RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd Year Odd Examination 2020

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.

SECTION : A

			Marks
Q.1.	(a)	Define database management system. "A database is a tool for storing information efficiently" -justify this statement.	3
	(b)	Describe the level of data abstraction in database management system with suitable diagram. Show the representation of data at each level.	4
	(c)	Define ER model. Draw an ER diagram that includes teacher, student, and course entities with following constraints: i) Each teacher must take at least one course. ii) A student can take one or more courses. iii) A group of students may have one supervisor.	5
Q.2.	(a)	Define the following terms with proper example: i) Derived attribute ii) Multi-valued attribute iii) Descriptive attribute	4
	(b)	Consider the following DB schema: *Book (ISBN, Book_Name, Genre, Language)* *Publisher(Publisher_ID, Pub_Name, Country)* *Book_Publisher_Relationship(Publisher_ID, ISBN, Price, No_of_Pages)* Now represent the following queries in SQL i) Find the ISBN, name and genre of all the books that are written in Bengali (Bangla); ii) find the name and genre of all the books that contain the term 'Rahasya' in their name; iii) Find all the book-genres and the total number of books in each genre; iv) Find the name, genre and price of the most expensive book; v) Find the name, genre and price of the most expensive book in each genre;	8
Q.3.	(a)	Consider the following DB schema and determine all possible multi-valued, derived and descriptive attributes: *Book (ISBN, Book_Name, Genre, Language)* *Publisher(Publisher_ID, Pub_Name, Country)* *Book_Publisher_Relationship(Publisher_ID, ISBN, Price, No_of_Pages)*	4
	(b)	Determine whether the following statements are true or false. provide some logic to support your answers: i) Data redundancy may lead to data inconsistency; ii) A relation may contain multiple primary keys but each primary key always consists of only one attribute.	8
Q.4.	(a)	What are the anomalies that usually occurred in database system? Explain them with example.	2
	(b)	Define the term relational algebra. Why are they important?	2
	(c)	Consider the following DB schema: *Emp (ID, name, salary, dno)* *Dept (dno, dname, location)* *Project (ID, dno, hour)* Hence each employee can work with only one department. A department can have zero to many projects. A project has many employees and employee can be involved in many projects. Create relational algebra for the following queries and also draw the required E-R diagram for the above cases: i) The list of all employees involved in project "FDRUET-ECE1".	8

ii) The list of the projects running by a department.
iii) The list of employees who are involve in more than 2 projects.
iv) The list of employees who are not listed in any project.

SECTION : B

Q.5. (a) What do you mean by the following expressions: 3
i) read(D) ii) write(D) iii) Lock-S(D) iv) Lock-X(D)
(b) What are the differences between serial schedule and serializable schedule? 3
(c) Mention the advantages of concurrent schedule over serial schedule. 3
(d) What are the main drawbacks of concurrent schedule? 3

Q.6. (a) What is self join? Describe with an example. 3
(b) Define cross product. What are the limitations of cross product? How can we overcome them with joining? 5
(c) Define database trigger. Create a database trigger so that it can be executed when an item is updated. 4

Q.7. (a) Draw the PL/SQL code block structure and describe it briefly. What are the benefits of using PL/SQL over SQL? 3
(b) Define two-phase locking protocol. Describe the use of two phase locking protocol to avoid deadlock. 5
(c) How can you handle exception in PL/SQL? Explain with an example. 4

Q.8. (a) Describe the significance of the following symbols in relational algebra: 5
i) σ ii) π iii) ∪ iv) ∨ v) ∧
(b) What is normalization? What is the purpose of normalization in database system? 3
(c) What do you mean by the following sentences or diagrams: 4
i) There exists a many-to-one relationship from city to country;
ii) The relationship set from book to author is many-to-many;
iii)

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Heaven's Light is Our Guide

RAJSHAHIUNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING
3rd Year Odd Semester Examination 2020

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.

