

Heaven's Light Is Our Guide
RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

3rd Year ODD Semester Examination 2021

COURSE NO: CSE 3107 COURSE TITLE: Applied Statistics and Queuing Theory

N.B. **FULL MARKS: 72 TIME: 3 HRS**

- (i) Answer any **SIX** questions taking any **THREE** from each section.
- (ii) Figures in the right margin indicate full marks.
- (iii) Use separate answer script for each section.

SECTION : A

Marks

- Q.1.**
- (a) Differentiate between descriptive statistics and influential statistics with suitable example. 3
 - (b) Suppose ABC company produces beverages. The stock of the company is traded both in Dhaka Stock Exchange (DSE) and New York Stock Exchange (NYSE). This week ABC stocks traded at \$63.18, a decrease \$0.74 or 1.16% from the previous trading session. In the past four weeks, it has experienced a 0.16% drop. Over the last year, its price has increased by 11.82%. This company holds 45% share of Bangladeshi beverages market. The following table depicts ABC's performance during past few years on NYSE and DSE.
- | Year
Stock | 2017 | 2018 | 2019 | 2020 |
|---------------|-------------|-------------|--------------|-------------|
| NYSE (%) | 3.0 - 4.20 | 3.2 - 4.60 | 5.10 - 11.30 | 2.28 - 3.96 |
| DSE (%) | 2.50 - 3.21 | 4.23 - 6.36 | 6.53 - 7.50 | 1.32 - 5.60 |
- i) Calculate the average yearly rate of return for each stock exchange
 - ii) Investigate and draw a statistical inference on which stock market we should invest.
- Q.2.**
- (c) Can we calculate mean for categorical data? Defend your answer with suitable example. 3
 - (a) Differentiate between statistic and parameter. 3
 - (b) Consider a scenario where you are interested in finding out batting-bowling average and standard deviation of players of domestic cricket clubs in Bangladesh. There are 500 players in 20 domestic clubs. You randomly select 100 players and calculate their average and standard deviation. What are this study's population, sample statistic, parameter and variables? 4
 - (c) Elaborate on the following remark: "Temperature expressed in Celsius is interval variable but temperature in Kelvin is ratio variable". 3
 - (d) Define i) Qualitative variable and ii) Ordinal variable 2
- Q.3.**
- (a) Consider the following runs scored by two batsmen in their previous 10 matches.
 Batsman V K: 53, 46, 48, 50, 53, 53, 58, 60, 57, 52
 Batsman S K: 30, 91, 0, 64, 42, 80, 30, 5, 117, 71
 The mean of runs scored by both V K and S K is same i.e. 53. Analyze the performance of two players. 3
 - (b) Walmart is one of the major importers of clothing from Bangladesh. It adheres to strict guidelines for selecting clothing items. Consequently, Walmart's rejection rate is higher than any buyer's. The following table depicts a sampling of Walmart's rejections throughout the past month. The minimum number of rejection is 21. 7
- | #Rejection | Less than 26 | Less than 31 | Less than 36 | Less than 41 | Less than 46 | Less than 51 | Less than 56 |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| #Factory | 5 | 15 | 28 | 42 | 15 | 12 | 3 |
- i) Characterize the nature of distribution of the above tabular data considering the concept of Skewness, Moments and Kurtosis.
 - ii) Make suitable comments on the above tabular data and draw an appropriate figure to explain the distribution.
- Q.4.**
- (c) Indicate the significance of Skewness, Moments and Kurtosis with proper examples. 2
 - (a) The COVID-19 pandemic has a devastating impact on human life. According to statistics, 11 per 1000 COVID-19 test-positive persons dies. Assume that the death toll of COVID-19 test-positive persons follows the Poisson distribution. Of the next 2000 persons who test positive, determine
 - i) The mean number of persons that will die.
 - ii) The probability that exactly ten (10) persons will die.
 - (b) Differentiate between mutually exclusive events and independent events with example. Write down the condition for two events to be both mutually exclusive and independent. 3
 - (c) Assume LK is one of the leading refrigerator manufacturing companies in the world. One of their refrigerator manufacturing plants produces 2000 units per day. The average weight of their refrigerator is 130 kg with a standard deviation of 10 kg. Assuming the weights of refrigerators are normally distributed, how many units are expected to weigh less than 150 kg. 4

