# Government of Karnataka Department of Technical Education Bengaluru

A PROPERTY OF	Course Title: Software Testing								
	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS61T						
	Type of Course: Lectures, Self Study & Student Activity	Credit :04	Core/ Elective:						
CIE- 25 Mark	S	S	EE- 100 Marks						

## **Prerequisites**

Knowledge of Software Engineering

# **Course Objectives**

- 1. Foundations of software testing, important concepts and the testing process
- 2. Understand Testing levels and testing methods
- 3. Study Static testing how to carry out testing without executing the code
- 4. Learn about dynamic testing and Test case design techniques. How to do the testing after executing the program and how to design test cases with examples
- 5. Know the details of Managing the testing Process
- 6. Know the need for testing tools and how to select a tool.

#### **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours
CO1	Understand the challenges and problems faced, what is testing, types of testing and the models	R, U	1,2,5,6,7,8,9,10	12
CO2	Understand the different types of testing with their workings.	U, A	1,2,3,4,5,8,9,10	08
CO3	Describe the techniques used in static testing	U, A	1,2,3,4,5,8,9,10	10
CO4	Visualizing the methods used to perform dynamic testing and case studies on it.	U A	1,2,3,4,5,8,9,10	08
CO5	Identify how to manage the testing process by developing the related documents	U, A	1,2,4,5,8,9,10	08
CO6	Analyze why tools are required, how to use them and understand the ethics required.	<i>U A</i> 1,2,4,5,6,7,8,9,10		06
		Total	sessions	52

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

#### **Course-PO Attainment Matrix**

Course		Programme Outcomes								
	1	2	3	4	5	6	7	8	9	10
Software Testing	3	3	2	3	3	3	3	3	3	3

#### Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

#### **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Introduction and Fundamentals of Testing	12	5	25	ı	30	20.69
II	Testing Levels and Types	08	-	15	10	25	17.24
III	Static Testing Techniques	10	-	25	1	25	17.24
IV	Dynamic Testing and Test case design Techniques	08	-	15	10	25	17.24
V	Managing the Testing Process	08	ı	20	5	25	17.24
VI	Software Testing Tools and Code of Ethics for Software Professionals	06	-	10	5	15	10.35
	Total	52	5	110	30	145	100

#### **UNIT I: Introduction and Fundamentals of Testing**

12 Hrs

**Introduction:** Power of software, Challenges in software projects, Software Fiascos, Ariane 5, Patriot Missile, Mars Pathfinder, CT Scanner, The great bank robbery, FBI Virtual case file, Reasons for software failure, What is the solution?, Software Quality Assurance, Software Testing, Code of Ethics, Software Testing Professionals, Skill sets for Testing Professionals, Tasks handled by Testing Professionals

**Fundamentals of Testing:** What is Testing?, Testing versus Debugging, Testing and Bebugging, Verification and Validation, Root Cause Analysis, Significance of Testing, Cost of Quality, Psychology of Testing, Testing Choices, In-house Testing, Outsourcing, Who does the testing?, Developers as Testers, Independent team Testing, Buddy Testing, Testing Phases, V Model, Testing and Life cycle models, Testing the Systems, Testing the Strategies, Static Testing, Dynamic Testing, Why testing is difficult?, Test Case, Test Oracle, Test Software,

Manual versus Automated Testing, Testing Software of different Technologies, Metrics in Testing Phase, When Testing is Complete?, Criteria for Completion of Testing, Risk-based Testing, Types of risks, The Myths and Realities of Testing

# **UNIT II: Testing Levels and Types**

08 Hrs

Testing Levels, Unit/Component Testing, Module Testing, Integration Testing, System Testing, Acceptance Testing, Testing Approaches, Static Testing vs Dynamic Testing, Positive Testing vs Negative Testing, Top-down Testing vs Bottom-up Testing, Functional Testing vs Structural Testing, Mutation Testing, Confirmation Testing, Regression Testing, Types of Testing, Smoke Testing, Black Box Testing, White Box Testing, Interface Testing, Use Case Testing, Gorilla Testing, Alpha Testing, Beta Testing, Field Trail / Operational Testing, Performance Testing / Load Testing, Stress Testing, Accessibility Testing, Conformance Testing, Internationalization Testing, Security Testing, Maintenance Testing, Acceptance Testing, Documentation Testing

# **UNIT III: Static Testing Techniques**

10 Hrs

Static Testing, Advantages of Static Testing, Manual Reviews, Formal Review Process, Informal Reviews, Walkthroughs, Inspections, Making Reviews Successful, Checklists, Formal Code Reviews, Coding Guidelines, Programming style, C Coding Guidelines, Code Optimization, Java Coding Guidelines, Static Analysis using Tools, Tool for Readability Improvement / Indenting, Portability Testing Tool, Symbolic Execution

# **UNIT IV: Dynamic Testing and Test case design Techniques**

08 Hrs

Dynamic Testing, Review work products, Identify Test Objectives, Test Specifications and Test Design, Design Test Cases, Black Box Test Case Design Techniques, White Box Test Case Design Techniques, Experience-based Test Case Design Techniques, Case Study #1: Test Cases for an IVR System, Case Study #2: Test Case for Finger Print Recognition System, Document Test Cases, Execute Test Cases, Generate Incident Report / Anomaly Report, Log the Defects, Test Documentation Standards, Formal Methods of Testing

# **UNIT V: Managing the Testing Process**

08 Hrs

Management Commitment, Organization Structure, Testing Process management, Options for Managers, Testing Process Management Activities, Planning, Budgeting and Scheduling the Testing Phase, Test Plan, Alignment of the Process to the Project, Team Formation, Infrastructure, Testing Tools, Reviewing, Monitoring and Risk Management, Risk Management, Test Reports, Metrics, Software Reliability, Defect tracking, Classification of Defects, Configuration Management, Test Closure and Process Improvement, Software testing Maturity Model (SW-TMM), Information Security

# **UNIT VI: Software Testing Tools and Code of Ethics for Software Professionals** 06 Hrs

**Software Testing Tools:** Need for Tools, Classification of Tools, Functional / Regression Testing Tools, Performance / Load Testing Tools, Testing Process Management Tools,

Benefits of Tools, Risks Associated with the Tools, Does your Organization Need Tools?, Selecting Tools, Introducing the tools in the Testing Process

**Code of Ethics for Software Professionals:** Human Ethics, Professional Ethics, Ethical Issues in Software Engineering, Code of Ethics and Professional Practice, Software Engineering Code of Ethics and Professional Practice, Ethical issues: Right versus Wrong

# **Text Books**

1. ISTQB Certification Study Guide, Dr. K.V.K.K. Prasad, Wiley-Dreamtech Press, ISBN: 9788177227116

#### References

- 1. Software Testing Principles and Practices, Srinivasn desikan, Goplaswamy Ramesh, Pearson, ISBN: 9788177581218
- 2. Software Testing Tools, Dr. K.V.K.K. Prasad, Wiley- Dreamtech Press, ISBN 10: 8177225324

ISBN 13: 9788177225327

3. Software Testing Concepts and Tools, Nageshwara Rao Pusuluri, DreamTech, ISBN 10: 8177227122 ISBN 13: 9788177227123

#### Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

- 1. Each student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
- 2. Each student should conduct different activity and no repeating should occur

1	Design test cases on validation of time with a format HH: MM: SS
2	Prepare a report on different types of testing.
3	Prepare a presentation on testing tools available

#### **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

## **Course Assessment and Evaluation Scheme**

Method	What		То	When/Where	Max	Evidence	Course outcomes
			who	(Frequency in	Marks	collected	
			m	the course)			
Dir ect As	CIE	IA	Stu	Three IA tests (Average of	20	Blue books	1 to 6

				three tests will be computed)			
				Student activities	05	Report	1 to 6
				Total	25		
	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
nent	Student Feed			Middle of the course		Feedback forms	1,2,3 Delivery of course
Indirect Assessment	End of Co Survey	urse	Students	End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

<u>Note</u>: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	4
2	Understanding	76
3	Application	20

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks
- 3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

# FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and	Time	Semester/year	Course/Cour	rse Code	N	Max Marks		
Ex: I test/6 th week		VI SEM				20		
of sem 10-11	l AM	Year: 2017-18				_ •		
Name of Cour	se coord	linator:						
Units: CO's	:							
Question no		Question	Marks	CL	CO	PO		
1								

2			
3			
4			

Note: Internal choice may be given in each CO at the same cognitive level (CL).

# **MODEL QUESTION PAPER (CIE)**

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM	Software Testing	20
of sem 10-11 AM	Year: 2017-18	Course code:15CS61T	

Name of Course coordinator:

Units:1,2 Co: 1,2

**Note: Answer all questions** 

Questio n no	Question	CL	C 0	РО
1	Differentiate between debugging and bebugging. (5) OR Explain the challenges faced in software projects.	U	1	1,2
2	Explain the levels of testing and corresponding test plans with a neat diagram. (10)	A	2	1,2,
3	Explain the significance of testing (5) OR Explain Test Oracle	U	1	1,2

# **Format for Student Activity Assessment**

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	very limited information;	Collects some basic information; refer to the topic	information;	all refer to	_

Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4			
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3			
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3			
	TOTAL								

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

# MODEL QUESTION PAPER

# Diploma in Computer science & Engineering VI Semester

**Course Title: SOFTWARE TESTING** 

Time: 3 Hours Max Marks: 100

# **PART-A**

# Answer any SIX questions. Each carries 5 marks.

5X6=30 Marks

Code: **15CS61T** 

- 1. What is the importance of Gorilla Testing?
- 2. What are the responsibilities of test manager?
- 3. Explain the IEEE standard characteristics of an SRS document.
- 4. Describe the incident report.
- 5. List the various metrics used in testing phase.

- 6. Mention the benefits of testing tools.
- 7. What are the tasks handled by testing professionals?
- 8. Explain Field-trial testing.
- 9. Explain configuration management.

ъ.

#### **PART-B**

# Answer any <u>SEVEN</u> full questions each carries 10 marks.

10X7=70 Marks

- 1. Explain V. Model with neat diagram.
- 2. Differentiate between the following:
  - a. Positive and Negative Testing
  - b. Alpha and Beta Testing
- 3. Explain the formal review process.
- 4. List and briefly explain the steps in dynamic testing
- 5. Explain the following tools to review testing progress:
  - a. Gantt chart
  - b. Cost schedule milestone chart
- 6. Explain how tools are introduced in testing process in an organization with help of diagram
- 7. Explain the classifications of Non-functional requirements.
- 8.
- a. What criteria are used to declare that the testing is complete?
- b. What is the need for Regression testing?
- 9. Explain different checklist in Static Testing.
- 10. What are the various methods used in black box test case design technique?



