VIT
Vellore Institute of Technology

Slot: B1+B2+TB1+TB2

School of Information Technology and Engineering

Summer-II Semester 2023-2024

Mid-Term

Programme Name & Branch: MCA

Course Name & code: Software Process and Metrics & ITA6014

Class Number (s): VL2022230701041, 1042, 1043, 1044, 1045, 1046

Faculty Name (s): Prof. Thanga Mariappan L, Prof. Sweta Bhattacharya, Prof. Nithya S, Prof. Vellingiri J, Prof. Charanya R, Prof. Mangayarkarasi R

Exam Duration: 90 Min. **Maximum Marks: 50**

Q.No. **Question**

1. In order to assess and improve software development and project management practices which framework are used in the industry? Explain it with neat diagram.

2. Suppose you are working as a quality engineer in 'ABC software pvt ltd'. You need to ensure the software developed should be reliable, adaptable, deliverable, and should be within the budget. On what basis the quality of the software will be evaluated and improved? Justify it with the type of measurements that will be used for developing the software. Also explain about scope of software measurements.

3. Assume yourself as a project manager of 'XYZ software pvt ltd'. And you have proposed a new tool, technique or method. You have been asked to investigate the tool, technique and method in a scientific way. Your scientific investigation is likely to involve a formal experiment approach. Explain the various principles applicable for this approach.

4. Assume that you're studying the relationship between newborns' weight and length. You have the weights and lengths of the 10 babies born last month at your local hospital. Calculate the Pearson correlation coefficient between length and weight.

Weight (kg)	3.63	3.02	3.82	3.42	3.59	2.87	3.03	3.46	3.36	3.3
Length (cm)	53.1	49.7	48.4	54.2	54.9	43.7	47.2	45.2	54.4	50.4

5. Sample of test scores from a class

DA-1: 47, 50, 62, 76, 98, 54, 38, 66, 24, 82.
DA-2: 43, 40, 32, 36, 48, 24, 28, 66, 42, 90.
Quiz-1: 29, 30, 42, 36, 88, 64, 48, 76, 44, 53.

Represent the following sets into a box plot and identify the outliers.

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Summer Term II Final Assessment Test – August 2023

Course: **ITA6014 - Software Process and Metrics**

Class NBR(s): **1041 / 1042 / 1043 / 1044 / 1045 / 1046**

Slot: B1+B2+TB1+TB2

Time: **Three Hours**

Max. Marks: **100**

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

General Instruction: Scientific Calculators are permitted.

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Assume you are in the task of designing an Medical shop system. The system consist of different functionality like finding the medicine in the shelf, availability of the medicine, etc. If the customer approves the functionality, requirements and the design of system is initiated. If the customer does not approve the system, the development team revisits and resubmits it to the customer for approval. Which process model is associated with the scenario?

2. a) Write an example of measurement objective from both manager's and engineer's viewpoints. Now consider the user's viewpoint. What measurement objectives might a software user have? **[5]**

   b) Identify the appropriate measurement scales for the following: **[5]**

   i) Internet services categorized according to their relevant technologies (i.e. dial-up, DSL, high-speed, wireless, etc.)

   ii) Measuring complexity of many software modules by defining 4 complexity classes (Trivial, Simple, Moderate, Complex)

   iii) Measuring duration of various phases of projects (Project scheduling)

   iv) Measuring attitude towards Internet services, if the evaluation scores are numerically meaningful so the difference between a rate of 3 and a rate of 6 is exactly the 3 same as the difference between a rate of 7 and a rate of 10.

   v) Measuring execution time of a program.

3. You are about to begin a large project that uses new tools, techniques and languages for building a mission-critical product. Your product president wants to know if the new tools, techniques and languages should become company standards if the product is a success. Your scientific investigation is likely to involve a case study. Explain the various planning Case Studies.

4. Your company is developing the software for a telephone switching system for a single client. This large system is delivered to the customer in phased releases. The customer occasionally observes system failures, such as loss of availability, loss of specific services, or erroneous services. There are two testing phases at which it is possible to gather additional failure data internally: integration testing and system testing. An attempt must be made to fix all failures, whether observed by the user or in test. Discuss in detail about failure of software and examine each categories with suitable example.

5. Construct a box plot for the following. 11 software systems are shown in Table -1. Find the upper tail, lower tail, median, upper quartile, lower quartile and outliers.

Table -1

System	KLOC	MOD (average module size in LOC)	FD (fault density)
A	11	16	36
B	24	46	26
C	25	61	19
D	37	15	33
E	33	43	16
F	45	52	17
G	47	58	22
H	53	64	16
I	58	50	19
J	62	64	18
K	71	54	19

6. A company wants to predict the annual value of its total sales based on the national income of the country where it does business. The relationship is represented in the following table:

X	189	193	200	234	249	289	299	274	293	308	316
Y	423	412	422	432	435	445	455	449	458	469	469

x represents the national income in millions of dollars and **y** represents the company's sales in thousands of dollars in the period from 1981 to 1990 (inclusive). Calculate:

a) The regression line of y on x.
b) The linear correlation coefficient and interpret it.
c) If in 2001, the country's national income was 325 million dollars, what would be the prediction for the company's sales be?

7. Consider an application with 15 EIs, 11 EOs, 7 EQs, 5 ILFs and 11 EIFs. The elements evaluated for technical complexity assessment with respect to the information domain values are provided in the table below: (EI-External Input; EO- External Output; EQ - External Inquiries; ILF - Internal Logical Files; EIF - External Interface Files; FTR -File Type Referenced; DET- Data Element Types; RET- Record Types)

	#FTR	#DET	#RET	Complexity
EI	5	10	**N.A**	?
EO	8	11	N.A	?
EQ	11	19	N.A	?
ILF	N.A	13	9	?
EIF	N.A	13	**8**	?

a) Assess the complexity of each of the information domain values and fill the table. **[3]**

b) Calculate the Unadjusted Function Point count **[4]**

c) Assuming that the Value Adjustment Factor for all the 14 components are Complex, calculate the Function Point count. **[3]**

8. Determine the object points for a smart vending machine assuming that the system is average size (total number of clients-server is greater than 8) using the following data, calculate Object point and effort.

Screens	Views (Data)
User screens	
S1: Buying Screen	Amount of coins to insert, selection
S2: Inventory update	Inventory input update (30 data items)
Reports	
R1: Display Money attended	Amount of money entered (4 view data item)
R2: Not enough money entered	Insufficient funds
R3: Machine Report	Inventory (24 data items)

9. Discuss the following metrics for software maintenance.
   a) Fix backlog and backlog management index
   b) Fix response time and fix responsiveness.
   c) Percent delinquent fixes
   d) Fix Quality

10. Design a Bayesian Network model for predicting the software defect and reliability. Explain your answer.

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