SECTION : A Marks

Q.1. (a) Define data communication. Briefly explain the fundamental characteristics of data communication. 03

(b) Briefly explain key elements of protocol with suitable example. 03

(c) Find suitable strategy where you want to transmit a square wave but what your transmitter can transmit is only sine wave. Also show your mathematical reasoning with figure. 03

(d) When a party makes a local telephone call to another party, is this a point to point or multipoint connection? Explain your answer. 03

Q.2. (a) Describe amplitude modulation with mathematical formula and figure. 03

(b) Show mathematically that amplitude modulation will create sidebands with figure. Explain problems with sidebands. 05

(c) Determine bandwidth of an AM signal whose carrier is 2.1 MHz, modulated by a 1.5 KHz square wave with significant harmonics up to fifth. Calculate all the upper and lower sidebands produced. 04

Q.3. (a) Determine whether FM can suppress every noise it interfered with. If can't, provide solution with figure. 04

(b) Convert the following digital data into digital signal using polor Bi-phase line coding scheme. 04

010011

(c) Differentiate between intranet and internet using suitable example. 02

(d) Define frequency and phase modulation with figure. 02

Q.4. (a) Differentiate between ASK, FSK, PSK and OOK. 04

(b) Consider intelligent digital data 10110. Draw following modulations: 04

i) ASK with 50% modulation
ii) ASK with 25% modulation
iii) FSK
iv) PSK

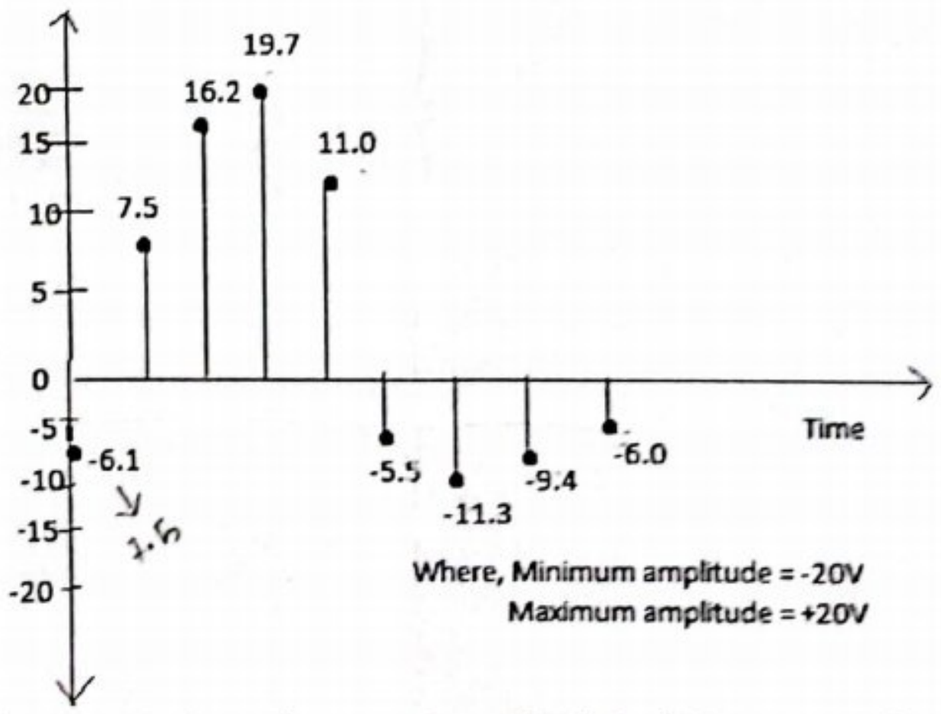
(c) Design a transmitter and receiver circuit based on following requirements: 04

i) Carrier signal: 16KHz $7V_{pp}$
ii) Modulating signal: 1KHz $4V_{pp}$
iii) Modulation: AM

Show and explain necessary calculations with formula.

SECTION : B

Q.5. (a) Convert the following sampled signal to digital data and calculate i) Normalized PAM values, ii) Normalized quantized values, and iii) Normalized error using quantization. 04



(b) In a digital transmission, the receiver clock is 0.1 percent faster than the sender clock, How many extra bits per second does the receiver receive if the data rate is 1 Kbps? how many if the data rate is 1 Mbps? 03

(c) Define transmission medium. What is the significance of the twisting in twisted-pair cable? 03

(d) Why cladding is used in fiber optic cable? 02

Q.6. (a) Define multiplexing. Distinguish between synchronous and statistical time division multiplexing. 03

(b) Four channels, two with a bit rate of 200 Kbps and two with a bit rate of 150 Kbps, are to be multiplexed using multiple slot TDM with no synchronization bits. Answer the following questions: 04

i) What is the size of a frame in bits?
ii) What is the frame rate?
iii) What is the duration of a frame?
iv) What is the data rate?