# MODEL QUESTION BANK

# Diploma in Computer Science & Engineering VI Semester

**Course Title: Software Testing** 

С	Question	CL	Marks
O			
	What are the tasks handled by testing professionals?	R	
	Explain the significance of testing	U	
	Differentiate between debugging and bebugging.	U	
	Differentiate between static and dynamic testing.	U	05
	Discuss important metrics in testing phase.	U	
	What criteria are used to declare that the testing is complete?	R	

I	Explain the challenges faced in software projects.	U	
	Explain V. Model with neat diagram.	A	
	Explain the following:	U	
	a. Test ORACLE		10
	b. Defect seeding		
	Explain the advantages and disadvantages of in-house testing and	U	
	outsourcing		
	Explain the classifications of Non-functional requirements.	U	
	Explain Field-trial testing.	U	
	Compare white-box testing and black-box testing.	U	
	Explain the importance of Gorilla Testing.	U	
	Explain the need for Regression testing?	U	
	Compare structural testing at module level and structural testing at	A	5
	system level.		
II	Explain stages of testing.	A	
11	Describe the different levels of Testing.	U	
	Differentiate between the following:	<b>T</b> T	10
	a. Positive and Negative Testing	U	10
	b. Alpha and Beta Testing		
	Explain how performance and stress testing can be done on database	U	
	system?	<b>A</b>	
	Explain the levels of testing and corresponding test plans with a neat	A	
	diagram.	U	
	Explain the IEEE standard characteristics of an SRS document.  What factors contribute to the success of review meeting?	U	
	What are the advantages of static testing?	U	
	Discuss the code optimization guidelines during code review.	U	_
	Mention guidelines to be followed by Software Engineers while	U	5
III	programming in Java.	O	
	Explain different checklist in Static Testing.	U	
	Explain the formal review process.	U	
	Mention important C coding guidelines	U	10
	Describe how to document a test cases.	U	10
	Explain how Decision tables are used in black box testing.	U	
	Describe the incident report.	U	
	Write a note on specifications based on testing.	U	
	Explain how to design test case	U	_
			5
IV	List and briefly explain the steps in dynamic testing.	U	
	Explain boundary value analysis.	U	10
	What are the various methods used in black box test case design	A	10
	technique?	<b>A</b>	
	Explain configuration management.	A	_
	What factors need to be considered while buying COTS software?	U	5
	Explain Defect tracking.	U	
	What are the responsibilities of test manager?  Explain the content of test report generated after testing phase	U U	
	Explain the content of test report generated after testing phase.	U	
$\mathbf{V}$	List the various metrics used in testing phase.  Explain the following tools to review testing progress:	A	
	a. Gantt chart	A	
	a. Gaill Chail		

	b. Cost – schedule – milestone chart		10
	Explain with a diagram, the change impact analysis in configuration	A	
	management.		
	Mention the benefits of testing tools.	U	
	Explain the risk associated with tools	U	
	Write a note on professional ethics	U	
	Explain Performance/Load Testing Tools	U	5
VI	Discuss the code of Ethics framework.	U	3
V I	Explain why testing tools are required	U	
	Explain the different classes of Testing Tools.	U	
	Explain how tools are introduced in testing process in an organization	A	
	with help of diagram		10
	Mention the criteria for selecting the tools	U	
	Write a note on software engineering code of ethics.	U	



# Government of Karnataka Department of Technical Education Bengaluru

	Course Title: Network Security & Management							
attack	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS62T					
attacks "" " " " " " " " " " " " " " " " " "	Type of Course: Lectures, Self Study & Student Activity.	Credit :04	Core/ Elective: Core					
CIE- 25 Marks SEE- 100 Mark								

# **Prerequisites:**

Knowledge of Computer Networks.

# **Course Objectives**

To study the concepts of network security and various cryptographic algorithms, hardware and software security, IDS, wireless security, web security, security laws with Internet Governance & Email policy.

## **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours			
CO1	Discuss the basic concepts of network security and various cryptographic algorithms.	R,U,A	1,2,3,7,8,9,10	06			
CO2	Describe various hardware and software securities for information.	R,U,A	1,2,3,7,8,9,10	14			
CO3	Discuss how Intrusion Detection System helps to provide security along with various types of firewalls.	R,U,A	1,2,3,7,8,9,10	06			
CO4	Describe how wireless security provided to information.	R,U	1,2,3,7,8,9,10	06			
CO5	Discuss various concepts of web security.	R,U	1,2,3,7,8,9,10	12			
CO6	Discuss security and law along with Internet Governance and Email policy.	R,U	1,2,3,7,8,9,10	08			
	Total						

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

## **Course-PO Attainment Matrix**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Network Security & Management	3	3	3	-	-	-	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

#### **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hour		Questions to be set for SEE		Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Introduction and Cryptography	16	10	10	20	40	27.58
II	Hardware & Software Security	06	05	05	05	15	10.34
III	Intrusion Detection System and Firewalls	10	10	10	10	30	20.68
IV	Wireless Security	06	05	15	-	20	13.79
V	Web Security	08	05	20	-	25	17.24
VI	Security and Law, Internet Governance and Email Policy	06	05	10	-	15	13.79
	Total	52	40	70	35	145	100

#### **UNIT I: Introduction and Cryptography**

16 Hrs

**Introduction:** Computer security concepts, The OSI security architecture, Security attacks, Security services, Security mechanisms, A model for network security, Standards

**Cryptography:** Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Random and Pseudorandom Numbers, Stream Ciphers and RC4, Cipher Block Modes of Operation, Approaches to Message Authentication, Secure Hash Function, Message Authentication Codes, Public Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures.

#### **UNIT II: Hardware and Software Security**

06 Hrs

Hardware Security, Smart Cards, Biometrics, Virtual Private Networks, Types of VPN's, Trusted Operating Systems, Pretty Good Privacy (PGP), Security Protocols, Security Socket Layer, Transport Layer Security, IPSec, S/MIME(Secure/Multipurpose Internet Mail Extension)

#### **UNIT III: Intrusion Detection System and Firewalls**

10 Hrs

**IDS:** What is not an IDS?, Infrastructure of IDS, Classification of IDS, Host-based IDS, Network based IDS, Anomaly Vs Signature Detection, Normal Behaviour Patterns-Anomaly Detection, Misbehaviour Signatures-Signature Detection, Parameter Pattern Matching, Manage an IDS.

Malicious Software, Safeguards, Firewalls, Packet-Filtering Firewalls, State full Inspection Firewalls, Proxy firewalls, Guard, Personal Firewalls, Limitations of Firewalls.

# **UNIT IV: Wireless Security**

06 Hrs

Wireless Application Protocol, WAP Security, Authentication, Integrity, Confidentiality, Security Issues with Wireless Transport Layer Security (WTLS), Wireless LAN, WLAN Configuration, WLAN Technology consideration, Wireless LAN Security, Access Point Security, Work Station Security, Safeguarding Wireless LAN's.

# **UNIT V: Web Security**

08 Hrs

Client/Server Architecture, Security considerations and Threats, Web traffic security approaches, SSL/TLS for secure web services, The Twin concept of "SSL Connection" and "SSL Session", SSL session state, SSL Connection State, SSL Record Protocol, SSL Handshake Protocol, Secure Hypertext Transport Protocol(S-HTTP), Secure Electronic Transaction(SET), Business Requirements, SET Participants, SET Transaction Flow.

# UNIT VI: Security and Law, Internet Governance and Email Policy

06 Hrs

**Security and Law:** Regulations in India, Information Technology Act 2000, Cyber Crime and the IT Act 2000, Indian Contract Act, 1872, Indian Penal Code, Indian Copyright Act, Consumer Protection Act, 1986, Specific Relief Act, 1963, Government Initiatives, Future Trends-Law of Convergence.

**Internet Governance and Email Policy:** Internet Governance, Network Security Aspects in E-Governance, Security Monitoring Tools, Electronic Mail, What are the e-mail Threats that Organization's face?, Why do you need an E-mail Policy?, How do you create an E-mail Policy?, Publishing the E-mail Policy, University E-mail Policy, Electronic mail policy.

#### Text books

- 1. **Network Security Essentials: Applications and Standards**, 4/e, William Stallings, Pearson Education, ISBN: 9788131716649 (Chap 1)
- 2. **Network Security and Management**, 2<sup>nd</sup> edition, Brijendra Sing, PHI, ISBN: 9788120339101 (Chap: 2,3,4,5,6)

#### References

1. Network Security Bible, 2<sup>nd</sup> edition, Eric Cole, Wiley Publisher, ISBN: 9788126523313

#### Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

- 1. Each individual student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
- 2. Each student should conduct different activity and no repetition should occur.

1	Make a survey in any industry/ institute to understand the way security is provided
	for information. Videos can also be used to make the survey.
2	Quiz

# **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

## **Course Assessment and Evaluation Scheme**

Method	lethod What		To	When/Where	Max	Evidence	Course
				(Frequency in	Marks	collected	outcomes
			m	the course)			
	CIE	IA		Three IA tests			1 to 6
int				(Average of	20	Blue books	
me				three tests will	20	Diuc books	
ess			nts	be computed)			
Direct Assessment			Students	Student	05	Report	1 to 6
ot /			Stı	activities	0.5	Report	
ire				Total	25		
Ω	SE	End		End of the	100	Answer scripts	1 to 6
	Е	Exam		course	100	at BTE	
ıt				Middle of the		Feedback forms	1, 2, 3 Delivery
me				course		1 ccdoack forms	of course
essi	End o	of	ts	End of the			1 to 6
VSSV	Cour	se	Students	course			Effectiveness of
t A	Surve	ey	tuc			Questionnaires	Delivery of
Indirect Assessment			$\infty$			Questionnanes	instructions &
ndi Ipu							Assessment
I							Methods

<u>Note</u>: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

# Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	28
2	Understanding	48
3	Application	24

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks

3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks		
Ex: I test/6 th week of	VI SEM		20		
sem 10-11 AM	Year: 2017-18		20		
Name of Course coordinator:					

Name of Course coordinator:

Units: CO's:

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

# MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM	Network Security Management	20
of sem 10-11 AM	Year: 2017-18	Course code: 15CS62T	20

Name of Course coordinator:

Units:1,2 Co: 1,2

**Note:** Answer all questions

	- 10 000					
Question no	Question	CL	СО	РО		
1	List the differences between passive and active security threats.(5) OR List out the design objectives for HMAC.(5)	R	1	1,2		
2	Explain essential ingredients of a symmetric cipher with a neat diagram (5)  OR  Describe the advantages of counter mode. (5)	U	1	1,2		
3	Explain with a neat diagram Fiestel Cipher Structure and its design elements.(10)	A	1	1,2		

# **Format for Student Activity Assessment**

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

#### **MODEL OUESTION PAPER**

# Diploma in Computer Science & Engineering

#### VI- Semester

# Course Title: Network Security & Management

Time: 3 Hours Max Marks: 100

#### **PART-A**

## Answer any SIX questions. Each carries 5 marks.

5X6=30 Marks

Code: 15CS62T

- 1. List the differences between passive and active security threats.
- 2. Explain essential ingredients of a symmetric cipher with a neat diagram
- 3. List out the design objectives for HMAC.
- 4. Describe the advantages of counter mode.
- 5. Write a note on S/MIME.
- **6.** Describe the classification of IDS.
- 7. Mention the purpose of firewalls and its limitations.
- 8. Explain how to safeguard Wireless LANs.
- 9. List the services provided by SSL record protocol.
- 10. Write a short note on Indian Penal Code.

#### **PART-B**

# Answer any **SEVEN** full questions each carries 10 marks.

10X7=70 Marks

- 1. Explain in detail various security services.
- 2. Explain with a neat diagram Fiestel Cipher Structure and its design elements.
- 3. Explain the RSA public-key Encryption algorithm with an example.
- 4. Explain the various hardware securities (Smartcard and Biometrics).
- 5. Write a note on network based IDS.
- 6. Explain Packet Filtering Firewall and its importance.
- 7. Describe WAP protocol architecture.
- 8. Describe the SET components and their relationships.
- 9. Explain how do you create an email policy for your organization.



#### **MODEL QUESTION BANK**

# Diploma in Computer Science & Engineering

VI Semester

Course Title: Network Security & Management

CO Question CL Marks

	Explain OSI security architecture.	U	
	List the differences between passive and active security threats.	R	
	Define categories of passive and active passive attacks.	R	
	Define categories of security services.	R	
	Discuss categories of security mechanisms.	U	
	Write three key objectives of computer security.	U	
	Explain essential ingredients of a symmetric cipher with a neat	U	
	diagram.	U	
	Describe cryptography, cryptanalysis and various types of attacks on it.	U	05
	Explain CBC mode operations with neat diagram.	U	
	Explain CTR mode operation with neat diagram.	U	
	Explain message authentication code with a neat diagram	U	
	List the design objectives of HMAC.	U	
	Describe the advantages of counter mode.	U	
	Explain in detail various security services.	U	
I	Explain network security model with a neat diagram.	U	
	Explain with a neat diagram Feistel Cipher Structure and its design	A	
	elements.		
	Explain AES algorithm with a neat diagram.	A	
	Describe Data Encryption Standard with a neat diagram	A	
	Explain with a neat diagram Stream Cipher Structure and list its	A	
	important design considerations.		10
	Describe RC4 algorithm with a neat diagram.	A	10
	Explain the RSA public-key Encryption algorithm with an example.	A	
	Explain message authentication using one way hash function with a	A	
	neat diagram.		
	Write public key encryption structure with neat diagram.	A	
	Perform Encryption and Decryption using RSA algorithm for the		
	following values	A	
	P=3,q=11,e=7,M=5		
	In a RSA system the Public Key of a given user is e=31,n=3599 what is	A	
	the private key of this user?	D	
	Describe trusted operating system.	R	
	Explain hardware security. Give an example of common hardware	U	05
	problem and safeguards for hardware security.	U	03
	Explain Pretty Good Privacy (PGP).  Write a note on S/MIME.		
		U A	
II	Explain the various hardware securities (Smartcard and Biometrics).	U	
11	Describe VPN and its types with a neat diagram.	U	10
	Explain Security protocols SSL and TLS with a neat diagram.  Discuss IPSec with Authentication and ESP headers.	U	10
		U	
	Explain infrastructure of IDS with a neat diagram.  Describe the classification of IDS.	U	
	Define IDS? List the functions performed by Intrusion Detection	U	
	System.		
	Explain the need for firewalls.	U	05
	Describe malicious software and its types.	U	00
	List the types of firewalls.	R	
	Mention the limitations of firewalls.	R	
	Write a note on network based IDS.	U	
Ш	Write a note on host based IDS.	U	
	WITE a note on nost based IDS.	U	

