Course Instructor Name: Mrs. N.TEJASREE Academic Year: 2024-25

Subject Name: SOFTWARE METRICS AND MEASURES Section: B & D

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Sem Start Date and End Date: 8-7-24 TO 9-11-24

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HOD

1. DEPARTMENT VISION & MISSION

Vision:

To produce globally competent and industry-ready graduates in Computer Science & Engineering by imparting quality education with the know-how of cutting-edge technology and holistic personality.

Mission:

1. To offer high-quality education in Computer Science & Engineering in order to build core competence for the graduates by laying a solid foundation in Applied Mathematics and program frameworkwith a focus on concept building.
2. The department promotes excellence in teaching, research, and collaborative activities to prepare graduates for a professional career or higher studies.
3. Creating an intellectual environment for developing logical skills and problem-solving strategies, thus developing, an able and proficient computer engineer to compete in the current global scenario.

2. LIST OF PEOs, POs AND PSOs

2.1 Program Educational Objectives (PEO):

PEO 1: Excel in professional career and higher education by acquiring knowledge of mathematical computing and engineering principles.
PEO 2: To provide an intellectual environment for analyzing and designing computing systems for technical needs.
PEO 3: Exhibit professionalism to adapt current trends using lifelong learning with legal and ethical responsibilities.
PEO 4: To produce responsible graduates with effective communication skills and multidisciplinary practices to serve society and preserve the environment.

2.2. Program Outcomes (POs):

Engineering Graduates will be able to satisfy these NBA graduate attributes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

10. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2.3 Program Specific Outcomes (PSOs):

PSO1: Professional Skills and Foundations of Software development: Ability to analyze, design and develop applications by adopting the dynamic nature of Software developments.
PSO2: Applications of Computing and Research Ability: Ability to use knowledge in cutting edge technologies in identifying research gaps and to render solutions with innovative ideas.

3. COURSE OUTCOMES

S. No	Course Out Come
CO1	**Explain** the foundational concepts of software metrics and measurement.(Understanding)
CO2	**Apply** various software metrics for evaluating software quality attributes.(Applying)
CO3	**Analyze** and interpret measurement data to assess software project health.(Analyzing)
CO4	Use tools and techniques to **develop** for software measurement.(Understanding,Creating)
CO5	Understand the relationship between software metrics and software engineering processes **Evaluate** and critique software metrics used in industry and research.[Evaluating]

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

Action Words for Bloom's Taxonomy					
Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	identify	manipulate	survey	grade	produce
discover	indicate	paint	advertise	measure	rearrange
duplicate	infer	prepare	appraise	predict	rewrite
enumerate	relate	produce	break down	rank	role-play
listen	restate	report	calculate	score	adapt
observe	select	teach	conclude	select	anticipate
omit	translate	act	correlate	test	arrange
read	ask	administer	criticize	argue	assemble
recite	cite	articulate	deduce	conclude	choose
record	discover	chart	devise	consider	collaborate
repeat	generalize	collect	diagram	critique	collect
retell	give examples	compute	dissect	debate	devise
visualize	group	determine	estimate	distinguish	express
	illustrate	develop	evaluate	editorialize	facilitate
	judge	employ	experiment	justify	imagine
	observe	establish	focus	persuade	infer
	order	examine	illustrate	rate	intervene
	report	explain	organize	weigh	justify
	represent	interview	outline		make
	research	judge	plan		manage
	review	list	question		negotiate
	rewrite	operate	test		originate
	show	practice			propose
	trace	predict			reorganize
	transform	record			report
		schedule			revise
		simulate			schematize
		transfer			simulate
		write			solve
					speculate
					structure
					support
					test
					validate

4. SYLLABUS COPY

UNIT-I

Measurement Theory

Fundamentals of measurement-Measurements in Software Engineering-Scope of Software metrics-Measurement theory-Goal based framework-Software measurement validation.