(c) Design transmitter and receiver of FDM system which multiplexes 3 signals at the same time. 05

Q.7. (a) Differentiate between coaxial cable and Fiber-optic cable. 02

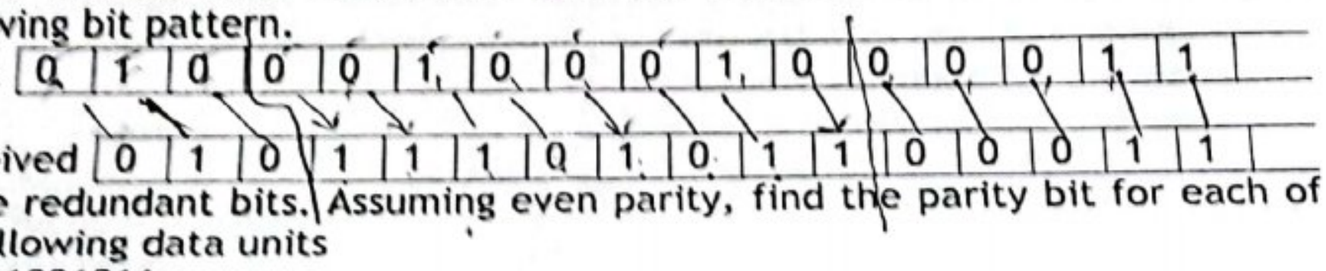
(b) Consider following digital data, 11111. Convert this digital data to digital signal using 06

i) Manchester
ii) AMI
iii) 2B/1Q

(c) Determine result of scrambling the sequence 11100000000000 using following techniques: 04

i) B8ZS
ii) HDB3(number of nonzero pulses is odd after last substitution)

Q.8. (a) Define forward error correction. Find the length of burst errors from the following bit pattern. 03



(b) Define redundant bits. Assuming even parity, find the parity bit for each of the following data units 04

i) 1001011
ii) 0001100
iii) 1000000
iv) 1110111

(c) Given the codeword 1010011110 and the divisor 10111, 05

i) Show the generation of the codeword at the sender side.
ii) Show the checking if the codeword at the receiver side.

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Heaven's Light is Our Guide

RAJSHAHIUNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING
3rd Year Odd Semester Examination 2020
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. (a) Explain why professional software that is developed for a customer is not simply the programs that have been developed and delivered. 02

(b) You have been appointed a project manager for a small software products company. Your job is to build a break-through product that combines virtual reality hardware with state-of-theart software. Because competition for the home entertainment market is intense, there is significant pressure to get the job done. 08

i) What team structure would you choose and why?
ii) What software process model(s) would you choose and why?
iii) Write a statement of scope that bounds this problem.

(c) The decision made by senior management can have a significant impact on the effectiveness of a software engineering team. Provide two examples to illustrate that this is true. 02

Q.2. (a) Compute the function point value for a project with the following information domain characteristics: 04

Number of user inputs: 30
Number of user output : 50
Number of user inquiries: 20
Number of files: 10
Number of external interfaces: 5

