Name Introduction to Software Engg. Date Marks: 10(2+4+4)

Assignment submission date: 9/11/2020 by 11:00 PM
Viva voce: 10/11/2020 at 2:30 PM

Q.1. Write some key challanges in software development techniques.

Q.2. What are some management myths regarding software Engineering process?

Q.3. Why do we continue to have difficulty in software development projects?

Discipline: Software Engineering
Course: SWE 127 (Data Structure)

Total marks: 20

1. Using the bubble sort algorithm (Sort in ascending order) find the number C of comparisons and the number D of interchanges for the given numbers: **10**

22 11 21 22 18 11

2. Suppose T contains the text "HIS BROTHER IS THE PROFESSOR" **10**
Perform the following operations.

INSERT(T , 3, 'xyz')
DELETE(T, 2 , 8)
INDEX(T , 'THE')
SUBSTRING(T , 4 , 12)
REPLACE(T , 'THE' , 'PP')

3. Write down the steps to search 7 in the following integer numbers using Binary search **10**

2, 4, 7, 8, 21, 34, 35, 56, 58, 78, 79, 83, 90, 99, 100

4. Suppose you have a stack of size 5. You can perform two operations on the stack**.** Now perform the following operations and show items on the stack after every operation (also show the TOP). **10**

- Push(3)
- Push(4)
- Pop()
- Push(4)
- Pop()

5. Apply quicksort algorithm over the following data to sort these values: **10**

5 1 3 9 -2 6

6. Consider the following **circular** queue where QUEUE is allocated with 5 memory cells. **10**
FRONT = 2, REAR =3 QUEUE:___, Phy, Mat,___,___

Describe the queue, including FRONT and REAR, as the following operations take place:

I. Swe is added.
II. Eng is added
III. Two items are deleted
IV. Ban is added
V. Three items are deleted

7. Let n denote a positive integer. Suppose a function L is defined recursively as follows: **10**

L(n) = 1, if n = 1
L(n) = L(n-3) + 1, if n>1
What will be the value of L(16) ?

8. Consider the queue where queue size is 8 **10**

FRONT = 2, REAR = 4, QUEUE: __, X, Y, Z,___,___,___, ___

a. A, B is added to the queue
b. Delete three letters
c. C, D and E are added to the queue
d. Delete two letters
e. F, G, H, I is added to the queue
f. Delete SIX letters
g. J, K, L and M are added to the queue

9. Evaluate the postfix expression using stack [Show all steps] **10**

a) 24, 7, 3, -, /, 2, 2, 3, ^, *, +, 15, -

b) 16, 7, 3, -, /, 2, 2, 3, ^, *, +, 20, -

10. Translate the infix expression into postfix expression using stack **20**

a) 4 + (5*6-(24/2^3)*4)*2 + 2

b) 10 + (((2+3)*10) / 5) + (2 - 2) / (20/5) + 10

11. Translate the infix expression into postfix expression using stack **20**

a) (7 + (((2+3)*10) / 5)) + ((5 - 2) / (10*3)) + 10

b) 4+(5*6-(24/2^3)*(4+1))*2 + 2

12. Translate the infix expression to equivalent postfix expression using stack. **20**

Show the steps using a table.

(A – 2 * (B + C) ↑ 3 / D * E) + F ↑ G

13.

Let S1 = "Success is simple." and S2 = "Do what's right, at the rightful time." **10**

Now perform the following operations sequentially (the result of each step will affect the next) and write the output (the starting index is 1 for S1, S2 and other resulting strings):

(i) LENGTH(S1, S2)
(ii) REPLACE(S1, "simple", "straightforward")
(iii) INSERT(S2, 16, ", the right way")
(iv) INDEX(S2, "right")
(v) DELETE(S2, 45, 3)
(vi) CONCAT(CONCAT(S1, " "), S2)
(vii) SUBSTRING(S1, 1, 7)
(viii) LENGTH(SUBSTRING(S1, 1, 7))
(ix) LENGTH(CONCAT(CONCAT(S1, " "), S2))
(x) INDEX(CONCAT(CONCAT(S1, " "), S2), "right")

First Test (14/11/2020 to 16/11/2020)

Definition of Statistics (Statistics is a branch of science that deals with data collection, data presentation, data analysis and interpretation of findings), Concepts of (i) Population (Entire experimental units under investigation) and Sample (representative part of the population) (ii) Primary and secondary data;

Data: Qualitative and Quantitative, Summarization, Presentation of statistical data, Frequency Distribution, Graphical representation.

Scale of measurement.

Measures of Central Tendency: Definition, Measures, Best measures and why? Main properties. Formula of calculating mean, median, mode for ungrouped and grouped data. Proofs of 3 Theorems.

For a set of n observations, prove that

(i) Sum of deviation from mean is zero

(ii) Sum of squares of deviation of a set of observations is minimum when the deviations are taken from arithmetic mean.