SECTION : B

- Q.5. (a) Interpret the values of the Karl Pearson's coefficient of correlation with suitable figure. 3
 (b) The Internet Movie Database (IMDb) is a website that offers information about movies, television shows, home videos and digital streaming contents such as cast, production crew, screenplay, summaries, trivia, ratings and review from critics. A sample IMDb database for several of these movies is presented the table below. 7

#critic_review	723	302	602	813	116	166	234
gross (Normalized)	760	309	200	448	368	191	532
#user_review	3054	1238	994	2701	254	391	205
genres	Action	Action	Thriller	Thriller	Drama	Action	Action
imdb_scores	7.9	7.1	6.8	8.5	6.6	8.3	6.7

Build a linear/nonlinear model to predict the imdb_scores by choosing any of the two features from the above dataset. Finally, predict the imdb_scores for #critic_review=469 and #user_review=2536.

- Q.6. (c) Briefly explain the "Goodness of Fit in Regression". 2

- Q.6. (a) Historical data shows that the RUET CSE 18 batch has 47 out of 180 students who failed an exam. Assume that past failures affect student's chances of failure in the future examination. The twenty (20) students are randomly selected from RUET CSE 18 and made to attend a mock exam. Determine the probability that in the mock exam-

- i) All 20 students will pass
- ii) At most, 15 students will pass
- iii) Between 4 and 10 students will pass

- (b) Semester final exam mark is assumed to be normally distributed. It is observed that 10% of the students have marks under 65 and 25% exceed 75. What percentages of students have marks between 60 and 74?

- (c) Differentiate between empirical probability and theoretical probability. 2

- Q.7. (a) A company 'X' has a policy that among the workers who do overtime, the top 5% in terms of overtime, duration, will get double hourly rate for overtime. The following frequency distribution shows the overtime (measured in hours) done by 100 employees in a month. 5

Overtime	10-15	15-20	20-25	25-30	30-35	35-40
No. of employees	11	20	35	20	8	6

- (b) Determine the minimum overtime duration required to get a double hourly rate benefit. Random variable X denotes the number of hours a battery can run before it wears out. The probability distribution function of X is:

$$f(x) = \begin{cases} Ce^{-\frac{x}{5}}, & \text{if } x \geq 0 \\ 0, & \text{if } x < 0 \end{cases}$$

Find the value of C and calculate the probability that the battery will last more than 10 hours.

- (c) Why Naive Bayes classifier is called "Naive"? 2

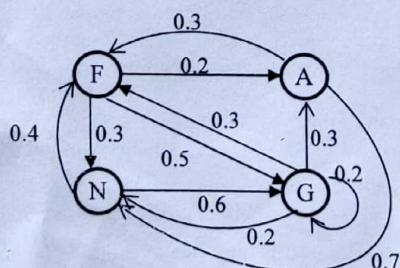
- Q.8. (a) Brain Tumor is a leading cause of death. Brain MRI is the most prevalent method of detecting brain tumor. A computer aided automatic system has been developed using brain MRI images for accurate and precise diagnosis. More than 98% of the cases were correctly predicted by the system. In 5% of instances, it gives false positive results. Brain tumor affects 7% people in developed country on average.

Find the probability that:

- i) No tumor is present given that test is positive.
- ii) Tumor is present given that test is positive.
- iii) Tumor is present given that test is negative.

- (b) List out the fundamental properties of Markov Chain. 2

- (c) PageRank is one of the techniques used by Google to determine the importance or relevance of a webpage. In order to implement the PageRank algorithm, we assume that web is a directed graph with web pages serving as nodes and hyperlinks as edges. In the following, directed graph, four (04) nodes designated as F, A, N and G represent four separate web pages. 6



Rank the above pages applying Markov Chain. Assuming that current state is G and there exists at least one stationary state. Iterate five (05) times.