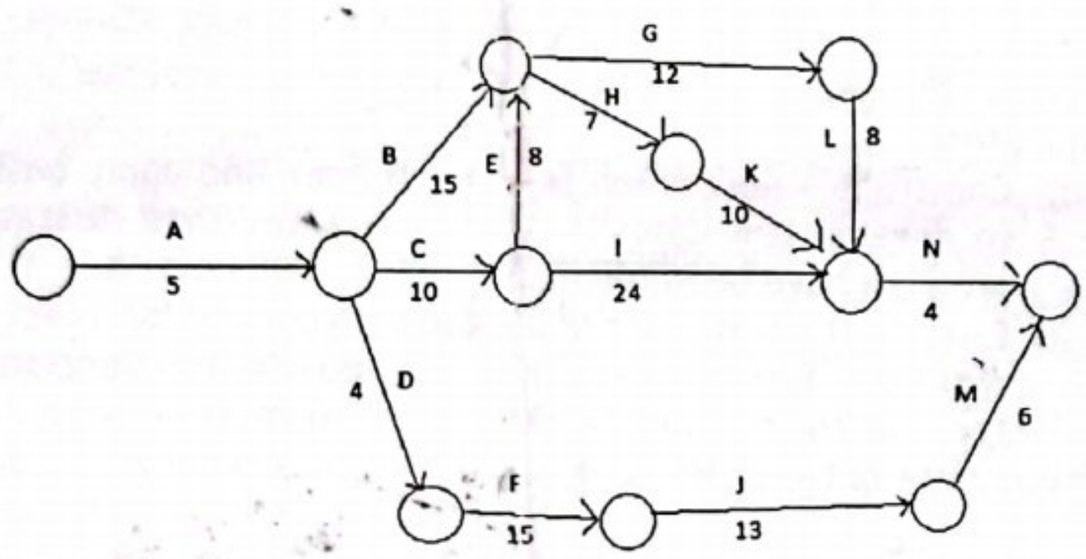
Assume that all complexity adjustment values are average.

(b) Present an argument against lines of code as a *measure for software* productivity. Will your case hold up when hundreds of *projects* are considered? *03*

(c) *Suppose for* a government software project, the line of code is 20,000 and *the effort in person months* is 12. Then find out the duration in months for *developing* this software. 03

(d) Mention two objectives of the software configuration management. 02

Q.3. (a) Consider the following arrow diagram that shows the software development activities in a system. Identify the critical path. Here, the number shows beside each arrow indicates the number of days required for each activity. 05



(b) Distinguish between reactive and proactive risk strategies. 02

(c) Considering a risk of high staff turnover, discuss an effective strategy of risk mitigation, monitoring and management. 03

(d) Why software project scheduling and tracking are essential? 02

Q.4. (a) Point out the differences between software and software engineering. 03

(b) What is bathtub curve and why is it named so? 03

(c) What is SDLC? Discuss the following steps of SDLC: 04

i) step where law and related obligations are analyzed
ii) step where the objective of the project is defined

(d) Define umbrella activities and list some of those. 02

SECTION : B

Q.5. (a) What portion of the version number should be updated in the following cases: 02

i) Fix bugs

ii) Add features

(b) A scientific software with approximately 75 KLOC is to be developed. Calculate the minimum time and effort required for developing the software. 05

(c) Sony mobile communication of Japan lunched a new series of Android OS-based smart phones commonly known as Xperia in 2010. In a report of 2017, it was mentioned that Sony had less than 1% of the global Smartphone market share. According to your opinion, which type of risk is this? What could Sony do to prevent the situation? 05

Q.6. Consider the following information related to project:

Activity	Immediate Predecessor(s)	Duration(unit)
A	-	5
B	-	5
C	A	10
D	B	15
E	A	10
F	B	20
G	C,F	10
H	D,E	10
I	G,H	10
J	C,F	20
K	D,E	15

(a) Construct the CPM network. 04

(b) Find the critical path from the CPM network and also calculate the minimum project completion time from the critical path. 06

(c) Calculate the total floats and free floats of activity G, I, J. 02

Q.7. (a) Why version control is needed? Write down the precedence of the following versions: 05

i) 1.0.0-alpha.1, 1.0.0-alpha, 1.0.0-beta.2, 1.0.1-beta

ii) 2.1.0, 2.1.0-rc.1, 2.0.1-rc.1, 2.0.1

(b) A software engineering organization with 15 inexperienced technical members is assigned to develop a bus ticket reservation and purchasing software within 2 months. Which software process model should they consider? Point out the reasons for choosing that particular model. 05

(c) Write down the steps of statistical SQA. 02

Q.8. (a) A program reads three integer values. The 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". 08

i) Construct a flow graph for the program and apply basic path testing to develop test cases that will guarantee that all statements in the program have been tested.

ii) Execute the test cases and illustrate your result.