UNIT-II

Data Collection And Analysis

Empirical investigation -Planning experiments - Software metrics data collection -Analysis methods-Statistical methods.

UNIT-III

Product Metrics

Measurement of internal product attributes – Size and structure-External product attributes – Measurement of quality

UNIT-IV

Quality Metrics

Software quality metrtics-Product quality-Process quality-Metrics for software maintenance –Case studies of Metrics Program – Motorola – HP and IBM.

Unit-V

Management Metrics

Quality management models – Rayleigh Model – Problem Tracking report(PTR) model-Reliablity growth model-Model evaluation-Orthogonal defect classification

Text Books

1.Software Metrics,Normal E-Fentor Shari Lawrence Pfllegar,International Thomson Computer Press,1997.

2.Software Metrics:A Rigorous approach Fenter Norman,E.Chupmen & Hall,London.

REFERENCE BOOKS:

1.Metric and Modelsin software Quality Engineering,Stephen H.Kin,Addison Wesley,1995.

2.Measuring Software Process,William A.Florac and Aretitor D Carletow,Addison-Wesley,1995.

5. INDIVIDUAL TIME TABLE (N.Tejasree)

	I	II	III	IV		V	VI	VII
MON	SMM-B							
TUE			SMM-B					
WED		SMM-D				SMM-D		
THU		SMM-B		SMM-D		SMM-B		
FRI	SMM-D		SMM-B					SMM-B
SAT	SMM-D		SMM-B				SMM-D	

6. SESSION PLAN/LESSON PLAN

S.NO	Topic (R22 syllabus)	Sub-Topic	NO. OF LECTURES REQUIRED	Planned Date	Conducted Date	Suggested Books	Teaching Method
1	UNIT – I	**Introduction Measurement Theory**	**L1**	29-07-24	29-07-24	T1	M1
2		Fundamentals of measurement	**L2**	30-07-24	30-07-24	T1	M1
3	**Measurement Theory**	Fundamentals of measurement	**L3**	1/8/2024	1/8/2024	T1	M1
4		Measurements in Software Engineering	**L4**	2/8/2024	2/8/2024	T1	**M1,M4,**
5		Scope of Software metrics	**L5**	5/8/2024	5/8/2024	T1	M1
6		Measurement theory	**L6**	6/8/2024	6/8/2024	T1	**M1,M4,**
7		Measurement theory	**L7, L8**	12-08-24, 13-08-24	12/8/2024	T1 T1	M1 M1
8		Goal based framework	**L9**	16-08-24	16-08-24	T1	**M1,M4,**
9		Software measurement validation.	**L10**	19-08-24	19-08-24	T1	M1
10		Software measurement validation.	**L11, L12**	20-08-24	21-08-24	T1	**M1,M4,**
11	**Unit – II**	**Data Collection And Analysis** Empirical investigation	**L13**	26-08-24	26-08-24	T1	M1
12	**Data Collection And Analysis**	Empirical investigation	**L14**	27-08-24	27-08-24	T1	M1

13		Planning experiments	**L15**	28-08-24	28-08-24	T1	M1
14		Planning experiments	**L16**	27-08-24	29-08-24	T1	M1
15		Software metrics data collection	**L17**	30-08-24	30-08-24	T1	M1
16		Software metrics data collection	**L18**	2/9/2024	2/9/2024	T1	M1
17		Analysis methods	**L19**	3/9/2024	3/9/2024	T1	M1
18		Analysis methods	**L20**	4/9/2024	4/9/2024	T1	**M1,M4,**
19		Statistical methods.	**L21, L22**	6/9/2024	6/9/2024	T1	**M1,M4,**
20		Statistical methods.	**L23**, **L24**	9/9/2024	10/9/2024	T1	**M1,M4,**
21		**Product Metrics**	**L25**	16-09-24	16-09-24	T1	M1
22		**Product Metrics**	**L26**	17-09-24	17-09-24	T1	**M1,M4,**
23		Measurement of internal product attributes	**L27**	18-09-24	18-09-24	T1	**M1,M4,**
24		Measurement of internal product attributes	**L28**	23-09-24	23-09-24	T1	**M1,M4,**
25		Size and structure	**L29**	24-09-24	24-09-24	T1	M1
26	**Unit – III**	Size and structure	**L30**	1/10/2024	1/10/2024	T1	M1
27	**Product Metrics**	External product attributes	**L31**	1/10/2024	2/10/2024	T1	**M1,M4,**