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3rd Year ODD Semester Examination 2021
COURSE NO: CSE 3109 COURSE TITLE: Microprocessors & Assembly Language
FULL MARKS: 72 TIME: 3 HRS

- N.B. (i) Answer any **SIX** questions taking any **THREE** from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

- | | Marks |
|--|-------|
| Q.1. (a) Suppose a processor has 16 bits address bus. How many memory bytes can be accessed? | 3 |
| (b) What happens in the BIU? Explain the purpose of instruction prefetch. | 4 |
| (c) Consider a machine language instruction

MOV WORD, AX
where WORD is memory word. What happens during fetch execution cycle? | 5 |
| Q.2. (a) Explain the reason of restrictions on memory to memory MOV, XCHG operation. | 3 |
| (b) Suppose the following data are loaded starting at offset 0000h:

A DB 7
B DW 1ABCh
C DB 'HELLO'

i) Find the offset address assigned to variables A, B and C
ii) Find the contents of the byte at offset 0002h in hex
iii) Find the contents of the byte at offset 0004h in hex
iv) Find the offset address of the character "O" in "HELLOW". | 4 |
| (c) For each of the following instructions, give the new destination contents and the new settings at CF, SF, ZF, PF and OF. Suppose that the flags are initially 0 in each part of this question-

i) SUB AX, BX where AX = 0002h and BX = FEOFh
ii) SUB AX, BX where AX = 0000h and BX = 8000h
iii) XCHG AX, BX where AX = 1ABCh and BX = 712Ah | 5 |
| Q.3. (a) Write down the differences between SHR (shift right) and SAR (shift arithmetic right) instructions. If AL contains -15, find the decimal value of AL after SAR AL, 2 is executed. | 4 |
| (b) Suppose AL contains 11001011b and CF=1. Find the new contents of AL after each of the following instruction is executed:

i) ROL AL, CL if CL contains 2
ii) RCR AL, CL if CL contains 3 | 6 |
| (c) Differentiate between signed and unsigned jump. | 2 |
| Q.4. (a) "Good programming practice requires that a macro should restore the registers if uses, unless they contain output values" Justify the statement with necessary example. | 3 |
| (b) Suppose memory bytes 0-2 have the following contents | 4 |

Address	Content
0	01101010
1	11010101
2	10011001

- Suppose the memory word at address 1 is fetched into AX. Write the assembly instruction to clear all the even bits of AX.
- (c) Explain the data transfer technique of DMA controller with proper diagram.

SECTION : B

- | | |
|---|--------|
| Q.5. (a) What happen when a CALL instruction is executed in procedure? Write a procedure for finding the product of two positive integers A and B by addition and bit shifting.

(b) Divide -1250 by 7 using CWD instruction. | 4
2 |
|---|--------|

- (c) Suppose DX contains 0000h, AX contains 0005h, BX contains 0002h. What will be the value of AX and BX if the following instructions are executed:
 i) IDIV BX
 ii) IDIV BX if BX contains FFFEh and
 iii) IDIV BL if BL contains FFh and AX contains 00FBh

- Q.6. (a) Write an assembly code to replace each uppercase letter in the following string by its lowercase equivalent using register indirect mode [ASCII value of 'R' is 52h and ASCII value of 'r' is 72h].

STRING DB "RULED"

- (b) After the conversion, replace the character 'd' by 'r' using index mode.
 Write a set of assembly language instructions to display a string pointed by SI with the number of characters in BX. Use stack along with string instruction.

- Q.7. (a) How does "IRET" instruction transfers control to main program after interrupt service procedure? Explain with graphical depiction.

- (b) A memory location has a physical address 4A37Bh. Compute
 i) Offset address if segment number=40FFh ii) the segment number if the offset address= 123Bh

- (c) Suppose the stack segment is declared as follows
 .STACK 2000H

Given that AX=A23Bh, BX=2B8Ch, CX=9BD8h, find the contents of AX, BX, CX and SP after executing the following instructions:

```
PUSH AX
PUSH CX
PUSH BX
MOV AX,CX
POP AX
POP BX
```

- Q.8. (a) Mention the most prominent features of 8087 numeric data processor.
- (b) Write short note on the following pins of 8087 co-processor
 i) QS₁, QS₀ ii) S₀, S₁, S₂
- (c) State the significance of LOCK and ALE signal of 8086.
- (d) Two kinds of memory are RAM and ROM. Which kind of memory
 i) holds a user's program? ii) holds the program used to start the machine?

