7 and -8 MOD 3. [5]

10. Using direct proof show that the sum of odd and even number is odd. [5]

11. Define cut vertices and cut edges. How do you determine whether the graph has Euler circuit or Euler path? [2 + 3]

12. Explain about structural induction and recursive definitions with example. [5]

BIT153-2081 ✡

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2081
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Bachelor Level / First Year/ Second Semester/ Science
Bachelors in Information Technology (BIT 153)
(Object Oriented Programming)

Full Marks: 60
Pass Marks: 24
Time: 3 hours

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

Section A

Long Answer Questions.
Attempt any TWO questions. **[2×10 =20]**

1. Define stream. How do you read and write binary files? Write a program to read an integer from the user and if the integer is less than 100 then write it in file named "SMALL.TXT" otherwise write in file named "LARGE.TXT". *[2 + 3 + 5]*

2. How does structure differ with class? What are the uses of friend function and friend class? Explain the types of constructors. *[1 + 3 + 6]*

3. List any two types of inheritance with example. Describe the order of execution of constructors and destructors in derived class. *[5 + 5]*

Section B

Short Answer Questions.
Attempt any EIGHT questions. **[8 × 5 = 40]**

4. Describe the features of object oriented programming. [5]

5. Distinguish between concrete class and abstract class. Describe the roles of polymorphism. [2 + 3]

6. Why do we need to handle exception? Illustrate with an example. [5]

7. How do you return object in function? Describe with an example. [5]

8. Write a program to create a class named STUDENT with data member age, then overload the unary operator (++) to increment the age of any object of above class. [5]

9. Explain advantages and disadvantages of inline function. [5]

10. How do you convert basic data type to user defined data type? Explain. [5]

11. Illustrate the use of set w and set precision with example. [5]

12. What are the purposes of operator overloading? Adress the problem in multiple inheritance. [2 + 3]

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Bachelor Level / First Year/ Second Semester/ Science Full Marks: 60
Bachelors in Information Technology (STA 154) Pass Marks: 24
(Basic Statistics) Time: 3 hours

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

Section A

Long Answer Questions
Attempt any TWO questions. **(2 × 10 = 20)**

1. A cloud service provider is evaluating the response times of two different server clusters over 10 requests. The company wants to compare the variability in response times between the two clusters. Here are the response times (in milliseconds) for the two clusters:

Cluster A	88	92	94	85	90	95	89	87	91	86
Cluster B	130	135	132	140	128	133	137	131	129	138

Which cluster has more consistent response times?

2. A data analytics company is analyzing the server latency times (in milliseconds) from a cloud-based application. They collect the following latency times in milliseconds from 10 requests during peak usage hours: 120, 135, 150, 125, 140, 160, 170, 155, 165, and 150. Compute four central moments and hence find the mean, standard deviation, the measure of skewness, and the measure of kurtosis from central moments. Also, comment on the nature of the data.

3. A software company tracks the number of hours its employees spend on coding (X) and the corresponding number of bugs they encounter during testing (Y). The data collected over 10 projects is as follows:

Project	1	2	3	4	5	6	7	8	9	10
Hour spent on coding (X)	20	25	30	35	40	45	50	55	60	65
Bugs encountered (Y)	5	7	8	12	15	13	17	18	20	25

(a) Calculate the Pearson correlation coefficient to determine the strength and direction of the linear relationship between the number of hours spent on coding and the number of bugs encountered.
(b) Find the regression equation of bugs encountered on hours spent on coding.
(c) Predict the number of bugs encountered if an employee spends 48 hours coding based on the regression equation.

Section B

Short Answer Questions
Attempt any EIGHT questions. **(8 × 5 = 40)**

4. In a survey of 50 IT students, the following programming languages were preferred: Python (20), Java (15), C++ (10), and JavaScript (5). Create a pie chart representing the preferences.

5. A server records the number of requests per minute, which follows a Poisson distribution with a mean of 5 requests per minute.
   (a) What is the probability that exactly 3 requests occur in a given minute?
   (b) What is the probability that more than 2 requests will occur?

6. A sample survey of 80 customers shows that 56 are satisfied with an IT service. Estimate the proportion of satisfied customers in the population with a 95% confidence interval.

7. A database server has a 95% reliability rate, meaning it functions without failure 95% of the time. However, even if the server does not fail (works properly), there is a 5% chance that it will still report an error (false positive). If the server reports an error, what is the probability that the server has actually failed?

8. The resolution time for customer support queries follows a normal distribution with a mean of 30 minutes and a standard deviation of 5 minutes.
   (a) What percentage of queries are resolved in less than 25 minutes?
   (b) What percentage of queries are resolved between 25 and 35 minutes?

9. The time taken (in seconds) to complete a file transfer operation is recorded for 11 sessions: 100, 120, 110, 115, 130, 105, 125, 122, 112, 108 and 135. Calculate the five-number summary for this data and construct a box plot.

10. A tech support team handles the following number of customer queries (X) per hour, along with their associated probabilities:

No. of queries (X)	0	1	2	3	4
Probability P(X)	0.10	0.20	0.30	0.25	0.15

Find the expected number and variance of queries handled by the team in an hour.

11. Discuss the importance of statistics in the field of information technology.

12. Write a short note on the following:
   (a) Sampling Error
   (b) Stratified sampling

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Bachelor Level / First Year/ Second Semester/ Science
Bachelors in Information Technology (ECO155)
(Economics)

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to give their answers in their own words as for as practicable.
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Section A

Long Answer Questions
Attempt any TWO questions. **(2×10=20)**

1. Define indifference curve. How a consumer attains equilibrium under indifference curve analysis? Explain.

2. Define production function. Explain the optimum employment of two variable inputs in production function.

3. What are the features of monopolistic competition market? How to determine price and output under it in long period of time?

Section B

Short answer questions.
Attempt any EIGHT questions. **(8×5=40)**

4. Explain the concept of production possibility curve. Discuss its significance in economics.

5. Discuss the law of diminishing marginal utility with table and figure.

6. The market demand and supply function are given as:
   Qd=500 - 5P
   Qs=100 + 5P
   Where, Q is Quantity and P is Price
   a. Find the equilibrium price and output.
   b. If the indirect tax of Rs 8 per unit is imposed by the government what will be the new equilibrium price and output?

7. Consider the following cost schedule

Output (Q)	0	1	2	3	4	5	6	7	8	9
Total Cost (TC)	200	250	254	265	270	300	350	380	400	450

   a. Compute TFC, AFC, AVC, AC and MC
   b. Show the relationship between AC and MC

8. How price elasticity is measured by arc method? Explain.
9. Explain the various instruments of monetary policy.
10. How the concept of microeconomics is helpful in different sectors of the economy? Discuss.
11. Derive the demand curve for the giffen goods with the help of price consumption curve.
12. Calculate GDP at market price and National Income (NI) from the following data

Items	RS
Personal Consumption expenditure	2800
Indirect tax	118
Government expenditure	2000
Closing stock	180
Gross private domestic fixed investment	1300
Export	1000
Net factor income from abroad	-100
Inputs	1100
Depreciation	190
Opening Stock	105
Subsidies	70