28		External product attributes	**L32**	3/10/2024	3/10/2024	T1	M1
29		Measurement of quality	**L33**	4/10/2024	4/10/2024	T1	M1
30		Measurement of quality	**L34**	7/10/2024	7/10/2024	T1	M1
31	UNIT-IV Quality Metrics	Software quality metrics	**L35, L36**	16-10-24	16-10-24, 18-10-24	T2 T2	**M1,M4,** **M1,M4,**
32		Software quality metrics	**L37**	21-10-24	21-10-24	T2	**M1,M4,**
33		Product quality	**L38, L39**	22-10-24	25-10-24	T2	**M1,M4,**
34		Process quality	**L40**	28-10-24	28-10-24	T2	**M1,M4,**
35		Process quality	**L41**	29-10-24	29-10-24	T2	**M1,M4,**
36		Metrics for software maintenance	**L42**	30-10-24	30-10-24	T2	**M1,M4,**
37		Metrics for software maintenance	**L43**	31-10-24	31-10-24	T2	**M1,M4,**
38		Case studies of Metrics Program	**L44, L45**	1/11/2024	1-11-24, 4/11/2024	T2 T2	**M1,M4,** **M1,M4,**
39		Motorola- HP and IBM.	**L46**	5/11/2024	5/11/2024	T2	**M1,M4,**
40		Motorola- HP and IBM.	**L47**	6/11/2024	6/11/2024	T2	**M1,M4,**

41	Unit – V **Management Metrics**	**Management Metrics** Quality management models	**L48**	7/11/2024	7/11/2024	T2	**M1,M4,**
42			**L49**	8/11/2024	8/11/2024	T2	**M1,M4,**
43		Quality management models	**L50**	9/11/2024	9/11/2024	T2	**M1,M4,**
44		Rayleigh Model	**L51**	11/11/2024	11/11/2024	T2	**M1,M4,**
45		Problem Tracking report(PTR) model	**L52**	12/11/2024	12/11/2024	T2	**M1,M4,**
46		Reliablity growth model	**L53**	15-11-24	15-11-24	T2	**M1,M4,**
47		Model evaluation	**L54**	16-11-24	16-11-24	T2	**M1,M4,**
48		Model evaluation	**L55**	18-11-24	18-11-24	T2	**M1,M4,**
49		Orthogonal defect classification	**L56**	19-11-24	19-11-24	T2	**M1,M4,**
50		Orthogonal defect classification	**L57**	22-11-24	22-11-24	T2	**M1,M4,**

METHODS OF TEACHING:

M1 : Lecture Method	**M4 : Presentation /PPT**	**M7 : Assignment**
M2 : DemoMethod	**M5 : Lab/Practical**	**M8 : Industry Visit**
M3 : Guest Lecture	**M6 : Tutorial**	**M9 : Project Based**

NOTE:

1. AnySubjectinaSemesterissupposetobecompletedin55to65periods.
2. Each Period is of 50minutes.
3. Each unit duration &completion should be mentioned in the Remarks Column.
4. ListofSuggestedbookscanbemarkedwithCodeslikeT1,T2,R1,R2etc.