	Write a note on Anomaly detection and signature detection.	U	
	Describe misbehaviour signatures – signature detection with its	U	10
	disadvantages.		
	Explain Packet Filtering Firewall and its importance.	A	
	Explain host-dependent programs and host-independent programs.	U	
	Explain Proxy Firewall with a neat diagram.	A	
	Mention advantages of wireless network.	R	
	Explain how to safeguard Wireless LANs.	U	5
IV	Write a short note on Wireless LAN security.	U	
	List various WLAN configurations.	$\frac{c}{R}$	
	Explain WAP protocol architecture.	U	
	Describe WAP security.	U	10
	Indicate the security of threats faced while using web.	U	
	List the parameters of SSL session state.	$\frac{c}{R}$	
	List the parameters of SSL Connection state.	R	
	List the services provided by SSL record protocol.	R	
	Write a note on S-HTTP.	U	
	Write a note on Secure Electronic Transaction (SET).	U,A	05
	Explain the client/server architecture of web.	U	
V	Describe web traffic security approaches.	U	
	Explain the importance of SSL/TLS for secure web services.	U	10
	Explain the parameters of SSL session and SSL connection states.	U	
	Describe SSL record protocol with a neat diagram	U	
	Explain SSL handshake protocol	U	
	Explain the flow of transaction in SET with a diagram.	U	
	Describe the SET components and their relationships.	U	
	Write a short note on Indian Penal Code.	U	
	Describe Information Technology act, 2000.	U	
	Explain the consumer protection act, 1986.	U	05
VI	Discuss Consumer Protection Act.	U	
	Discuss the constituents of consumer complaint and its stakeholders	U	
	Describe network security aspects in E-Governance.	U	
	List the email threats that an organization face.	R	
	Explain the purpose of email policy.	U	
	Discuss initiatives undertaken by government to upgrade security	U	
	standards.		10
	Describe Security monitoring tools.	U	
	Explain how an email system works with a diagram.	U	
	Explain how you create an email policy for your organization.	U	



# Government of Karnataka Department of Technical Education Bengaluru

DAS	Course Title: Inform	ation Storage and Manage	ement
SAN NAS NAS	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS63A
	Type of Course: Lectures, Self Study & Student Activity.	Credit :04	Core/ Elective: Elective
CIE- 25 Mark	S		SEE- 100 Marks

# **Prerequisites**

Basic knowledge about Networking.

# **Course Objectives**

To Understand the Concept of Information Storage, Data centre Environment, Data Protection, Fibre Channel SAN and Backup and Archive Techniques.

## **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours
CO1	To Understand the Concept of Information Storage and Data centre Environment.	R,U,A	1,2,8,9,10	12
CO2	To understand about Data Protection.	U,A	1,2,4,8,9,10	08
CO3	To Know and understand Intelligent Storage System.	R,U,A	1,2,4,8,9,10	08
CO4	To Understand Fibre Channel SAN	U,A	1,2,4,8,9,10	10
CO5	To Understand Network Attached Storage (NAS).	U,A	1,2,4,8,9,10	06
CO6	To Know the Backup and Archive Technologies.	U,A	1,2,4,8,9,10	08
			Total	52

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

#### **Course-PO Attainment Matrix**

Course		Programme Outcomes								
	1	2	3	4	5	6	7	8	9	10
Information Storage and Management	3	3		3				3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

#### **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Introduction to Information Storage and Data centre Environment.	12	10	15	05	30	22.75
II	Data Protection : RAID	08	-	10	10		15.17
III	Intelligent Storage System.	08	10	10	10		15.17
IV	Fibre Channel Storage Area Networks	10	-	20	20		19.32
V	Network Attached Storage	06	1	10	10		12.42
VI	Backup and Archive	08	1	10	10		15.17
	Total	52	20	80	70	145	100

#### **UNIT I : Introduction to Information Storage and Data centre Environment.** 12 Hrs

**Introduction to Information Storage**- Information Storage, Data, Types of Data, Big Data, Information, Storage, Evolution of Storage Architecture, Data Centre Infrastructure, Core Elements, Key characteristics for Data Centre Elements, Managing Data centre, Virtualization and Cloud Computing.

**Data Centre Environment** -Application, DBMS, Host, OS, Memory Virtualization, Device Driver, Volume Manager, File System, Compute Virtualization, Connectivity-Physical Components of Connectivity, Interface protocols- IDE/ATA and Serial ATA, SCSI and Serial SCSI, Fibre Channel, Internet Protocol, Storage, Disk Drive Components- Platter, Spindle, R/W Head, Actuator Arm Assembly, Drive Controller Board, Physical Disk Structure, Zoned Bit Recording, Logical Block Addressing, Disk Drive Performance- Disk Service Time, Seek Time, Rotational Latency, Data Transfer Rate; Host Access to Data, Direct-Attached Storage- Benefits and Limitations, Storage Design Based on Application,

Requirements and Disk Performance, Disk Native Command Queuing, Introduction to Flash Drives- Components and Architecture of Flash Drives, Features Of Enterprise Flash drives.

# **UNIT II: Data protection: RAID**

08 Hrs

**Data Protection: RAID** - Implementation of RAID, Software RAID, Hardware RAID, RAID Array Components, RAID Techniques- Striping, Mirroring, Parity; RAID Levels-RAID 0, RAID 1, Nested RAID, RAID 3, RAID 4, RAID 5, RAID 6, RAID Impact on Disk Performance, Application IOPS and RAID Configurations, RAID Comparison, Hot Spares.

# **UNIT III: Intelligent Storage System**

08 Hrs

**Intelligent Storage System -** Components of an Intelligent Storage System, Front End, Cache- Structure of Cache, Read Operation with Cache, Write Operation with Cache, Cache Implementation, Cache management, Cache Data Protection, Back End, Physical Disk, Storage Provisioning- Traditional Storage Provisioning, LUN Expansion: Meta LUN, Virtual Storage Provisioning, Comparison between Virtual and Traditional Storage Provisioning, LUN Masking, Types of Intelligent Storage Systems- High end Storage Systems, Mid Range Storage Systems.

# **UNIT IV: Fibre Channel Storage Area Networks**

10 Hrs

**Fibre Channel Storage Area Networks** - Fibre Channel: Overview, The SAN and Its Evolution, Components of FC-SAN, Node Ports, Cables and Connectors, Interconnect Devices, SAN Management Software, FC Connectivity, Point-to-Point, Fibre Channel Arbitrated Loop, Fibre Channel Switched Fabric, FC-SW Transmission, Switched Fabric Ports, Fibre Channel Architecture, Fibre Channel Protocol Stack- FC-4 Layer, FC-2 Layer, FC-1 Layer, FC-0 Layer, Fibre Channel Addressing, World Wide Names, FC Frame, Structure and Organization of FC Data, Flow Control- BB\_Credit, EE\_Credit,, Classes of Service, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies- Mesh Topology, Core-Edge Fabric, Benefits and Limitations of Core Edge Fabric.

# **UNIT V: Network Attached Storage**

06 Hrs

**Network-Attached Storage -** General-Purpose Servers vs. NAS Devices, Benefits of NAS, File Systems and Network File Sharing- Accessing a File System, Network File Sharing; Components of NAS, NAS I/O Operations ,NAS Implementations- Unified NAS, Unified NAS Connectivity, Gateway NAS, Gateway NAS Connectivity, Scale Out NAS, Scale Out NAS Connectivity, NAS File-Sharing Protocols- NFS, CIFS; Factors Affecting NAS Performance, File Level Virtualization.

## **UNIT VI: Backup and Archive**

08 Hrs

Backup Purpose- Disaster Recovery, Operational Backup, Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments- Server Based and Server less Backup, NDMP- Based Backup; Backup Targets- Backup to Tape, Physical Tape Library, Limitations of Tape; Backup to Disk, Backup to Virtual Tape, Data Deduplication for Backup- Data Deduplication Methods, Data Deduplication Implementation, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture- Use Case- Email and File Archiving.

#### Text books

1. Information Storage and Management, Second Edition, EMC Education Services, Wiley India Edition, ISBN: 9788126537501.

#### References

1. Storage Networks Explained, Ulf Tropan, Rainer Erkens, Wofgang Muller, Wiley, ISBN: 9788126518326

# Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

- 1. Each student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
- 2. Each student should conduct different activity and no repeating should occur

1	Prepare a presentation on different types of topologies
2	Survey on Network-Attached Storage
3	Survey on RAID Calculator

# **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

#### **Course Assessment and Evaluation Scheme**

Method	What		To who m	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE	IA	nts	Three IA tests (Average of three tests will be computed)	20	Blue books	1,2,3,4
ses			Students	Student activities	05	Report	1,2,3,4
ct As			Stı	Total	25		
Dire	SEE	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4
nent	Stude Feedb course	ack on		Middle of the course		Feedback forms	1 & 2 Delivery of course
Indirect Assessment	End o Cours Surve	se	Students	End of the course		Questionnaires	1,2,3,4 Effectiveness of Delivery of instructions & Assessment Methods

<u>Note</u>: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	14
2	Understanding	55
3	Application	48

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks
- 3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF IA TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM		20
of sem 10-11 AM	Year: 2017-18		20

Name of Course coordinator:

Units:\_\_ CO's:\_\_\_\_

Question no	Question	MARKS	CL	CO	PO
1				·	
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

# MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 <sup>th</sup> week of sem 10-11 AM	VI SEM	Information Storage and Management	20
	Year: 2017-18	Course code: 15CS63A	

Name of Course coordinator:

Units:1,2 CO- 1,2

**Note: Answer all questions** 

Questi on no	Question	CL	СО	РО
1	Define data. Explain the types of data with diagram.	R	CO1	1,2,8,9, 10
2	Differentiate between server-centric and information-centric storage architecture.	U	CO1	
3	Explain the different RAID techniques with diagrams. <b>OR</b> Briefly explain the different RAID levels with diagrams.	A	CO2	1,2,4,8, 9,10

# Format for Student Activity Assessment

D	IMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
C	Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
	ulfill team's lles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
S	hares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time	3

					frame	
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

#### **MODEL QUESTION PAPER**

# Diploma in Computer Science & Engineering

#### VI- Semester

# Course Title: Information Storage & Management

Time: 3 Hours Max Marks: 100

#### **PART-A**

# Answer any SIX questions. Each carries 5 marks.

5X6=30 Marks

Code: 15CS63A

- 1. Mention the key challenges in managing information.
- 2 Write a note on Virtualization
- 3. Explain the two different methods to implement RAID.
- **4.** Write a note on hot spares.
- 5. Write a note on Storage provisioning
- **6.** What are the two techniques to protect the data in a Cache
- **7.** Explain SAN and its Evolution.
- **8.** Write a note on NFS
- 9. Explain SAN-Based Backup Topology.

#### **PART-B**

# Answer any **SEVEN** full questions each carries 10 marks.

10X7=70 Marks

- 1. Discuss various Interface Protocols.
- 2. Explain with Diagram RAID 5 and RAID Levels
- **3.** What is Intelligent Storage Systems (ISS)? Explain the different components of an ISS with a neat diagram.
- **4.** Explain the read and write operations with Cache.
- **5.** What is Fibre Channel? Explain in brief the FC SAN implementation.
- **6.** Discuss the types of Zoning.
- 7. How to implement NAS? Explain.
- **8.** Explain File-Level Virtualization.
- **9.** Discuss Backup and Restore Operations.
- 10. Discuss Backup in NAS Environments.