6

6

6

4

4

4

2

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2

2

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3rd Year Odd Semester Examination 2021
COURSE NO: CSE 3101 COURSE TITLE: Database Systems
FULL MARKS: 72 TIME: 3 HRS

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

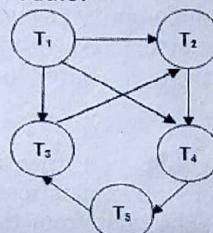
<u>SECTION : A</u>		Marks
Q.1.	(a) Define E-R model. Describe the scenario with appropriate figure for the placement of relationship attribute for one-to-one, one-to-many, many-to-one, and many-to-many relationship. (b) Determine the primary key for each of the following relationship sets: (i) there exists a one-to-many relationship from movie to reviews. (ii) There exists a many-to-many relationship from movie to director. (c) Construct an ER diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time and has an associated due date, and the date when the payment was received.	3 3 6
Q.2.	(a) Explain the differences between tow-tier and three-tier architectures. Which is better suited for web applications? why? (b) Consider a foreign key constraint from the dept_name of instructor to the department relation. Give examples of inserts and deletes to these relations, which can cause a violation of the foreign key constraint. (c) Consider the following database schema: employee(person_name, street, city) works(person_name, company_name, salary) company(company_name, city) manages (person_name, manager_name) Write SQL statements to i) Find the names of all employees who work for First Bank Corporation located at Main City ii) Find the names of all employees who live in the same street as do their managers iii) Group the employees who work for the same company and located in the same city.	3 3 6
Q.3.	(a) Define database normalization. Consider the following database schema: customer(customer_id, customer_name, address, order_details) Normalize the customer table upto 3NF. (b) Describe the ACID properties of database system. (c) Describe the cross product operation in DBMS. Explain the problem of performing cross product between tables with example.	5 3 4
Q.4.	(a) Define the following terms with proper examples: i) Multivalued attribute ii) Derived attribute iii) Descriptive attribute. (b) Determine whether the following statements are true or false. Support your answers by providing appropriate logic: (i) Serial execution of transactions provides significant performance benefits in comparison with concurrent execution, but serial execution can create inconsistency. (ii) Cascading rollbacks can be avoided by two-phase locking protocol. (c) Differentiate between domain and data type with proper example.	3 6 3

SECTION : B

- Q.5. (a) Define transaction. How lock based transaction create deadlock? Explain. 4
 (b) Consider the following schedule: 4

T ₁	T ₂
read(a); A=A+30;	read (a); A=A-1000; write(A); read (B);
write (A); read (B); B=B-30; write (B);	B=B+1000; write(B);

- (c) Determine whether the above schedule is conflict serializable or not.
 (c) Consider the following "wait-for" graph and determine the existence of deadlock in corresponding schedule: 4



- Q.6. (a) What do you mean by 'Atomic Transaction'? Explain the way by which DBMS ensures the atomicity of a transaction. 3
 (b) Describe the advantages of Atomicity and Durability properties. 3
 (c) Mention the major advantages and disadvantages of a concurrent schedule over a serial schedule. 3
 (d) Specify the problems that can be avoided by using the following protocols:
 (i) 2PL (ii) Strict 2PL 3

- Q.7. (a) Consider the following DB schema: 6

Book(ISBN, Book_Name, Genre, Price)
 Character_from_Book(Char_ID, Char_Name, Age, Address)
 BookCharRelationship(ISBN, Char_ID)

Now write an expression in relational algebra for each of the following queries:

- (i) Find the name, genre and IMDB rating of all the books of drama or detective genre,
 (ii) Find the price of the most expensive book.
 (iii) Find the ISBN of all the books and the age of the youngest character in each book.
 (iv) find the name of all the books and the name and age of the youngest character in each book.

- Q.8. (b) Define database views. What problems may arise while updating views? 4
 (c) Describe the differences between primary key and unique key. 2

- (a) Define database trigger. Create a transparent audit system for a table "client_master". The system must keep track of the records that are being deleted or modified and when they have been deleted or modified, create a trigger for this purpose and write PL/SQL block of code to execute that trigger. 5

- (b) What are the purpose of using i) Commit, ii) Roll back. 3
 (c) Consider the following DB schema and reconstruct it by following 1NF, 2NF and 3NF. 4

StudentMarks(Roll_No, Std_Name, Dept, Head_of_Dept, Std_Mobile_No, Dep_Contact_No, CGPA, Course_No, Std_Email, Course_Title, Credit, CT_No, Obtained_Marks)

[Consider that a student may have multiple email address and mobile numbers, but each department has only one official contact number]

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3rd Year Odd Semester Examination 2021
COURSE NO: CSE 3105 COURSE TITLE: Software Engineering
FULL MARKS: 72 TIME: 3 HRS