7. Session Execution Log:

S no	Units	Scheduled started date	Completed date	Remarks
1	I	29-07-2024	21-08-2024	COMPLETED
2	II	26-08-2024	10-09-2024	COMPLETED
3	III	16-09-2024	07-10-2024	COMPLETED
4	IV	16-10-2024	06-11-2024	COMPLETED
5	V	07-11-2024	22-11-2024	COMPLETED

8. Lecture Notes – (hand written)

9.ASSIGNMENT QUESTIONS ALONG SAMPLE ASSIGNMENT SCRIPTS

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MID 1 ASSIGNMENT

ACADEMIC YEAR 2024-25

SUBJECT NAME: SOFTWARE METRICS AND MEASURES

Subject: SOFTWARE METRICS AND MEASURES

Assignment -1

A.Y. 2024-25

1. What is the need for software metrics? Explain briefly GQM paradigm and its implementation with an example.(co1)

b) Explain the scope of software metrics? (co1)

2. What are the different measurement scale types? Explain each of them with an illustrative example. (co2)
3. A)Explain in detail various steps to carry out a
   Formal experiment with suitable example.(co2)
   b) How are statistical methods used in data collection and analysis? Explain in detail.

4a) what are empirical investigation techniques in data collection and analysis? Explain. (co2)

b)i)write short notes on fault types.
ii) Discuss the content of failure report
iii) Write notes on box plot.

5. Explain Nin detail various structural measures used for measuring internal product features of software. (co3)

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SMM Assignment –II

A.Y - 2024-2025

1.Explain Halstead's Software Metrics with example.

2. Briefly explain McCabe's Cyclomatic complexity measure

2B) Define COCOMO MODEL with advantages and disadvantages .Explain types of COCOMO model.

3. Define In-Process Quality Metrics?and explain any 2 metrics

B) Explain the case study metric program used in HP Software Company.

4. Explain any four software quality metrics for process and products. How these values will be helpful for software engineers?

5. A. Write brief notes on

(1) Orthogonal defect classification.

(ii) PT report.

B. Explain in detail Reyleigh model for quality management.

Note: Submit on or before 2/12/2024 by 1.30 [pm]

10. MID EXAM QUESTION PAPER ALONG SAMPLE ANSWER SCRIPTS

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III.B.TECH-I-SEM-I MID EXAMINATIONS, **Time: 1.30 PM TO 03:30 PM**

Subject: CN **Branch: CSE** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (21/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a, b, c sub questions.

Set: 1

Answer All Questions In Part-A& Part-B

I. **Answer all the below questions each question carry two marks** **5*2=10M**

1. Differentiate between measurement and measure (Co1)
2. Write an example for cost and effort estimation. (Co1)
3. Define: Replication, Randomization with reference to experimental design. (Co2)
4. What is data collection form and prepare a report. (Co2)
5. Write the advantages and disadvantages of lines of code? (Co3)

PART B

II. Answer any four questions from the following **4*5=20 M**

6. Explain the scope of software metrics? (Co1)
7. Describe software measurement validation and its types. (Co1)
8. What are the types of experimental designs? (Co2)
9. How are statistical methods used in data collection and analysis? Explain in detail. (Co2)
10. Write short notes on Halstead's work. (Co2)
11. Explain in detail various structural measures used for measuring internal product features of software. (Co3)

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III.B.TECH-I-SEM-I IIMID EXAMINATIONS, **Time: 01:30 PM TO 03:30 PM**

Subject: IOT **Branch: CSE** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (21/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a, b, c sub questions.