# MODEL QUESTION BANK

# Diploma in Computer Science & Engineering VI Semester

# **Course Title: Information Storage & Management**

CO	Question	CL	Marks
	Define data. Explain the types of data with diagram.	R	
	Differentiate between server-centric and information-centric storage architecture.	U	
	Discuss the five core elements of a data centre.	U	
	Mention the key challenges in managing information.	R	
	Write a note on Virtualization.	U	
	Explain key characteristics of a Data Centre.	R	
	Write a note on Volume manager	R	
	List and Explain the physical components of connectivity.	U	05
_	Define DAS. Explain different types of DAS with diagram.	U	
Ι	List the benefits and limitation of DAS.	R	
	Write a note on zoned bit recording.	U	
	Write a note on Flash drives.	U	
	Write a note on physical disk structure.	R	
	List and Explain the features of Enterprise Flash Drives.	A	
	Explain the Logical Block Addressing	U	
	Discuss various disk drive interfaces.	A	
	Discuss various Interface Protocols.	A	
	Discuss briefly various Disk Drive Components.	U	10
	Explain the components of Disk drive Performance.	U	
	Explain RAID Array Components.	U	
	Discuss Mirroring RAID Technique	U	
	Explain the two different methods to implement RAID.	U	05
	Explain Striping technique in RAID.	U	
II	Write a note on hot spares.	U	
	Explain with Diagram RAID 5 and RAID Levels	A	
	Discuss Impact on Disk performance.	U	
	Explain Nested RAID.	U	10
	Explain the different RAID techniques with diagrams.	A	
	Briefly explain the different RAID levels with diagrams.	A	
	What is meant by Read-hit and read-miss? Explain	U	
	Write a note on Cache management.	U	
Ш	Discuss the structure of Cache.	U	05
	Write a note on Storage provisioning	A	
	Explain the types of flushing	A	
	Compare Virtual and traditional storage provisioning.	A	

	What are the two techniques to protect the data in a Cache.	U		
	Explain the types of Intelligent Storage Systems with a neat diagram.	A		
	What is Intelligent Storage Systems (ISS)? Explain the different	A		
	components of an ISS with a neat diagram.		10	
	Explain the read and write operations with Cache.	U	10	
	Discuss the types of MetaLUN.	A		
L	Explain SAN and its Evolution.	U		
L	Explain different ports used in Switched Fabrics with a neat diagram.	U		
L	Explain different Fabric Services.	U		
L	Write a note on Zoning.	A		
	Explain Fibre Channel Protocol Stack.	A		
	Explain FC Frame with a neat diagram.	U	0.=	
	Explain Fibre Channel Switched Fabric.	A	05	
	Explain Mesh Topology.	A		
	List the benefits and limitations of Core-Edge fabric.	U		
IV	Discuss Core-Edge Fabric.	A		
	Write a note on VSAN	A		
	Write a note on Virtualization in SAN.	U		
	Discuss switched fabric login types.	U		
	What is Fibre Channel? Explain in brief the FC SAN implementation.	U		
	Discuss the components of FC SAN	U		
	Discuss the types of Zoning.	A	10	
	xplain the three basic FC Connectivity.		10	
	Discuss FC SAN Topologies.	A		
	Explain the different components of FC SAN.	U		
	What is Network-Attached Storage (NSS)? Explain different benefits of NAS.	U		
	Explain the components of NAS with a neat diagram.	U		
	Explain the NAS I/O operation with a neat diagram.	A	0.=	
	Explain different file-sharing protocols in NAS.	U	05	
$\mathbf{v}$	Write a note on NFS.	A		
	Explain the benefits of NAS.	U		
	Write a note on Network File Sharing.	U		
	How to implement NAS? Explain.	U		
	Explain File-Level Virtualization.	A	10	
	Explain different factors affecting NAS performance.	A		
]	Discuss the purpose of backup.	U		
	Explain Backup Architecture.	U		
VI 🗍	Explain Direct-attached Backup Topology.	A		
	Write a note on Virtual Tape Library.	A	05	
	Explain LAN-Based backup Topology.	A		
	1 1 01			
	Explain SAN-Based Backup Topology.	A		

Explain the backup methods.	U	
Explain Data Archive Types.	U	
Explain Data Deduplication methods.	U	
Discuss Data Deduplication Implementations.	A	
Discuss Backup and Restore Operations.	A	
Explain Backup in Virtualized Environments	A	10
Discuss Backup in NAS Environments.	A	
Explain backup topologies.	U	



# Government of Karnataka **Department of Technical Education**

# Bengaluru

CLOUD	Course Title:	CLOUD COMPUTING	
	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS63B
	Type of Course: Lectures, Self Study & Student Activity.	Credit :04	Core/ Elective: Elective
CIE- 25 Marks			SEE- 100 Marks

# **Prerequisites**

Knowledge of Computer Networks

# **Course Objectives**

To understand cloud computing, the different models and architectures and study about the services offered by cloud, software plus services, understand about virtualization of cloud and various examples of cloud computing.

# **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours
CO1	Understand need of cloud computing, cloud essentials, benefits, challenges, limitations, usage and applications, business models	R,U,A	1,2,3,4,6,7,8,9,10	07
CO2	Discuss the meaning of cloud computing, understand cloud models, cloud application architecture, cloud computing architecture and various infrastructure models	U,A	1,2,3,4,6,7,8,9,10	10
CO3	Understand the various cloud services	U,A	1,2,3,4,6,7,8,9,10	10
CO4	Determine the various software plus services possible for the users to place the very sensitive data housed on-site	U,A	1,2,3,4,6,7,8,9,10	08
CO5	Get knowledge of virtualization to know about virtual machines, virtual cluster, types of virtualization	R,U,A	1,2,3,4,6,7,8,9,10	10
CO6	Illustrate the different approaches to cloud computing, examples like Aneka, Autonomic computing engine	U,A	1,2,3,4,6,7,8,9,10	07
			Total	52

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

#### **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
				U	A	A	
I	Introduction to cloud computing	06	05	10	05	20	13.79
II	Cloud models	10	-	15	10	25	19.31
III	Cloud services	10		15	10	25	19.31
IV	Software plus services	10	-	15	10	25	15.17
V	Virtualization for cloud	08	-	15	10	25	19.31
VI	Examples of cloud computing	08	-	10	10	25	13.10
	Total	52	05	82	58	145	100

# **Course-PO Attainment Matrix**

Course				Prog	ramm	e Out	comes			
	1	2	3	4	5	6	7	8	9	10
Cloud Computing	3	3	3	3	-	-	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## **UNIT I: Introduction to Cloud computing**

06 Hrs

Evolution of cloud, Essentials, Cloud Computing definition, Benefits and Challenges, Limitations, Usage and Applications, Business Models around Cloud Computing, Characteristics, Cloud Adoption

#### **UNIT II: Cloud models**

10 Hrs

Introduction, Collaboration to cloud, Cloud Models, Cloud Applications and Architecture, Cloud Computing Architecture, Cloud Infrastructure Models, Cloud Infrastructure Self Service, Scaling a cloud infrastructure

#### **UNIT III: Cloud services**

10 Hrs

Introduction to Services, Storage as a Service, Database as a Service, Information as Service, Process as a Service, Application as a Service, Management/Governance as Service, Platform as a Service, Security as a Service, Testing as Service, Integration as Service, Infrastructure as Service

# **UNIT IV: Software plus Services**

10 Hrs

Introduction, Mobile Device Integration, Providers, Microsoft Online Intuit Quick base, Cast Iron Cloud, Bungee Connect, Introduction to Map Reduce, Goggle File System, Hadoop framework, Hadoop Distributed File System

## **UNIT V: Virtualization for cloud**

08 Hrs

Introduction, Pros and Cons of Virtualization, Virtualization Architecture, Virtualization Machine, Virtualization in Clusters/Grid Context, Virtual Network, Types of Virtualization, Virtual Machine Monitor, Virtual Desktop Infrastructure

#### **UNIT VI: Examples of Cloud Computing**

08 Hrs

Introduction, Types of clouds, Cloud Comparing Approaches, Aneka Integration of private and public cloud, Aneka Cloud Platform, Introduction,, Resource Provisioning Service, Aneka Hybrid Cloud Implementation, Comet Cloud Architecture, Autonomic Behaviour, Comet Cloud, Overview of Comet Cloud Based Applications, Implementation

#### **Text books**

Cloud Computing, M.N RAO, PHI Learning Private Limited, ISBN: 978-81-203-5073-1

#### References

- 1. Cloud Computing A practical approach for learning and implementation Pearson A.Srinivasan J.Suresh
- 2. Cloud Computing A hands-on-Approach, universities Press Arshdeep Bahga and Vijay Madisetti
- 3. Cloud Computing Concepts, Technology and Architecture Pearson Thomas Erl

#### **Web Sources**

- 1. http://www.tutorialspoint.com/cloud computing/cloud computing tutorial.pdf
- 2. http://www.thbs.com/downloads/Cloud-Computing-Overview.pdf
- 3. https://www.priv.gc.ca/resource/fs-fi/02 05 d 51 cc e.pdf
- 4. Lewis, Grace. Basics About Cloud Computing. http://www.sei.cmu.edu/library/abstracts/whitepapers/cloudcomputingbasics.cfm (2010).
- 5. http://www.intel.in/content/dam/www/public/us/en/documents/guides/cloud-computing-virtualization-building-private-iaas-guide.pdf
- 6. http://manjrasoft.com/aneka architecture.html

# Suggested list of student activities

Note: The following activities or similar activities for assessing CIE (IA) for 5 marks (Any one) Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

# **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

#### **Course Assessment and Evaluation Scheme**

Method	What		To who m	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
ent	CIE IA		ts	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
Direct Assessment			Students	Student activities	05	Activity Reports	1 to 6
ct As			Total	25			
Dire	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
nent	Student Feedback on course			Middle of the course		Feedback forms	1 to 3 Delivery of course
Indirect Assessment	End o Cours Surve	se	Students	End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

# Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	4
2	Understanding	57
3	Application	39

# Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks
- 3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF IA TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM		20
of sem 10-11 AM	Year: 2017-18		20

Name of Course coordinator:

Units:\_\_ CO's:\_\_\_\_

Question no	Question	MARKS	CL	CO	PO
1			·	·	
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

# **MODEL QUESTION PAPER (CIE)**

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM	Cloud computing	20
of sem 10-11 AM	Year: 2017-18	Course code: 15CS63B	

Name of Course coordinator:

Units:1,2 Co: 1,2

**Note:** Answer all questions

Question no	Question	CL	СО	РО
1	Explain the need of cloud computing (5)	U	1	1,2
2	Illustrate the development of cloud to an organization. (5)	A	1	1,2
3	Explain and illustrate cloud computing (5)	U	2	1,2
4	Explain in detail about cloud application architecture (5)	U	2	1,2

Note: Internal choice may be given in each CO at the same cognitive level (CL).

# **Format for Student Activity Assessment**

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

## **MODEL QUESTION PAPER**

## Diploma in Computer Science & Engineering

## VI- Semester

**Course Title: Cloud Computing** 

Time: 3 Hours Max Marks: 100

#### **PART-A**

## Answer any SIX questions. Each carries 5 marks.

5X6=30 Marks

Code: **15CS63B** 

- 1. Explain the business models around the cloud
- 2. Explain the characteristics of cloud computing
- 3. Compare public cloud verses private cloud
- 4. Explain in detail about cloud application architecture
- 5. Define Cloud Service. List the main features of cloud services.
- 6. List the examples of SaaS, PaaS and IaaS.
- 7. Discuss about Software plus services in brief.
- 8. Describe Google Map Reduce.
- 9. Describe the types of server virtualization

## **PART-B**

## Answer any SEVEN full questions each carries 10 marks.

10X7=70 Marks

- 1. List and explain the usage scenarios and applications of cloud.
- 2. Write advantages and disadvantages of cloud computing
- 3. Explain the two main sections of cloud computing architecture
- 4. Explain briefly the cloud infrastructure self service.
- 5. Discuss about the security aspects of cloud computing
- 6. Summarize the different forms of testing related to cloud.
- 7. Write a short note on GFS and HDFS.
- 8. Explain the Hadoop architecture with the help of a diagram.
- 9. Compare server virtualization and storage virtualization and network virtualization
- 10. Explain Aneka hybrid cloud implementation