(b) Will exhaustive testing (even if it is possible for very small programs) guarantee that the program is 100 percent correct? 02

(c) Differentiate between white-box and black-box testing. 02

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CamScanner

Heaven's Light Is Our Guide

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd Year Odd Semester Examination 2020
COURSE NO: CSE 3107 COURSE TITLE: Applied Statistics and Queuing Theory
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.

Marks

SECTION : A

Q.1. (a) What do you mean by joint probability and total probability? Give examples. 3

(b) There is a 1% probability for a hard drive to crash. Therefore, it has two backups, each having a 2% probability to crash, and all three components are independent of each other. The stored information is lost only in an unfortunate situation when all three devices crash. What is the probability that the information is saved? 3

(c) Ninety percent of flights depart on time. Eighty percent of flights arrive on time. Seventy-five percent of flights depart on time and arrive on time. 3
i) You are meeting a flight that departed on time. What is the probability that it will arrive on time?
ii) You have met a flight, and it arrived on time. What is the probability that it departed on time?
iii) Are the events, departing on time and arriving on time, independent?

(d) A speaks truth in 2/5 cases and B lies in 3/7 cases. What is the percentage of cases in which both A and B contradict each other in stating a fact? 3

Q.2. (a) Explain whether the statement is true or false: The most probable class or label of test example $x = < x_1, x_2 \dots\dots, x_n >$ is c_k that maximizes $P(x_1, x_2 \dots\dots, x_n | c_k)\, P(c_k)$. 4

(b) According to the recent statistics 7.0% of the population of a certain country has lung disease. Of those having lung disease 90.0% are smokers, of those not-having lung disease 25.3% are smokers. Determine the percentage that a randomly selected smoker has lung disease. 3

(c) Define mathematical expectation. A lot of 12 television sets include 2 white cords. If 3 of the sets are chosen at random for shipment to a hotel, how many sets with white cords can the shipper expect to send to the hotel? 5

Q.3. (a) If a variance is binomially distributed, determine its i) mean ii) variance. 3

(b) The mean grade on a final examination was 72 and the standard deviation was 9. The top 10% of the students are to receive A's. What is the minimum grade that a student must get in order to receive an A? 4

(c) What is Markov chain? Suppose, in Rajshahi, each day is either sunny or rainy. A sunny day is followed by another sunny day with probability 0.7, whereas a rainy day is followed by a sunny day with probability 0.4. Meteorologists predict an 80% chance of rain on Monday. Make forecast for Tuesday, Wednesday, and Thursday. 5

Q.4. (a) Explain the Little's Theorem in queuing system with example. 4

(b) The petrol pump in front of RUET is anxious with its waiting line system and uses a single server system. Based on the previous records, the average number of vehicles arriving per hour is 9 and is described by a Poisson distribution. The service rate is 12 vehicles per hour with the service times following an exponential distribution. The vehicles come from an infinite population. The manager of the pump would like you to calculate the operational characteristics of the system as: (i) the average system utilization (ii) the average number of vehicles in the system (iii) the average number of vehicle waiting in line (iv) the average time a vehicle spends in the system (v) the average time a vehicle spends waiting in line. 5

(c) Why is queuing model needed in computer science related areas? Explain. 3

SECTION : B

Q.5. (a) Explain "Correlation does not imply causality". 3

(b) Explain the following distribution: 4
i) Exponential distribution
ii) Normal distribution

(c) Consider the following data; 5
20, 28, 29, 30, 36, 37, 39, 42, 53, 54, 55, 58, 61, 67, 68, 70, 74, 81, 82, 93.
Now, calculate:
i) Median (M) ii) First Quartile (Q_1) iii) Seventh decile (D_7)
iv) 25^{th} percentile (P_{25}) v) Inter-quartile range (I_Q)

Q.6. (a) Define diagnostic statistical analysis. What is the difference between stratified sampling and cluster sampling? 3

(b) What is the relationship among mean, median and mode for symmetric and differently skewed data? 3

(c) A car travelled from point P to point Q at 70 kmph and returned at 50 kmph. 4
i) Which type of mean is more accurate to calculate the mean speed of the whole trip?
ii) Calculate the mean speed of the whole trip.