(iii) For n positive observations, prove that AM ≥ GM ≥ HM. When the equality sign holds?

Computation of quartile, decile, percentile.

Second Test (20/11/2020 to 23/11/2020)

Second Test (20/11/2020 to 23/11/2020)

Measures of Dispersion: Definition, Absolute and relative measures, Best measures and why? Main properties. Formula of calculating mean deviation, standard deviation, Coefficient of variation for ungrouped and grouped data. Proofs of 04 Theorems.

(i) Show that the variance of first n-natural number is $\frac{n^2-1}{12}$.

(ii) If $\bar{x}$ and S denote the mean and standard deviation respectively for m non-negative quantities $x_1, x_2, \ldots\ldots, x_m$, then show that $\bar{x}\sqrt{m-1} \geq S$

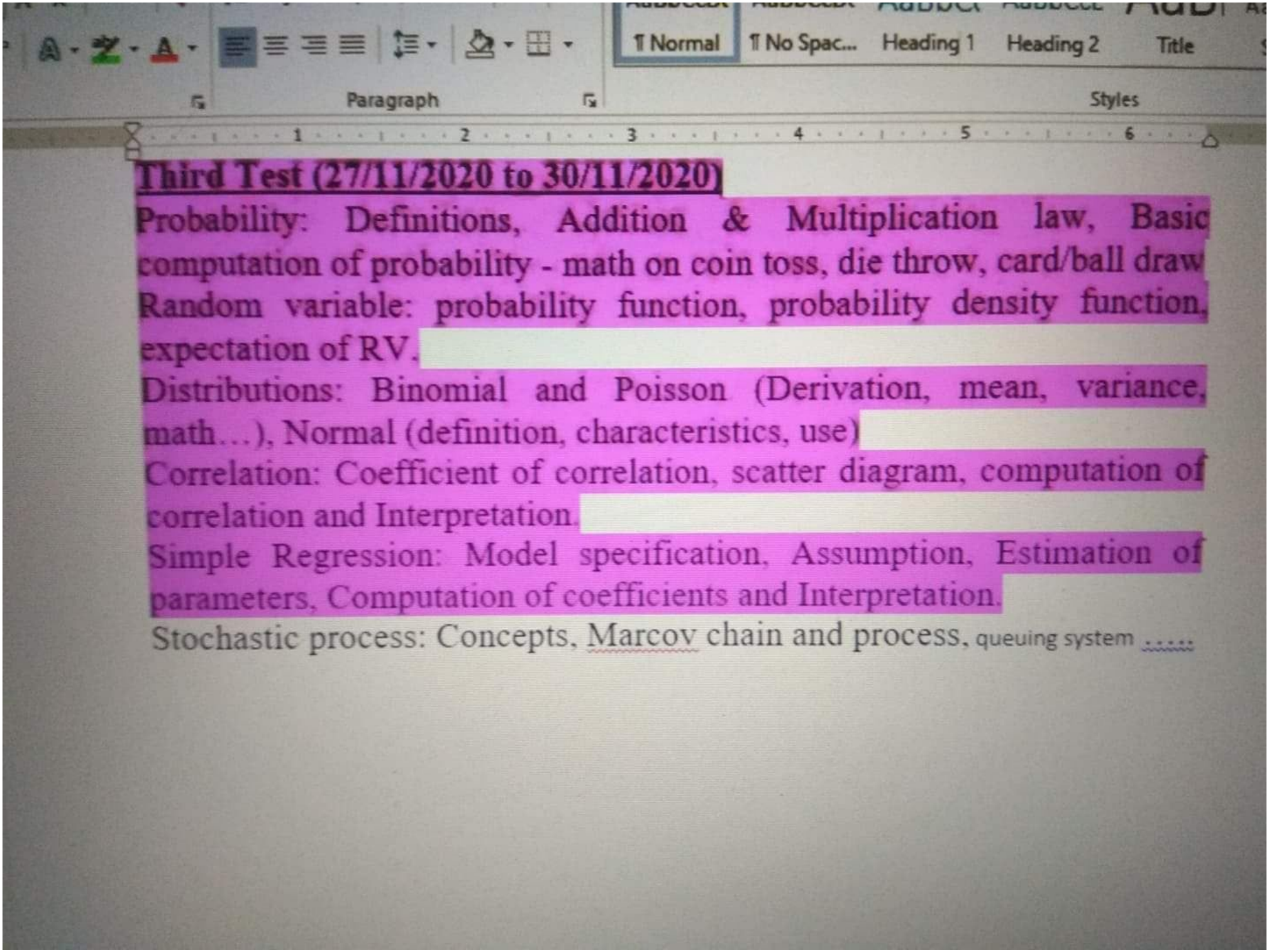
(iii) Show that mean deviation is the least when the deviation are taken from median.