Short Questions **5X2=10**

I. **Answer all the below questions each question carry two marks** **5*2=10M**

1. Define the term: software metrics and explain types of metrics (CO1)
2. What is quality models and measures with neat diagram (CO1)
3. What hypothesis testing. (CO2)
4. Differentiate between independent variables and dependent variables with example. (CO2)
5. Define length of software size. (CO3)

PART B **Marks: 3X5=15M**

6. What are types of structural measures? Explain control flow graph with suitable example (CO3)
7. explain data structure measures. (CO3)
8. What is meant by software maintenance? Discuss various metrics for software maintenance. (CO4)
9. Explain the case study metric program used in HP Software Company. (CO4)
10. Explain reliability growth model to manage metrics. (Co5)
11. Explain Model Evaluation in Software Quality Management (Co5)

1. SCHEME OF EVALUATION:

MID 1

S.NO	THEORY	MARKS	TOTAL
	PART-A		
1	Define the term: software metrics and explain types of metrics (CO1)	2	2
2	Write an example for cost and effort estimation. (Co1)	2	2
3	Define: Replication, Randomization with reference to experimental design. (Co2)	2	2
4	What is data collection form and prepare a report. (Co2)	2	2
5	Write the advantages and disadvantages of lines of code? (Co3)	2	2
	PART-B		
6	Explain the scope of software metrics? (Co1)	5	5
7	Describe software measurement validation and its types. (Co1)	5	5
8	What are the types of experimental designs? (Co2)	5	5
9	How are statistical methods used in data collection and analysis? Explain in detail. (Co2)	5	5
10	Write short notes on Halstead's work. (Co2)	5	5
11	Explain in detail various structural measures used for measuring internal product features of software. (Co3)	5	5

MID 2

S.NO	THEORY	MARKS	TOTAL
	PART-A		
1	Define the term: software metrics and explain types of metrics (CO1)	2	2
2	What is quality models and measures with neat diagram (CO1)	2	2
3	What hypothesis testing. (CO2)	2	2
4	Differentiate between independent variables and dependent variables with example. (CO2)	2	2
5	Define length of software size. (CO3)	2	2
	PART-B		
6	What are types of structural measures? Explain control flow graph with suitable example (CO3)	5	5
7	explain data structure measures. (CO3)	5	5
8	What is meant by software maintenance? Discuss various metrics for software maintenance. (CO4)	5	5
9	Explain the case study metric program used in HP Software Company. (CO4)	5	5
10	Explain reliability growth model to manage metrics. (Co5)	5	5
11	Explain Model Evaluation in Software Quality Management (Co5)	5	5

12.Mapping of COs and Pos with PSOs

CO/PO Mapping	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO 1	3	2			2							3	2
CO 2	3	3	2		2							3	2
CO 3	3	3		3	2				2			2	3
CO 4	3	2	3		3							3	2
CO 5	2	3		3	2		2					2	3

13.Cos,POs,PSOs JUSTIFICATION

CO1: Explain the foundational concepts of software metrics and measurement.(Understanding)
Correlated with PO1 high: Strongly aligned as it requires applying knowledge of mathematics, science, and engineering fundamentals.
Correlated with PO2 moderately: Moderately aligned because understanding foundational concepts contributes to identifying and analyzing engineering problems.
Correlated with PO5 moderately: Moderately aligned because explaining concepts can involve using modern tools and techniques to aid comprehension.
Correlated with PSO1 Strongly: aligned with **PSO1** as understanding foundational concepts builds the core knowledge required for software analysis, design, and development.
Correlated with PSO2 moderately: Moderately aligned with **PSO2** as it supports understanding innovative approaches to using metrics.

CO2: Apply various software metrics for evaluating software quality attributes.(Applying)
Correlated with PO1 Strongly: Strongly aligned as applying metrics requires knowledge of engineering and software principles.
Correlated with PO2 Strongly: Strongly aligned because applying metrics involves identifying and solving quality-related engineering problems.
Correlated with PO4 moderately: Moderately aligned as applying metrics contributes to system or process design by improving quality.
Correlated with PSO1 moderately: Strongly aligned with **PSO1** because applying metrics enhances skills in assessing software quality, which is vital in professional software development.
Correlated with PSO2 moderately: due to its application in evaluating cutting-edge technologies and identifying gaps in research.