## MODEL QUESTION BANK

## Diploma in Computer Science & Engineering VI Semester

**Course Title: Cloud computing** 

CO	Question	CL	Marks		
	Explain the evolution of cloud computing	R			
	Why cloud computing?	U			
	Describe the essentials of cloud computing	U	05		
	Illustrate the development of cloud to an organization	A			
	Explain the benefits and strategies of cloud	U			
	Discuss the limitations of cloud computing	U			
I	Explain the business models around the cloud	U/A			
	Explain the characteristics of cloud computing	A			
	Explain the business and it perspectives of cloud	U			
	Describe in detail cloud computing	U			
	List and explain the usage scenarios and applications of cloud	A	10		
	Write advantages and disadvantages of cloud computing	U			
	Illustrate the cloud adoption	U			
	Explain and illustrate cloud computing	U			
	Discuss about various cloud models	U			
	Write the advantages of cloud computing architecture	U	0.5		
	Discuss the value of cloud computing	U	05		
	Explain cloud infrastructure models	U			
	Compare public cloud verses private cloud	U			
II	Explain in detail about cloud application architecture	U			
	Discuss about various cloud models	U			
	Explain the two main sections of cloud computing architecture	A			
	Describe cloud infrastructure. Explain about each component clearly	A	10		
	Discuss how do you scale a cloud infrastructure	A			
	Explain regarding different categories of scalability	U			
	Explain briefly the cloud infrastructure self service.	U			
	Define Cloud Service. List the main features of cloud services.	R			
	List the advantages of cloud services.	U			
	Describe various modes of software as service.	U			
	Identify the applications of software as service.	A	05		
	Describe briefly the integration platform as a service.	U			
	List the examples of SaaS, PaaS and IaaS.	A			
III	Describe the importance of platform as a service.	U			
	Describe the three main services provided by cloud computing.	A			
	Explain management as a service.	A			
	Compare the advantages of SaaS, PaaS, IaaS.	U	10		
	Explain database as a service with a neat diagram.	U	10		
	Summarize the different forms of testing related to cloud.	A			
	Discuss about the security aspects of cloud computing	U			
	Discuss about Software plus services in brief.	U			
IV	Explain mobile device integration.	R	05		
IV	List the services provided by Microsoft.	U	05		
	Explain about cast iron cloud.	U			

	Explain Bungee Connect.	U	
	Describe Google Map Reduce.	U	
	Differentiate between google map reduce and hadoop map reduce.	U	
	List the main functions in map reduce. Explain with diagram.	U	
	Write a short note on GFS and HDFS.	U	10
	Explain the Hadoop architecture with the help of a diagram.	A	10
	Describe the Hadoop Map Reduce framework.	U	
	Define virtualization. Illustrate the pros and cons of virtualization,	R	
	Explain virtual machines.	U	
	Define virtualization in cluster.	U	
	Explain Virtual machine monitor.	U	05
	Describe the properties of virtual machine.	U	
	Distinguish between desktop virtualization and desktop infrastructure	U	
<b>T</b> . 7	virtualization.  Describe briefly the types of virtual machines.	U	
V	Describe the types of server virtualization	A	
	Identify the need of storage virtualization. list the advantages and	A	
	disadvantages		
	Define virtual desktop infrastructure. Discuss its advantages and	U	10
	disadvantages.		
	List the different types of server virtualization. Explain them briefly.	U	
	Compare server virtualization and storage virtualization and network	U	
	virtualization.		
	List and explain various types of clouds.	U	
	Compare and contrast different types of cloud approaches.	U	
	Explain Aneka Integration of private and public cloud.	U	
	Demonstrate Aneka cloud platform.	U	
	Explain the overview of comet cloud based applications.	A	05
	Explain the fundamental cloud functions.	A	
	Demonstrate the overlay joins overheads.	U	
VI	Compare and contrast the execution time and utilized funds with or	A	
	without a scheduling agent	1.	
	Explain Aneka hybrid cloud implementation	A	
	Draw and explain comet cloud architecture.	A	
	Explain Autonomic cloud bursting and autonomic cloud bridging.	A	10
	Explain Autonomic cloud behaviours	A	
	Traniani nie autonomie cioud denaviours		



# Government of Karnataka Department of Technical Education Bengaluru

	Course Title: MOBILE COMPUTING						
ACUSTO No Barriello ave	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS63C				
	Type of Course: Lectures, Self Study & Student Activity	Credit :04	Core/ Elective Elective				
CIE- 25 Mark	XS	S	SEE- 100 Marks				

## **Prerequisites**

Knowledge of basic concepts of computer networks.

## **Course Objectives**

- 1. To study the basics of wireless, cellular technology and the working of Mobile IP, ad hoc network, features of mobile operating systems.
- 2. To know J2ME, SDK, android that helps the mobile application development.
- 3. To understand the use of M-Commerce application.

## **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours
CO1	Recognize and explain wireless and Mobile Communication system and Bluetooth technology.	R,U	1,2,4,9,10	06
CO2	Describe and Differentiate Mobile Computing vs Wireless Networking, GSM,GPRS,UMTS and SDR	U,A	1,2,3,4,9,10	16
CO3	Explain the working of Mobile IP and Mobile Ad Hoc Networks, Vehicular Ad Hoc Network.	U,A	2,3,4,8,9,10	12
CO4	Describe the constraints and survey of commercial mobile Operating Systems.	U	2,10	06
CO5	Discuss and explain Mobile Application Development.	U,A	2,3,4,9,10	08
CO6	Explain different Mobile Commerce applications.	A	2,7,9,10	04
			Total	52

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

## **Course-PO Attainment Matrix**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
MOBILE COMPUTING	3	3	2	2	-	-	1	1	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hou r	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Basics of Communication Technologies	06	05	10	05	20	13.79
II	Introduction to Mobile Computing and Wireless Networking	16	05	25	10	40	27.60
III	Mobile IP and Mobile Ad Hoc Networks	12	05	25	05	35	24.14
IV	Operating Systems for Mobile Computing	06	05	10	05	20	13.79
V	Mobile Application Development and Protocols	08	-	10	10	20	13.79
VI	Mobile Commerce	04	-	05	05	10	6.89
	Total	52	20	85	40	145	100

## **UNIT I: Basics of Communication Technologies**

06 Hrs

Mobile handsets, Wireless Communications and Server Applications, Cell phone System, Types of Telecommunication Networks, Components of wireless communication system, Architecture of mobile telecommunication system, wireless networking standards,

Wireless LANs, Wireless LAN Architecture, Applications of WLANs, Advantages of WLANs over wired LANs, Bluetooth Technology, Protocol stack of Bluetooth.

## **UNIT II: Introduction to Mobile Computing and Wireless Networking**

16 Hrs

Define Mobile Computing, Mobile Computing vs. Wireless Networking, Mobile Computing Application, Characteristics of Mobile Computing, Structure of Mobile Computing Application, Cellular Mobile Communication, Generation of Cellular Communication

Technologies, Global System for Mobile communications(GSM),GSM Services, System Architecture of GSM,GSM security, General Packet Radio Service(GPRS),GPRS Services, GPRS ArchitectureUniversal Mobile Telecommunication System (UMTS),UMTS Network Architecture, SDR, Mobile phone and human body.

## **UNIT III: Mobile IP and Mobile Ad Hoc Networks(MANET)**

12 Hrs

Mobile IP, Packet Delivery, Desirable features of Mobile IP, Key mechanism used in Mobile IP, Route Optimization, Dynamic Host Configuration Protocol(DHCP), significance of DHCP. A Few Basics concepts-How is an Ad Hoc Network setup without the infrastructure Support?, Why is Routing in a MANET a Complex Task?, Characteristics of Mobile Ad Hoc Networks(MANETs)-MANET Operational Constraints, Applications of MANETs, MANET Design issues, Routing ,Vehicular Ad Hoc Networks(VANETs), MANET vs VANET, Security issues in a MANET.

## **UNIT IV: Operating Systems for Mobile Computing**

**06 Hrs** 

A Few Basic Concepts, Special Constraints and Requirements of Mobile OS, A Survey of Commercial Mobile Operating Systems, Windows Mobile, Palm OS, Symbian OS, iOS, Android, Blackberry OS, A Comparative study of Mobile OS, OS for sensor Network.

## **UNIT V: Mobile Application Development and Protocols**

08 Hrs

Mobile Devices as Web Clients ,HDML(Handheld Markup Language) ,WAP, J2ME - J2ME Configuration, Android Application Development - Software Development Kit(SDK), Features of SDK, Android Application Components, Android Software stack Structure, Advantages of Android.

## **UNIT VI: Mobile Commerce**

04 Hrs

Application of M-Commerce, Business to Consumer(B2C) Applications, Business to Business (B2B) Applications,. Structure of M-Commerce, Pros and Cons of M-Commerce, Mobile Payment System, Mobile Payment Schemes, Desirable properties of a Mobile Payment system, Mobile Payment solutions, Process of Mobile Payment, Security Issues.

#### Text books

1. Fundamentals of Mobile Computing, Prasant Kumar Pattanaik, Rajib Mall, Second Edition, PHI, ISBN: 978-81-203-5181-3

## References

1. Mobile Computing, ASOKE TALUKDER HASAN AHMED ROOPA R YAVAGAL,Second Edition.Mc GrawHill

## Suggested student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

- 1. Each group should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and programme coordinator.
- 2. Each group should conduct different activity and no repeating should occur

1	Give a presentation on call setup between two mobile phones.
2	Prepare a report and demonstrate Bluetooth technology.
3	Prepare a report on the working of GSM and GPRS
4	List and prepare a report any one application used by MANET.
5	With a real world example prepare a report on different mobile payment solutions
	for different payment schemes.
6	Prepare a report on procedure for working of software in shopping mall.

## **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

## **Course Assessment and Evaluation Scheme**

Method	What		To who m	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
ment	CIE	IA	nts	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
essi			Students	Student activities	05	Report	1 to 6
Direct Assessment			Stı	Total	25		
Direc	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
ent	Student Feedl course	back on		Middle of the course		Feedback forms	1,2,3 Delivery of course
Indirect Assessment	End of Course Survey	e	Students	End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

<u>Note</u>: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	45
3	Application	45

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks
- 3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF IA TEST OUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM		20
of sem 10-11 AM	Year: 2017-18		

Name of Course coordinator:

Units:\_\_ CO's:\_\_\_\_

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

## MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 <sup>th</sup> week	VI SEM	MOBILE COMPUTING	20
of sem 10-11 AM	Year: 2016-17	Course code:15CS63C	

Name of Course coordinator:

Units:1,2 Co: 1,2

**Note:** Answer all questions

Questio n no	Question	CL	<b>C O</b>	РО
1	List the types of telecommunication networks and Distinguish between data and voice networks. (5)	R	1	1,2
2	Define mobile computing. Mention at least three applications of mobile computing (5)	R	2	1,2
3	Interpret the necessary of using standard in networking (5)	U	1	1,2
4	List the advantages of GPRS. (5)	U	2	1,2

Note: Internal Choice may be given in each CO at the same cognitive level (CL).

## Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

## **MODEL QUESTION PAPER**

## **Diploma in Computer Science & Engineering**

## VI- Semester

**Course Title:** Mobile Computing

Time: 3 Hours Max Marks: 100

#### PART-A

## Answer any SIX questions. Each carries 5 marks.

5X6=30 Marks

Code: 15CS63C

- 1. Explain the advantages of wireless LANs.
- 2. Define mobile computing. Mention at least three applications of mobile computing.
- 3. Define MANET( Mobile Ad Hoc Network). Explain the schematic model of a MANET.
- 4. Comparison of features of various mobile Oss
- 5. Explain the components of Android application.
- 6. Explain different M-payment schemes (mechanisms) that exist at present.
- 7. Explain the characteristics of mobile computing.
- 8. Explain the desirable features of Mobile IP.
- 9. Define microkernel OS. Give some reasons to prefer microkernel for developing mobile OS.

## **PART-B**

## Answer any **SEVEN** full questions each carries 10 marks.

10X7=70 Marks

- 1. Discuss the architecture of Mobile telecommunication system using schematic diagram.
- 2. Explain the various services provided by GSM.
- 3. Describe the Key mechanism used in Mobile IP.
- 4. Explain the operation of mobile IP with a help of a suitable schematic diagram(Sequence of steps involved in packet delivery to and from a mobile node)
- 5. Discuss architecture GPRS using schematic diagram.
- 6. Explain the special constraints of mobile OS.
- 7. Explain J2ME configuration.
- 8. Discuss the Pros and Cons of M-Commerce.
- 9. Explain WAP Protocol stack.
- 10. Explain the important design constraints(issues) on a MANET.