Shape characteristics: Moments, Relationship of raw and central moments, Concepts and measures of skewness and kurtosis. Proofs of 02 Theorems.

Establish the relationship

$$\mu_2 = \mu_2' - \mu_1'^2$$

$$\mu_3 = \mu_3' - 3\mu_1'\mu_2' + 2\mu_1'^3$$



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Third Test (27/11/2020 to 30/11/2020)

Probability: Definitions, Addition & Multiplication law, Basic computation of probability - math on coin toss, die throw, card/ball draw

Random variable: probability function, probability density function, expectation of RV.

Distributions: Binomial and Poisson (Derivation, mean, variance, math…), Normal (definition, characteristics, use)

Correlation: Coefficient of correlation, scatter diagram, computation of correlation and Interpretation.

Simple Regression: Model specification, Assumption, Estimation of parameters, Computation of coefficients and Interpretation.

Stochastic process: Concepts, Marcov chain and process, queuing system .....

Take Home Exam: Part 01

Course Code: MAT107W **Course Title:** Linear and Abstract Algebra
Total Marks: 10 **Submission Deadline:** 15 November 2020

1. Write **BY HAND** on plain papers with your **REGISTRTATION NUMBER** on the top right corner of each page.
2. Prepare **ONE PDF** file containing the images of all the pages consecutively.
3. Rename the file as **REGISTRTATION NUMBER _FULL NAME** (For example, 20198310[][]_Mr. uvw xyz)
4. Send a copy of the file to *salahuddin-mat@sust.edu* by the **DEAD LINE** with **Take Home Exam: Part 01** as the **SUBJECT** of the email.
5. **Note:** Priority will be given to the earlier received files. **RECEIVED** date and time will be considered as the **SUBMISSION** date and time.

Problem 1: Let $M = \begin{bmatrix} -1 & 2 & 0 \\ a-b & 3 & 0 \\ a & -b & 1 \end{bmatrix}$ where a and b are the last two digits of your university registration number, that is, 20198310ab. Find the matrix that diagonalizes M. Hence compute M^{199}.

Problem 2: Let $v_1 = \begin{bmatrix} 2 \\ -2 \\ 1 \end{bmatrix}$, $v_2 = \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}$ and $v_3 = \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$. Find the matrix A such that $Av_1 = \begin{bmatrix} -5 \\ 8 \\ -1 \\ 0 \end{bmatrix}$, $Av_2 = \begin{bmatrix} 5 \\ -2 \\ -1 \\ -1 \end{bmatrix}$ and $Av_3 = \begin{bmatrix} 2 \\ 4 \\ -2 \\ -3 \end{bmatrix}$. Hence find Av for any vector $v = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \in \Re^3$.

Take Home Exam: Part 02

Course Code: MAT107W **Course Title:** Linear and Abstract Algebra
Total Marks: 10 **Submission Deadline:** 10 December 2020

1. Write **BY HAND** on plain papers with your **REGISTRTATION NUMBER** on the top right corner of each page.
2. Prepare **ONE PDF** file containing the images of all the pages consecutively.
3. Rename the file as **REGISTRTATION NUMBER _FULL NAME** (For example, 20198310[][]_Mr. Uvw Xyz)
4. Send a copy of the file to *salahuddin-mat@sust.edu* by the **DEAD LINE** with **Take Home Exam: Part 02** as the **SUBJECT** of the email.
5. **Note:** Priority will be given to the earlier received files. **RECEIVED** date and time will be considered as the **SUBMISSION** date and time.

Problem 1: Let $M = \begin{bmatrix} 2 & 0 & -1 \\ 5 & x+y & 0 \\ 0 & -y & 3 \end{bmatrix}$ where x and y real numbers. Find the values of x and y so that M is nonsingular. Use Cayley-Hamilton theorem to find M^{-1} for $x = 2$ and $y = -1$.

Problem 2: Let the linear transformation $L: \Re^3 \to \Re^4$ be defined by $L\left(\begin{bmatrix} x \\ y \\ z \end{bmatrix}\right) = \begin{bmatrix} x+y \\ x-y \\ z \\ x \end{bmatrix}$, $\forall x, y, z \in \Re$. Find the transformation matrix $[L]$ with respect to the bases $S = \left\{\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}\right\}$ and $T = \left\{\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}\right\}$.

[Use any text book of linear algebra or the site https://yutsumura.com/linear-algebra/linear-transformation-from-rn-to-rm/ for sample solutions.]

Term Test

1-2, 2019-2020

Soc203w

Sociology for Engineers

Ashis Kumer Banik

Marks: 10x3=30

Assignment 1: **Development of Sociology.**

Assignment 2: **Scientific Methods of Sociology.**

Assignment 3: **Culture.**