CO3: Analyze and interpret measurement data to assess software project health.(Analyzing)
Correlated with PO1 Strongly : Strongly aligned with applying foundational knowledge for analyzing project health.
Correlated with PO2 Strongly: Strongly correlated because analyzing project health involves

identifying and solving complex problems.
Correlated with PO4 Strongly: Strongly aligned as this involves research-based methods to analyze and synthesize data.
Correlated with PO5 moderately: Moderately aligned due to the reliance on modern tools for analyzing and interpreting project data.
Correlated with PSO1 moderately: as analyzing measurement data ensures robust software project development and health.
Correlated with PSO2 moderately: because interpreting data aligns with research-based problem-solving and innovation.

CO4: Use tools and techniques to **develop** for software measurement.(Understanding,Creating)
Correlated with PO1 Strongly: Strongly aligned as developing tools requires knowledge of mathematics and engineering.
Correlated with PO3 moderately: Strongly correlated because designing tools supports creating processes that meet engineering needs.
Correlated with PO5 Strongly : aligned as using and creating tools requires expertise in modern engineering and IT techniques.
Correlated with PSO1 Strongly: as developing tools and techniques is crucial for professional software development.
Correlated with Moderately aligned with PSO2 :because it includes utilizing existing tools and techniques to bridge research and practical application.
CO5: Understand the relationship between software metrics and software engineering processes **Evaluate** and critique software metrics used in industry and research.[Evaluating]
Correlated with PO1 moderately: Moderately aligned because understanding metrics involves applying engineering knowledge.
Correlated with PO2 Strongly : aligned as evaluating and critiquing metrics requires problem analysis and identifying gaps.
Correlated with PO4 High: Strongly aligned as research methods and data analysis are essential for evaluating metrics.
Correlated with PO5 moderately: Moderately aligned since applying modern tools assists in critiquing metrics.
Correlated with PO7 moderately: Moderately aligned because ethical principles are applied when evaluating metrics used in industry and research.
Correlated with PSO1 moderately: Moderately aligned with **PSO1** as understanding and critiquing

metrics contributes indirectly to software development practices.
Correlated with PSO2 Strongly: aligned with **PSO2** because critiquing metrics involves research and innovation in identifying process improvements.

Mapping POs with PEOs

	Program Outcome(PO):											
		1	2	3	4	5	6	7	8	9	10	11
	I	**X**			**X**						**X**	
	II		**X**	**X**		**X**						
	III							**X**				**X**

PEOS	**IV**				**X**		**X**		**X**	**X**		

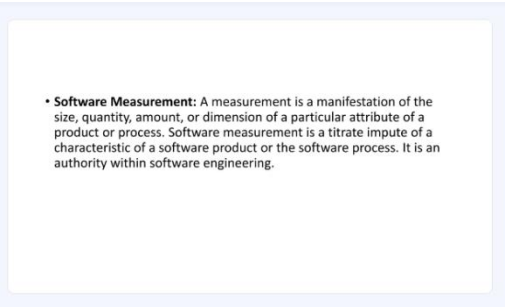
14.Attainment of COs,POs AND PSOs (Excel sheet)