## MODEL QUESTION BANK

## **Diploma in Computer Science & Engineering**

## VI Semester

**Course Title: MOBILE COMPUTING** 

CO	Question	CL	Marks
	List the types of telecommunication networks and Distinguish between	R	
	data and voice networks.		
	List the components of wireless communication system and explain any	R	
	two of them	U	
	Interpret the necessary of using standard in networking.	U	
	List the IEEE 802.11 standard used in wireless LAN.	R	
	Identify and Explain the components of WLAN	U	
I	Summarize the application of Wireless LANs.	U	05
1	Explain the advantages of wireless LANs.	U	
	Write a note on Bluetooth	U	
	Define piconet and scatternet.	R	
	Explain the function cellular communication system.	U	
	Compare Data network and voice network and their relative advantages	A	
	and services		
	Identify and overcome the main difficulties if digitalized voice signals	U	
	are to be transmitted over a data network.	A	10
	Explain the components of wireless communication system.	U	
	Discuss the architecture of Mobile telecommunication system using	U	
	schematic diagram.		
	Explain Architecture of Wireless LAN.(Infrastructure based IEEE 802.11 network).	U	
	Explain application and advantages of WLAN.	U	-
	With a neat diagram describe the Bluetooth protocol stack.	A	-
II	Define mobile computing. Mention at least three applications of mobile	R,	
	computing	A	
	Explain the characteristics of mobile computing.	R	05
	Explain the functions of each tier structure of mobile computing.	U	
	Explain cellular mobile communication.	U	
	Compare 2G and 3G cellular communication technology.	U	
	Summarize the characteristics of cellular technologies.	U	
	Summarize the transport technologies used various generations of cellular networks.	U	
	Explain GSM Security.	U	
	Describe the function of HLR and VLR in call routing and roaming.	U	

	Define GPRS and explain GPRS Services.	R						
	List the advantages of GPRS.	R						
	List the limitations of GPRS.	R						
	Define UMTS. Discuss the dissimilarities between UMTS and GSM.	U						
	Explain UMTS Network architecture.							
	List out the problems faced by human by using mobile phones.							
	With a neat diagram explain the structure of mobile computing application.	A						
	Explain the various services provided by GSM.	U	10					
	With a neat diagram explain the functional architecture of GSM system.	U						
	Discuss architecture GPRS using schematic diagram.	U						
	Discuss the features and advantages of SDR.	U						
	Define the following mobile IP terms  a. Mobile Node  b. Foreign Agent  c. Foreign Network  d. Home Network  e. Home agent	R						
	Write short notes on the following:  a. Correspondent node  b. Care-of-Address  c. Agent Discovery  d. Tunnelling and Encapsulation	R						
Ш	Define tunnelling process .	R						
111	Explain agent advertisement.	U						
	Explain agent solicitation.	U						
	Discuss the process of packet delivery by suitable example.	U						
	Explain the desirable features of Mobile IP.	U						
	Explain the Mobile IP mechanism of Discovering the COA.	U						
	Explain the Mobile IP mechanism of Registering the COA.	U	05					
	Explain the Mobile IP mechanism of Tunnelling the COA.	U						
	Give a brief account of route optimization in mobile IP.	U						
	Define binding. Explain the messages transmitted in Optimized mobile IP.	U						
	Explain DHCP.	U						
	Explain three important mechanisms for IP address allocation by DHCP.	U						
	State some applications of DHCP.	U						
	Define MANET(Mobile Ad Hoc Network). Explain the schematic model of a MANET.	U						
	Compare the MANET routing strategies with the routing strategies of traditional networks.	U						

	List the characteristics of MANETs.	R	
	List the MANET Operational constraints.	R	
	Describe the applications of MANETs.	A	
	Define routing. List out the problems arises in MANET by routing.	U	
	Explain VANET and few important applications of it.	A	
	Compare MANET and VANET.	U	
	Write a short note on characteristics of secure MANET.	U	
	Explain the characteristics of MANET that can be exploited to cause security vulnerabilities.	U	
	Explain the operation of mobile IP with a help of a suitable schematic diagram(Sequence of steps involved in packet delivery to and from a mobile node)	U	10
	Explain the agent discovery methods.	U	
	Describe the Key mechanism used in Mobile IP.	U	
	Explain the characteristics of MANETs.	U	
	Explain the important design constraints(issues)on a MANET.	U	
	Explain security issues in a MANET.	U	
	Explain the special features that an operating system for a mobile device needs to support compared to the features provided by a traditional	U	
	operating system.	A	
	Define microkernel OS.Give some reasons to prefer microkernel for developing mobile OS.	U A	05
	Write a short on the following commercial OS	U	
	a. Windows Mobile		
IV	b. Palm OS		
	c. Symbian OS		
	d. IOS		
	e. Android f. Kernel		
	g. Blackberry OS		
	Comparison of features of various mobile OS	U	
	Explain the important ways in which the operating system for a sensor	U	
	network is different from a traditional operating system.	T.T.	
	List and explain the special constraints of mobile OS	U	10
	List and explain the special service requirements of mobile OS.	U	10
	Explain the problems arise by mobile devices used as a web client.	U	
	Explain HDML.	U	
	Define WAP. Explain the traditional web access mechanism.	U	0.7
	Explain the working of WAP based web access.	U	05
	Define J2ME.List the applications of J2ME.	A	
<b>X</b> 7	Difference between J2ME device and conventional computers.	U	
V	Define Android and their applications.	A	

	Define Android SDK.Compare Java byte code with Android byte code	A						
	Explain the features of SDK.	U						
	Explain the components of Android application.							
	List out the Android APIs.							
	Summarize the advantages of Android							
	Explain WAP Protocol stack.	U						
	Explain J2ME configuration.	U						
	Explain J2ME functional architecture.	U	10					
	Explain the structure of Android software stack.	U						
	Define M-Commerce	R						
	List the features required by a mobile device to potentiate M-Commerce.	A						
	Explain the Pros(Advantages) of M-Commerce	A						
	Discuss the Cons(Disadvantages) of M-Commerce	A	05					
	Define Mobile payment Systems.	U						
	Explain different M-payment mechanisms that exit at present	U						
VI	Discuss the different M-payment solution in a M-commerce.	U						
	List the characteristics of M-payment system.	R						
	Describe the security issues in M-commerce.	U						
	Explain B2B Commerce.	U						
	Explain B2C Commerce.	U						
	List the application of M- Commerce and explain any one application.	A	10					
	Describe the architecture of a M-Commerce	U						
	Discuss the Pros and Cons of M-Commerce	U						
	Explain different M-payment schemes (mechanisms) that exist at present.	U						
	Explain the properties (characteristics) of M-payment system.	U						
	Discuss a model of M-payment process	U						
	Discuss the Pros and Cons of M-Commerce	U						



# Government of Karnataka Department of Technical Education Bengaluru

	Course Title: Internet of Things							
THINGS A	Scheme (L:T:P) : <b>4:0:0</b>	Total Contact Hours: 52	Course Code: 15CS63F					
	Type of Course: Lectures, Self Study & Student Activity	Credit :04	Core/ Elective: Elective					
CIE- 25 Marks SEE- 100								

## **Prerequisites**

Basic knowledge computer networks and related courses.

## **Course Objectives**

- 1. To assess the vision of IoT.
- 2. To classify Real World IoT applications in various Domains.
- 3. To understand design methodology for IoT platforms.

## **Course Outcome**

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course Outcome	CL	Linked PO	Teaching Hours
CO1	Interpret the vision of IoT from a global context.	R,U	1,2,5,6,7,8,9,10	12
CO2	Illustrate the application of IoT in various Domains.	U, A	1,2,4,5,6,8,9,10	12
CO3	Understand the differences and Similarities between IoT and M2M.	R,U	1,2,3,4,5,6,10	06
CO4	Interpretation of different IoT platforms design methodology.	U A	1,2,5,6,8,9,10	08
CO5	Illustration of IoT Physical Devices.	U, A	1,2,5,6,8,9,10	08
CO6	Narration of Ethics in IoT.	U A	1,2,5,6,7,9,10	06
	52			

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

#### **Course-PO Attainment Matrix**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Internet of Things	3	3	1	2	3	3	2	3	3	3

#### Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## **Course Content and Blue Print of Marks for SEE**

Unit No	Unit Name	Hour	Quest	ions to for SEE	be set	Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Introduction to Internet of Things	12	5	20	10	35	24.13
II	Domain specific IoT	12	-	20	10	30	20.68
III	IoT and M2M	06	5	10	1	15	10.35
IV	IoT Platforms Design Methodology	08	-	10	15	25	17.24
V	IoT Physical Devices & Endpoints.	08	-	15	10	25	17.24
VI	Ethics in IoT	06	-	15	-	15	10.35
	Total	52	10	90	45	145	100

## **UNIT I: Introduction to Internet of Things**

12 Hrs

Definition and characteristics of IoT, Physical design of IoT, Things in IoT, IoT Protocols, Logical Design of IoT, IoT functional blocks, IoT communication Models, IoT communication API's, IoT enabling Technologies Wireless sensor networks, Cloud Computing, Big Data Analytics, Communication protocols, embedded systems. IoT Levels and Deployment templates – IoT Level-1, IoT Level-2, IoT Level-3, IoT Level-4, IoT Level-5, IoT Level-6

## **UNIT II: Domain specific IoT**

12 Hrs

Introduction, Home automation- Smart lighting, smart appliances, intrusion detection, smoke for gas detectors; Cities- Smart Parking, Smart lighting, Smart Roads, Structural Health Monitoring, surveillance, Emergency Response; Environment- Weather monitoring, air pollution monitoring, noise pollution monitoring, forest fire detection, river flood's detection;

Energy- Smart grids, renewable energy systems, prognostics; Retail- Inventory management, smart payments, smart vending machines; Logistics- Route generation and scheduling, Fleet tracking, Shipment monitoring, Remote vehicle diagnostics; Agriculture- Smart Irrigation, Green house control; Industry- Machine diagnosis and prognosis, indoor air Quality monitoring; Health and Life Style- Health and fitness monitoring, Wearable electronics.

## **UNIT III: IoT and M2M**

06 Hrs

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking, network function virtualization;

## **UNIT IV: IoT Platforms Design Methodology**

08 Hrs

Introduction, IoT Design and Methodology- Purpose and requirements specification, Process specification, Domain model specification, Information model specification, service specification, IoT level specification, functional view specification, Operational view specification, Device and component integration, application development.

## **UNIT V: IoT Physical Devices and Endpoints**

08 Hrs

What is an IoT device? , Basic Building blocks of an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Other IoT devices.

## **UNIT VI: Ethics in IoT**

06 Hrs

Characterizing the IoT, Privacy, Control – Disrupting Control, Crowd sourcing; Environment – Physical thing, Electronics, Internet service; Solutions – The IoT as a part of the solution, cautious optimism, the open IoT definition.

## **Text Books**

- 1. Internet of Things A Hands on Approach, By Arshdeep Bahga and Vijay Madisetti Universities Press, ISBN: 9788173719547 (Unit I to V)
- 2. Designing the Internet of Things Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861 (Unit VI)

## References

- 1. The Internet of Things Key Applications and Protocols, Wiley Publication, Olivier Hersent, David Boswarthick, Omar Elloumi. ISBN: 9788126557653
- 2. The Internet of Things, Pearson, By Michael Miller ISBN: 9789332552456
- 3. http://www.cisco.com/c/dam/en\_us/solutions/trends/iot/introduction\_to\_IoT\_november.p df
- 4. https://www.bbvaopenmind.com/en/iot-implementation-and-challenges/
- 5. https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-staff-report-november-2013-workshop-entitled-internet-things-privacy/150127iotrpt.pdf

## Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

- 1. Each student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course coordinator and program coordinator.
- 2. Each student should conduct different activity and no repeating should occur.