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

Marks

- Q.1. You have been appointed as a software project manager for a company that services the genetic engineering world. Your job is to manage the development of a new software product that will accelerate the pace of gene typing. The work is R&D oriented, but the goal is to produce a product within the next year.
- (a) Write a statement of scope that bounds this problem. 3
(b) Select a team structure and explain the reason for choosing this structure. 5
(c) Describe the project coordination and communication techniques for this project. 4
- Q.2. (a) Which signs indicate that a project is in jeopardy? 4
(b) If a project can be modularized then which generic team organization [DD/CD/CC] should we choose? Justify your answer. 3
(c) compute the function point value for a project with the following information domain characteristics: 5
Number of user inputs: 30
Number of user outputs: 50
Number of user inquiries: 28
Number of user files: 10
Number of external interfaces: 4
Assume that all weighting adjustment values are moderate.
- Design a program that reads three integer values. The three values are interpreted as representing the lengths of the sides of a triangle. The program prints a message that states whether the triangle is scalene, isosceles or equilateral.
- (a) Derive a flow graph for the program 4
(b) Apply basis path testing to develop test cases that will guarantee that all statements in the program have been tested. 4
(c) Execute the cases and show your results. 4
- Q.3. (a) Techsoft systems is a CMMI level 5 organization in the country. Which characteristics helped them achieve this certification? 4
(b) A telecommunication software with approximately 60000 Loc is to be developed. Calculate the approximate number of people required for the development. 4
(c) EA sports released their last version of cricket game in 2007. According to your opinion, which type of risk forces them to stop developing newer versions of cricket game? What possible solutions would you propose? 4

SECTION : B

- Q.5. (a) Consider a project where your job is to build a breakthrough product that combines virtual reality hardware with state-of-the-art software. Because competition for the home entertainment market is intense, there is significant pressure to get the job done. What software process model would you choose and why? 4
(b) Describe the agile scrum framework for web development. 4
(c) What is KPA? List out the umbrella activities in generic view of software engineering. 4
- Q.6. (a) A reputed game development organization has been assigned the task of developing a multiplayer 3D racing game within 6 months. But after the projects have been assigned, 7 of the most experienced developers have left their job. To compensate this, the organization decided to recruit some of their interns for this project. Considering the above mentioned scenario, which software process model should they consider? Why? 7
(b) Between partial experience components and new components, which one 2

- would you choose generally? Why?
- (c) Considering low productivity as a potential risk, develop a RMMM strategy 3
- Q.7. (a) Consider the following task table: 6
- | Task | Predecessor | Time (days) | Optimistic estimate | Pessimistic estimate | Most likely estimate |
|------|-------------|-------------|---------------------|----------------------|----------------------|
| A | - | 5 | 5 | 7 | 6 |
| B | - | 12 | 7 | 11 | 12 |
| C | A | 10 | 8 | 10 | 12 |
| D | - | 15 | 10 | 13 | 14 |
| E | A,B | 15 | 12 | 12 | 14 |
| F | B,D | 20 | 15 | 18 | 20 |
| G | C,E | 20 | 18 | 19 | 20 |
| H | G,F | 15 | 7 | 20 | 12 |
- Now from the table given in the above-
- i) Draw CPM network.
 - ii) Calculate slack time associated with each task (if there any)
 - iii) Identify critical path and calculate standard deviations of critical path using PERT.
- (b) Suppose for the result system software, the line of code is 20,000 and the effort in person month is 10. Now find out the duration in months for developing this software. 3
- (c) Performance is an important consideration during planning. Discuss how performance can be interpreted differently depending upon the software application area. 3
- Q.8. (a) Write down the checklist which is used for software risk identification. 4
- (b) Find the precedence of the following software verifications: 2
2.5.1-alpha.beta, 2.5.1-2.5, 2.5.1, 2.5.0-rc.2, 2.5.1-alpha.2
- (c) Write down short notes on the following: 6
- (i) Task of the serum master
 - (ii) COTS
 - (iii) Importance of software reviews.