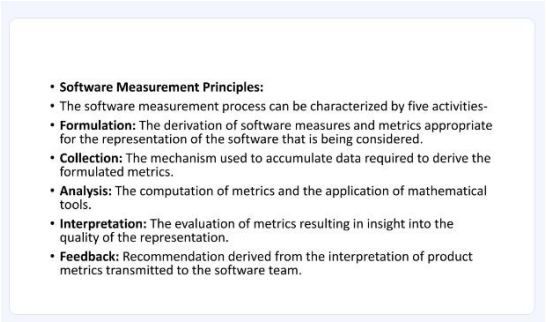
AFTER RESULT

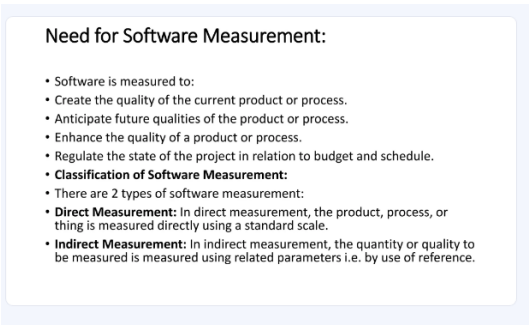
15. Previous Question Papers

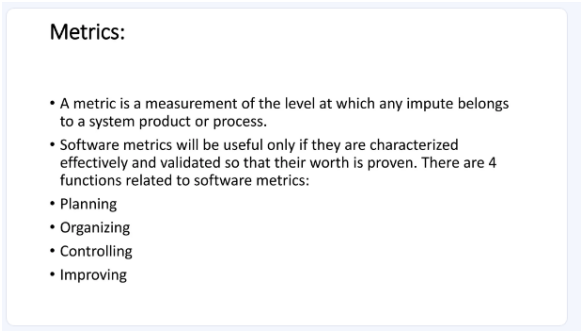
16.Power point presentations (PPTs)

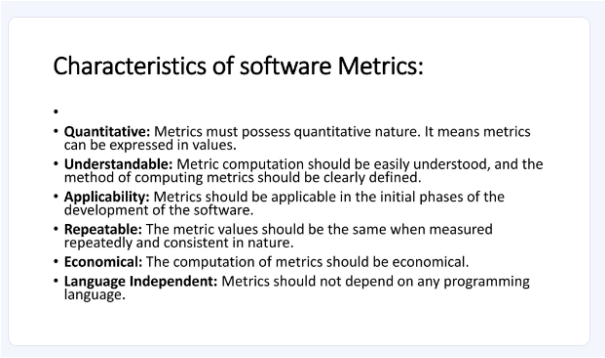
PPTs AND PRESENTATION

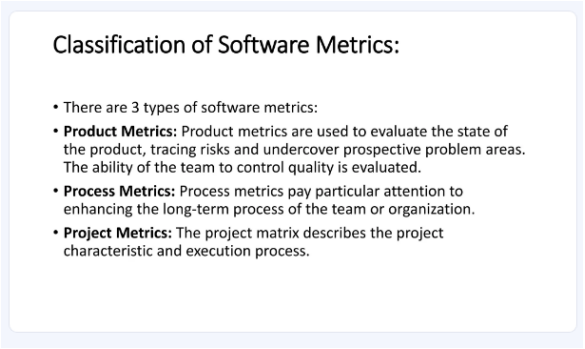












17. Innovative Teaching method if any(Attached Innovative Assignment)

QUESTIONS

A.Y 2024-25

1. explain the Real-World Applications of Metrics

2. explain the Real-World Case Study

18. References (Textbook/Websites/Journals)

Textbook

Text Books

1.Software Metrics,Normal E-Fentor Shari Lawrence Pfllegar,International Thomson Computer Press,1997.

2.Software Metrics:A Rigorous approach Fenter Norman,E.Chupmen & Hall,London.

REFERENCE BOOKS:

1.Metric and Modelsin software Quality Engineering,Stephen H.Kin,Addison Wesley,1995.

2.Measuring Software Process,William A.Florac and Aretitor D Carletow,Addison-Wesley,1995.

Websites or URLs e- Resources

1. https://www.geeksforgeeks.org/software-measurement-and-metrics/
2. https://www.javatpoint.com/software-engineering-software-metrics
3. https://www.geeksforgeeks.org/product-metrics-in-software-engineering/
4. https://www.tutorialspoint.com/software_quality_management/software_quality_management_metrics.html
5. https://www.geeksforgeeks.org/methods-of-data-collection/

Journals

1. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8588655
2. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9755217
3. https://tuengr.com/V12A/12A12G.pdf
4. https://ieeexplore.ieee.org/document/5385114
5. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9336003