1	Understand the different protocols and their purposes used to communicate in IoT.
2	Learn and Understand different Cloud Platform Services Offered by Vendors.
3	Learn the Deployment steps of any Domain specific IoT Services.
4	Learn/Compare Different Hardware Boards for Creating IoT Services
5	Understand the different functionalities of sensors in IoT Devices.
6	Understand integrating IoT Services to other third party Clouds.
7	Discuss Privacy Issues in IOT
8	Quiz

## **Course Delivery**

The course will be delivered through lectures and Power point presentations/ Video

## **Course Assessment and Evaluation Scheme**

Method	What		То	When/Where	Max	Evidence	Course outcomes
			who	(Frequency in the course)	Marks	collected	
nt	CIE	IA	m	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
Direct Assessment	Student activities	Student	05	Report	1 to 6		
t Ass			S	Total	25		
Direc	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
t	Student Fe on course	edback	S.	Middle of the course		Feedback forms	1,2,3 Delivery of course
Indirect Assessment	End of Course Survey		Students	End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

<u>Note</u>: Continuous Internal Evaluation shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	07
2	Understanding	62
3	Application	31

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (20 marks)
- 2. Student suggested activities report for 5 marks
- 3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF IA TEST OUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM		20
of sem 10-11 AM	Year: 2017-18		

Name of Course coordinator:

Units:\_\_ CO's:\_\_\_\_

Question no	Question	MARKS	CL	СО	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

## **MODEL QUESTION PAPER (CIE)**

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	VI SEM	Internet of Things (IOT)	20
of sem 10-11 AM	Year: 2017-18	Course code: 15CS63F	

Name of Course coordinator:

Units:1,2 Co: 1,2

**Note:** Answer all questions

Questio n no	Question	CL	СО	РО
1	Discuss Big Data Analytics role in IoT. (5M) <b>OR</b>	U	1	1,2
	What is the Role of Things and Internet in IoT? (5M)			
2	Describe the characteristics of IoT. (5M)	R	1	1,2
3	Describe applications of IoT for Cities. (10M) <b>OR</b>	A	2	1,2
	Discuss applications of IoT for Logistics. (10M)			

Note: Internal choice may be given in each CO at the same cognitive level (CL).

## Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties		Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

## MODEL QUESTION PAPER

## Diploma in Computer Science & Engineering VI Semester

## **Course Title: Internet of Things**

Time: 3 Hours Max Marks: 100

#### PART-A

## Answer any SIX full questions. Each carries 5 marks.

5X6=30

Code: 15CS63F

#### Marks

- 1. Describe an Example of IoT Service that uses publish-subscribe communication Model
- 2. What are the Differences between Machines in M2M and Things in IoT?
- 3. Describe the characteristics of IoT.
- 4. Explain architectural constraints of REST.
- 5. Discuss noise pollution monitoring and forest fire detection on IoT.
- 6. Explain Operational view specification with an example.
- 7. List and explain the functional attributes of an IoT device.
- 8. How Raspberry pi is different from Desktop Computer?
- 9. Explain the Privacy v/s the IoT.

#### **PART-B**

## Answer any SEVEN full questions each carries 10 marks.

10X7=70 Marks

- 1. Explain IoT Communication Models.
- 2. Explain the Components of IoT
- 3. Explain applications of IoT for Retail.
- 4. Discuss Applications of IoT for Homes.
- 5. Discuss Smart Irrigation and Green House Control
- 6. Explain Software Defined Networking (SDN) architecture with neat Diagram.
- 7. Derive the services from process and information model for Home automation IoT System.
- 8. List and briefly explain the steps involved in IoT System Design Methodology.
- 9. Explain in brief the various components and peripherals of Raspberry pi Board.
- 10. Describe crowd sourcing with an example



## MODEL QUESTION BANK

## Diploma in Computer Science & Engineering VI Semester

**Course Title: Internet of Things** 

CO	Question	CL	Marks
	Describe the characteristics of IoT.	R	
	Write a Note on Physical Design of IoT	A	
	Explain IoT Functional Blocks.	U	
	Explain IoT Enabling Technologies.	U	
	Discuss Big Data Analytics role in IoT.	U	
I	Explain IoT Level-5.	U	
•	Describe an Example of IoT Service that uses publish-subscribe	U	05
	communication Model		
	Describe an Example IoT Service that uses web socket-based	U	
	Communication.		
	Explain architectural constraints of REST.	U	
	What is the Role of Things and Internet in IoT?	R	
	Discuss IoT Protocols.	A	
	Explain IoT Communication Models.	A	
	Explain IoT Communication API's	U	
	Explain the Components of IoT	U	10
	Discuss IoT Level-1 and IoT Level-2	U	
	Discuss IoT Level-3 and IoT Level-4	U	
	Explain weather monitoring and air pollution monitoring on IoT.	A	
	Discuss noise pollution monitoring and forest fire detection on IoT.	A	
	Explain remote vehicle diagnostics using IoT.	A	_
	Discuss Smart Irrigation and Green House Control	A	5
	Explain the role of IoT in Health and Fitness Monitoring.	A	
	List and Briefly explain Domain Specific IoT Services.	U	
II	Discuss Applications of IoT for Homes.	A	
	Describe applications of IoT for Cities.	A	
	Explain applications of IoT for Energy Systems.	U	
	Explain applications of IoT for Retail.	A	10
	Discuss applications of IoT for Logistics.	A	
	Discuss Applications of IoT in Industry.	A	
	Explain SDN Layers.	U	
	What are the Differences between Machines in M2M and Things in IoT?	R	
	How do Data Collection and Analysis approaches differ in M2M and	R	5
	IoT.		
Ш	What are the differences between SDN and NFV?	U	
	Describe how NFV can be used for virtualizing IoT Devices?	U	
	Explain M2M System architecture.	U	
	Explain the Differences between IoT and M2M	U	

	Explain Software Defined Networking (SDN) architecture with neat Diagram.  Describe NFV architecture with neat block diagram.	U	10
	Explain purpose and requirement specification of IoT Design.	U	
	Describe Process specifications for Home Automation IoT Systems.	A	
	Describe information Model of the Home automation IoT Systems.	A	
	Explain Controller service of Home Automation IoT System.	A	
	Explain Operational view specification with an example.	U	5
IV	List and Briefly explain the steps involved in IoT System Design Methodology.	U	
	Explain Domain Model of the Home automation IoT system.	A	10
	Derive the services from process and information model for Home automation IoT System.	A	
	Explain functional view specification for Home Automation IoT System.	A	
	What is an IoT Device? List Examples.	U	
	List and explain the functional attributes of an IoT device.	A	
	List and explain Raspberry pi interfaces.	A	5
	How Raspberry pi is different from Desktop Computer?	U	Č
	List and explain Other IoT Devices.	U	
V	What's the use of SPI and I2C interfaces on Raspberry pi?	U	
V	With neat Block diagram explain an IoT Device.	A	
	Explain in brief the various components and peripherals of Raspberry pi Board.	U	10
	Illustrate characterizing the Internet of Things.	U	
	Explain the ideal ethics for IoT.	U	
	Explain the Privacy v/s the IoT	A	5
	List and explain 5 critical requirements for sensor commons projects.	A	
VI	Explain the environmental issues relating to IoT.	U	
V I	Explain the open Internet of Things definition.	U	
	Describe crowdsourcing with an example.	U	
	Describe with an example Internet of Things as a part the solutions.	A	10



## Government of Karnataka Department of Technical Education Bengaluru

Total Languages Local	Course Title: Software Testing Lab					
linear language of the Language of Colors	Scheme (L:T:P): 0:2:4	Total Contact Hours: 78	Course Code: 15CS64P			
Total States	Type of Course: Tutorial and	Credit :03	Core/ Elective:			
	Practical's		Core			
CIE- 25 Mar	ks		SEE- 50 Marks			

## **Prerequisites**

Knowledge about basic JAVA and PHP.

## **Course Objectives**

- 1. To discuss the distinctions between validation testing and defect testing.
- 2. To describe the principles of system and component testing.
- 3. To describe strategies for generating system test cases.
- 4. To understand the essential characteristics of tool used for test automation.

## **Course Outcome**

On successful completion of the course, the students will be able to attain CO:

	Course Outcome	Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Understanding Selenium tool to perform testing	1 to 4	U,A	1 to 10	24
CO2	Writing test suits for applications.	5 to 8	$\boldsymbol{A}$	1 to 10	21
CO3	Construct and test simple programs.	9 to 13	A	1 to 10	21
CO4	Understanding the use of bug tracking and testing tool Bugzilla, Jira	14	A	1 to 10	12
				Total	78

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

## **Course-PO Attainment Matrix**

Course				Prog	ramm	e Out	comes			
	1	2	3	4	5	6	7	8	9	10
Software Testing lab	3	3	3	3	3	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## **List of Graded Practical Exercises**

Sl.No	Practical/Exercise
1	Understand The Automation Testing Approach (Theory Concept).
2	Using Selenium IDE, Write a test suite containing minimum 4 test cases.
3	Understanding Test Automation. Using Selenium write a simple test script to
	validate each field of the registration page (Eg: Facebook Registration Page)
4	Install Selenium server and demonstrate it using a script in Java/PHP.
5	Conduct a test suite for any two web sites.
6	Write and test a program to login a specific web page.
7	Write test cases to validate a mobile number using one time pin identification(OTP)
8	Write and Test a program to find out list of employees having salary greater than Rs
	50,000 and age between 30 to 40 years.
9	Write and test a program to update 10 student records into table into Excel file.
10	Write and test a program to select the number of students who have scored more
	than 60 in any one subject (or all subjects).
11	Write and test a program to provide total number of objects present / available on
	the page.
12	Write and test a program to get the number of list items in a list / combo box.
13	Write and test a program to count number of items present on a desktop.
14	Understanding the use of bug tracking and testing tool Bugzilla and Jira
15	Open ended Experiment: Mini Project – Not for exam but to compulsory to be
	included in Record. (Test cases for Admission form, Shopping cart, Travel Booking,
	Hotel Booking, Utility Bill Payment)

## Reference

- 1. Testing in 30+ Open Source Tools, Rahul Shende, Shroff Publishers & Distributor Pvt. Ltd, ISBN 13: 9789350231005 (page numbers from 15 to 117)
- 2. http://seleniumhq.org/
- 3. http://sourceforge.net/projects/sahi/
- 4. http://testng.org/doc/index.html

## Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

1. Each student should conduct different activity and no repeating should occur.

1.	Demonstrate any one open source tool for software other than that used in lab
	exercises
2.	Prepare test cases for any software application.
3.	Quiz

## **Course Delivery**

The course will be delivered through Demonstration and Practices

## **Course Assessment and Evaluation Scheme**

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
		IA	Students	Two tests (average of two tests)	10	Blue books	1,2,3,4
ent	CIE (Continuous			Record	10	Record	1,2,3,4
Direct Assessment	Internal Evaluation)			Student activity.	05	Report.	
)irect				Total	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
ent	Student Feedb course	ack on	Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
Indirect Assessment	End of Survey	Course		End of the course		Questionnaires	1,2,3, & 4 Effectiveness of Delivery of instructions & Assessment Methods

<sup>\*</sup>CIE – Continuous Internal Evaluation

- 1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
- 2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

## Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	20
3	Application	70

## Note to IA verifier. The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (10 marks)
- 2. Record (10 marks)
- 3. Student suggested activities report for 5 marks
- 4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

<sup>\*</sup>SEE – Semester End Examination

## **Format for Student Activity Assessment**

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned Course Coordinator for assessing the given activity

## **Scheme of Valuation for End Examination**

SN	Particulars	Marks
1	Writing procedure for two programs	20
2	Execution with results (any one)	20
3	Viva Voce	10
	Total	50

<sup>\*\*</sup>Evaluation should be based on the screen output only. No hard copy required.

## Resource requirements for Software Testing Lab

(For an Intake of 60 Students [3 Batches])

Sl. No.	Equipment	Quantity
1	Computers	20
2	Internet Connection: Minimum 10 Mbps	Shared for 20
3	Switch – 32 port	01

<sup>\*\*</sup>Open Source Software should be encouraged

	MODEL QUESTION BANK
1	Install Selenium IDE. Write a test suite containing minimum 4 test cases.
2	Understanding Test Automation. Using Selenium write a simple test script to validate
	each field of the registration page (Eg: Facebook Registration Page)
3	Install Selenium server and demonstrate it using a script in Java/PHP.
4	Conduct a test suite for any two web sites.
5	Write and test a program to login a specific web page.
6	Write test cases to validate a mobile number using one time pin identification(OTP)
7	Write and Test a program to find out list of employees having salary greater than Rs
	50,000 and age between 30 to 40 years.
8	Write and test a program to update 10 student records into table into Excel file.
9	Write and test a program to select the number of students who have scored more than 60
	in any one subject (or all subjects).
10	Write and test a program to provide total number of objects present / available on the
	page.
11	Write and test a program to get the number of list items in a list / combo box.
12	Write and test a program to count number of items present on a desktop.
13	Understanding the use of bug tracking and testing tool Bugzilla
14	Understanding the use of bug tracking tool Jira

<sup>\*\*</sup>Change of question is allowed only once. Marks of 05 should be deducted in the given question.