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3rd Year Odd Semester 2021
COURSE NO: CSE 3103 COURSE TITLE: Data Communication
FULL MARKS: 72 TIME: 3 HRS

- N.B. (i) Answer any **SIX** questions taking any **THREE** from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

<u>SECTION : A</u>		Marks
Q.1.	(a) We all know that data communication is the exchange of data between two devices via some of the transmission medium such as a wire or wireless cable. For data communication to occur, the communication devices must be a part of communication system and follow some set of rules which is called protocol. To develop an effective data communication system, answer the following questions:- i) Which characteristics should be considered for an effective data communication system? Briefly describe each of them. ii) Briefly explain all the key elements of a protocol that should be considered to develop a data communication system.	7
	(b) Assume that you are a CEO of a software firm. In this software firm, there are hundreds of employees working in a project. In order to complete the project they need to share the computing resources only between them. After the completion of project, the client of this project needs to give observations and further requirements about the completed project. Now answer the following questions:- i) Which network should be provided by the company among their employees to share the computing resources and why? ii) Which network should be used by the company to share the demo project file with their client and why?	5
Q.2.	(a) Define channel capacity. What key factor affect highest data rate for noiseless channel and noisy channel?	6
	(b) Signal-to-noise ratio is often given in decibels. Assume $SNR_{DB}=36$ and the channel bandwidth is 2 MHz. Calculate theoretical channel capacity.	6
Q.3	(a) In Longitudinal redundancy check (LRC), if two bits in one data units are damaged and two bits in exactly the same positions in another unit are also damaged, the LRC will not detect any error. Is it true or false? Explain with example. (b) We need a three-stage space division switch with $N=100$. We use 10 crossbars at the first and third stages and 4 crossbars at the middle stage. i) Draw the configuration diagram, ii) Calculate the total number of crosspoints, iii) Find the possible number of simultaneous connections, iv) Find the possible number of simultaneous connections if we use one single-crossbar, v) Redesign the configuration using clos criteria. (c) Consider that two friends are using an extremely noisy channel, where the noise is so strong that the signal is faint away. If the SNR is almost zero, calculate the capacity of the channel.	3
		3
Q.4.	(a) In analog to analog conversion, we need to modulate the analog carrier signal based on the analog message signal. But why we need to modulate the analog signal to represent analog information by an analog signal, where the original message signal is already an analog signal? Also answer the following questions:- (i) Define carrier signal. Briefly explain the role of it in analog transmission. (ii) What is modulation? Why modulation is needed? How is it performed? (b) What are the two components of signal when signal is represented as a constellation diagram? Which components are shown in vertical and horizontal axis? (c) Show the equivalent analog sine wave pattern of the bit string 00110101 using amplitude shift keying, frequency shift keying and phase shift keying.	6
		3
		3
		3
<u>SECTION : B</u>		
Q.5.	(a) How Time Division Multiplexing (TDM) handle disparity in the input data rate, if data rate of all input lines are not same. (b) We have 14 sources, each creating 500 8-bit characters per second. Since only	3
		4

some of these sources are active at any moment, we use statistical TDM to combine these sources using character inter leaving. Each frame carries 6-slots at a time, but we need to add four-bit addresses to each slot. Answer the following questions:

- i) What is the size of an output frame in bits? ii) What is the output frame rate? iii) What is the duration of an output frame? iv) What is the output data rate?
- (c) Give any two reasons why baseband signal cannot be directly transmitted in a wireless system? How Frequency Hopping Spread Spectrum (FHSS) spread the baseband signal for transmission? 5
- Q.6. (a) Distinguish between circuit switched network and packet switched network. In between these two, which one is better and why? 6
- (b) In radio wave transmission, why the transmitting and receiving antenna need not to be aligned? Which propagation mode radio wave transmission does follow? 4
- (c) Suppose you have two computers connected by an Ethernet hub at home. Is this a LAN, MAN or WAN? Explain your answer. 2
- Q.7. (a) What are the advantages of microwave transmission over radio wave transmission? 3
- (b) Explain the following wireless propagation models: i) Ground wave propagation, ii) Sky wave propagation 3
- (c) What type of multiplexing is required in optical fiber communication? 3
- (d) Given the data word 1001001111 and the divisor 10111, show the generation of CRC codeword at the sender and receiver site using binary division. 3
- Q.8. (a) While converting the digital data into digital signal using Not Return to Zero-Level (NRZ-L) and NRZ-Inversion (NRZ-I), prove that change of polarity in the system changes the interpretation of data in NRZ-L but not in NRZ-I 3
- (b) We have sampled a low-pass signal with a bandwidth of 200kHz using 1024 levels of quantization.
 (i) Calculate the bit rate of digitalized signal
 (ii) Calculate the SNR_{DB} for this signal
 (iii) Calculate the PCM bandwidth of this signal 3
- (c) Line coding technique is used to convert the digital data into digital signal. Now find the data stream for the following cases:- 6