(d) Which technique of measurement of central tendency is most appropriate for data with outliers? 2

Q.7. (a) What is statistical inference? Explain P-value. 2

(b) What is matrix of confusion? How to calculate the sensitivity and specificity from the matrix. 3

(c) The record of GRE quant exam between 1994 and 1997 was 558 ± 139 ($\mu \pm$ 6). In a sample of 100 (n) the mean is 585 (M). Compute Z-test for whether or not we will retain the null hypothesis ($\mu = 558$) at a 0.05 level of significance ($\alpha = 0.05$). Also calculate P-value and interpret the results. 7

Q.8. (a) Illustrate the following plots: 2
i) Scatter plot ii) Boxplot

(b) Which attributes are expressed by the following statistical concepts 6
i) Variance
ii) Skewness
iii) Kurtosis
Explain with appropriate formulas.

(c) Consider the following table and find 4
i) Covariance
ii) Correlation between variables X and Y and interpret results

X	2	8	18	20	28	30
Y	50	45	23	12	5	3

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Heaven's Light Is Our Guide

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING
3rd Year Odd Semester Examination 2020

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) Why states signals are provided in Microprocessor? 4
(b) How can you locate instruction using segment (CS) and instruction pointer (IP)? Briefly explain with example. 4
(c) Is it possible to access 32 bit data using 16 bit port? Justify your answer. 4

Q.2. (a) Explain hardware and software interrupt with example. 4
(b) Distinguish between SHIFT and ROTATE instruct: SHL, ROL 4
(c) Describe the difference between instruction MOV AX, 2437H and MOV AX,[2235H] 4

Q.3. (a) Consider following two strings: 6

```
DATA
str1 DB 'Hello'
str2 DB 5 DUP(?)
```

Write instruction to copy str1 into str2 in reverse order.

(b) Consider the array declaration:- 6
w DB 10,20,30,50,60,?
Write instructions to insert 40 between 30 and 50(Assume DS and ES are initialized to the data segment)

Q.4. (a) What is the advantage of using unconditional jump instruction over conditional jump instruction? 4
(b) Distinguish between DOS and BIOS routines. 3
(c) When the stack has completely filled the stack area , SP=0, if another 2 words are pushed onto the stack, what would happen to SP? 5

SECTION : B

Q.5. (a) A memory location has a physical address 4A65Ch. Compute (i) the offset address if the segment number is 41FE and (ii) the segment number if the offset address is 124C. 5
(b) In how many ways can you reverse a bit pattern? Explain with appropriate instructions. 4
(c) Define addressing mode. Explain base indexed addressing mode with suitable example. 3

Q.6. (a) Suppose AL = -28 decimal, BL=59, CL=3 decimal. What will be the output if the following instructions are executed?

```
IMUL BL
SHL AX, CL
```

(b) Define the term "interrupt". Suppose in your program instruction there is an instruction CWD. What is the purpose of using it? 3
(c) Suppose AX = 37D7H, BH = 151 decimal. What will be the output of the following code: 6

```
DIV BH
MOV BL, AL
ADD AL, 0Ah
SHR AL, 2
NEG AL
```

show the result of execution of each instruction.

Q.7. (a) Suppose that AX = 3415h, BX = 5783h, CX = 93ACh and SP = 100h. Give the contents of AX, BX, CX and SP after the following instructions execution: 5

```
PUSH AX
PUSH BX
XCHG AX, CX
POP CX
PUSH AX
POP BX
```

93AC

(b) Describe none-maskable interrupt signal, interrupt acknowledge signal and hold-acknowledge signal. 3

(c) How can 8086 handle 20-bit physical address using 16-bit register? Explain with example. 4

Q.8. (a) IF AL contains -15, give the decimal value of AL after SAR AL, 1 is performed. 2

(b) How can XLAT be used to convert a byte value into other values that comes from a table? Explain with example. 5

(c) Write an assembly language program to take a single digit integer from user and determine whether it is an even or odd number? Assume that the input will be from 0 to 9. 5

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