# Government of Karnataka Department of Technical Education Bengaluru

top 5 School Stoop Ep loan earp	Course Title						
* Storestur (secondary)     * Recept (certago ang)     * Maria (path i) welcago bit (com)     * Operated (secondary)     * Operated (secondary)	Scheme (L:T:P): 0:2:4	Total Contact Hours: 78	Course Code: 15CS65P				
5 • AuCost (www.aistrack-eg.org)	Type of Course: <b>Tutorial and</b>	Credit :03	Core/ Elective:				
	Practical's		Core				
CIE- 25 Mar	CIE- 25 Marks						

## **Prerequisites**

Knowledge of Computer Network Softwares and Components.

## **Course Objectives**

- 1. Installation of relevant softwares to Demonstrate Virtual box, port scanning, Finding active machines and version of remote OS.
- 2. Demonstrate active and passive fingerprinting, sniffing the router traffic, use of dumpsec.
- 3. Perform wireless audit of an access point, ARP poisioning, IPCop installation, study of various crypto algorithms.
- 4. Demonstrate IDS, Rootkits, Open ssl command, setup and monitoring honeypot.

## **Course Outcome**

On successful completion of the course, the students will be able to attain CO:

	Course Outcome	Experiment linked	CL	Linked PO	Teaching Hrs
CO1	Install and demonstrate virtual box or any other equivalent software and Grabbing banner with telnet and netcat	1, 2	A	1 to 10	09
CO2	Demonstrate port scanning, active machines, version of remote OS using NMAP or any other software.	3,4	A	1 to 10	12
CO3	Experiment on active and passive fingerprinting, sniffing the router traffic, use of dumpsec	5 to 7	A	1 to 10	15
CO4	Demonstrate wireless audit of an access point, ARP poisoning, IPCop Firewall installation using relevant softwares.	8 to 10	A	1 to 10	18
CO5	Demostrate different cryptoalgorithms, IDS, Rootkits using suitable softwares.	11 to 13		1 to 10	15
CO6	Demonstrate open ssl command, setup and monitor honeypot on network.	14,15	A	1 to 10	09
			Total	sessions	78

**Legends:** R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

## **Course-PO Attainment Matrix**

Course		Programme Outcomes								
	1	2	3	4	5	6	7	8	9	10
Network Security Lab	3	3	3	3	3	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If >40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If  $\frac{-}{25}$  to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## **List of Graded Practical Exercises**

Sl.No	Practical/Exercise
1	Learn to install Wine/Virtual Box/ or any other equivalent s/w on the host OS
2	Perform an experiment to grab a banner with telnet and perform the task using Netcat
3	Perform an experiment for Port Scanning with nmap, superscan or any other equivalent software
4	Using nmap 1)Find Open ports on a system 2) Find machines which are active 3)Find the version of remote OS on other systems 4)Find the version of s/w installed on other system (using nmap or any othe software)
5	Perform an experiment on Active and Passive finger printing using XProbe2 and nmap
6	Perform an experiment to demonstrate how to sniff for router traffic by using the tool Cain and Abel / wireshark / tcpdump
7	Perform an experiment how to use DumpSec.
8	Perform an wireless audit of an access point / router and decrypt WEP and WPA (softwares netstumbler or airsniff)
9	Perform an experiment to sniff traffic using ARP poisoning
10	Install IPCop on a linux system and learn all the function available on the software.
11	Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management
12	Demonstrate Intrusion Detection System (IDS) using any tool eg. Snort or any other s/w
13	Install RootKits and study variety of opt
14	Generate minimum 10 passwords of length 12 characters using open ssl command
15	Setup a honey pot and monitor the honey pot on network

## Reference

Build Your Own Security Lab: A field guide for network Testing, Michael Gregg, Wiley India edition, ISBN: 9788126516919.

## Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)

- 1. Each individual student should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course co-ordinator and programme co-ordinator.
- 2. Each student should conduct different activity and no repeating should occur.

1.	Demonstration of various software's used for port scanning.
2.	Report on result of various crypto algorithms by using equivalent software.
3.	Prepare a report on firewall along with its uses and functions.

## **Course Delivery**

The course will be delivered through Demonstration and Practices

## **Course Assessment and Evaluation Scheme**

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
		IA	Students	Two tests (average of two tests)	10	Blue books	1,2,3,4,5,6
lent	CIE (Continuous			Record	10	Record	1,2,3,4,5,6
Direct Assessment	Internal Evaluation)			Student activity.	05	Report.	
				Total	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4,5,6
ent	Student Feedb course	ack on	Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
Indirect Assessment	End of Course Survey			End of the course		Questionnaires	1,2,3,4,5,6 Effectiveness of Delivery of instructions & Assessment Methods

<sup>\*</sup>CIE – Continuous Internal Evaluation

\*SEE – Semester End Examination

## Note:

- 1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
- 2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	20
3	Application	70

## Note to IA verifier. The following documents to be verified by CIE verifier at the end of semester

- 1. Blue books (10 marks)
- 2. Record (10 marks)
- 3. Student suggested activities report for 5 marks
- 4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

## **Format for Student Activity Assessment**

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	13/4=3.25=4

Note: This is only an example. Appropriate rubrics/criteria may be devised by the

## concerned Course Coordinator for assessing the given activity

## **Scheme of Valuation for End Examination**

SN	Particulars	Marks
1	Record	05
2	Installation of tool (Any two)	15
3	Conduction and Demonstration	20
4	Viva Voce	10
	Total	50

<sup>\*\*</sup>Evaluation should be based on the screen output only. No hard copy required.

## Resource requirements for Network Security Lab

(For an Intake of 60 Students [3 Batches])

- 1) For all experiments the student must and should install software's. After the demonstrate the same be uninstalled. Each batch has to learn to install and use the tools. You can use any other equivalent software's other than the mentioned one.
- 2) The lab should have structured network with 10 mbps internet line. Using Virutal Box, two OS can be installed on one machine, where in one OS acts as a client and other acts a server.

## **MODEL QUESTION BANK**

1	Learn to install Wine/Virtual Box/ or any other equivalent s/w on the host OS
2	Perform an experiment to grab a banner with telnet and perform the task using Netcat
3	Perform an experiment for Port Scanning with nmap, superscan or any other equivalent
	software
4	Using nmap 1)Find Open ports on a system 2) Find machines which are active 3)Find
	the version of remote OS on other systems 4)Find the version of s/w installed on other
	system (using nmap or any othe software)
5	Perform an experiment on Active and Passive finger printing using XProbe2 and nmap
6	Perform an experiment to demonstrate how to sniff for router traffic by using the tool
	Cain and Abel / wireshark / tcpdump
7	Perform an experiment how to use DumpSec.
8	Perform an wireless audit of an access point / router and decrypt WEP and WPA
	(softwares netstumbler or airsniff)
9	Perform an experiment to sniff traffic using ARP poisoning
10	Install IPCop on a linux system and learn all the function available on the software.
11	Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric
	crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security
	and Management
12	Demonstrate Intrusion Detection System (IDS) using any tool eg. Snort or any other s/w
13	Install RootKits and study variety of opt
14	Generate minimum 10 passwords of length 12 characters using open ssl command
15	Setup a honey pot and monitor the honey pot on network

<sup>\*\*</sup>Change of question is allowed only once. Marks of 05 should be deducted in the given question.

## Government of Karnataka

## **Department of Technical Education**

## **Board of Technical Examinations, Bangalore**

	Course Title: INPLA			
Gulance by Expers	Scheme (L:T:P): 0:0:4	Total Contact Hours: 52	Course Code: 18CS66P	
Tall Tall	Type of Course: Periodical Exposure and working in organizational environment	Credit :02	Core/ Elective: Core(Practice)	
	Only CIE:25 Marks	No SEE		

## **Prerequisites:**

Enthusiasm to explore new things by participating in individual tasks available in outside organizational learning environment and acquires skills from participating in such activities.

## **Course Objectives:**

In plant training is a learning opportunity for students. Students should therefore receive feedback on their performance so that they can grow professionally. Overall professional development of diploma Computer Science engineers is the need of the day for enabling them to sustain in competitive global environment..

#### **COURSE OUTCOME**

On successful completion of the course, the students will be able to:

	Course Outcome	CL	Linked	Allotted
			PO	Hours
CO1	Exposure to the organizational environment and recognize the requirement of the organization and cope with the organizational scenario.	Application/Analysis/Innovative	2 to 10	
CO2	Identify career paths taking into account their individual strengths and aptitude and prepare a report about the work experience in organization	Application/Analysis/Innovative	2 to 10	4 Hrs/Week
CO3	Communicate effectively through technical presentation.	Application/Analysis/Innovative	2 to 10	
CO4	Enhancing the employability skills and start-up skills to increase his/her ability to engage in life-long learning.	Application/Analysis/Innovative	2 to 10	
CO5	Develop individual confidence to handle various engineering assignments and expose themselves to acquire life skills to meet societal challenges.	Application/Analysis/Innovative	2 to 10	
		TOTAL		52 Hours

COURSE-PO ATTAINMENT MATRIX										
Course				Programme Outcomes						
	1	2	3	4	5	6	7	8	9	10
INPLANT TRAINING	0	3	3	3	3	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

 $\underline{\textit{Method}}$  is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If >40% sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2  $\,$ 

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

## 1. Inplant training:

**52 HRS** 

#### A. Introduction

- Inplant training means a course of training in any organization or establishment undergone by the student of final year diploma in Computer Science Engineering in pursuance of memorandum of understanding between organization and department of the concerned institute or department can make necessary arrangements in the local vicinity industries to get on job learning exposure to the students in industries.
- 2. Organization means any organization or business in which any trade, occupation or subject field in concerned engineering or technology.
- 3. The period of inplant training is 52 hours in a semester. The student may be allowed to undergo inplant training in industrial organization on weekly basis preferably Saturday's by allocating four hours per week or a fixed term during semester break or semester beginning ensuring 52 hours of inplant training to the students. The period of training and other modalities will be decided by the respective Head of section/supervisory faculty in consultation with local industrial organization.

#### B. The Industries where in-plant training can be undergone

- 1. The supervisory faculty / Head of section / students may identify IT or computer based service / industrial organization preferably in the local vicinity with prior approval of the principal of concerned institution. Structured training to be detailed by the concerned supervisory faculty and a detailed report of the in plant training undergone shall be submitted by the student for evaluation.
- **2.** The students may be allowed to undergo in-plant training in any Government/Private organizations dealing IT/Computer based job or services.

## **C.Obligation of students**

- 1. Students are required to acquire skills and get industrial exposure in the concerned field of Engineering or Technology conscientiously and diligently during in-plant training.
- 2. Students must adhere to the rules and regulations stipulated by the in-plant training establishment.
- 3. Students must be punctual and exhibit good conduct during the training period.

- 4. Students shall maintain log of activities and submit report on schedule of work entrusted during in-plant training.
- 5. Students are required undergo in-plant training in stipulated time frame.
- 6. Students are obligated to get familiar with the process and activities during in-plant training.
- 7. Students may be encouraged to develop a solution to the tasks/problems related to the software development/networking/software testing/ servicing to acquire knowledge and to reciprocate to the industrial needs.

### **D.** Monitoring of Inplant Training

- 1. The Head of section shall prepare batches of students and allocate a supervisory faculty to each batch. Supervisory faculty shall assist students in identifying industrial organisation and monitor the activities of the students during the schedule of training.
- 2. The concerned supervisory faculty in consultation with respective industrial organisation shall review the progress of students undergoing inplant training in a time frame. The head of section must take complete responsibilities in organising inplant training.
- 3. Student undergoing in-plant training in the respective branch of Engineering in any establishment shall be treated as a trainee. The provision of any law with respect to labour will not apply to such a trainee
- 4. It shall not be obligatory on the part of the Employer / Organization to offer any stipend and other welfare amenities available, if any, to the students undergoing in-plant training. However, if the organization desirous to do so, at will be a privilege for the students.

#### **E- Continuous Internal Examination-CIE- Scheme of evaluation**

SL No	Particulars		Marks
1	Visiting Organization		10
2	Submission of report		10
3	Viva-voce		05
		TOTAL	25

F. Course Assessment and Evaluation Scheme for Project work What To When/Where Max **Evidence Course outcomes** whom (Frequency in the Marks collected course) Direct Assessment CO1, CO2, Students Report and Log of Ι 25 CIE CO3,CO4,CO5 sheets met End SEE SEE No End Examination Exam CO1, CO2 Student Indirect Assessment Feedback on Middle of the course Feedback forms Delivery of course course Students CO1 to CO5 End of Course Effectiveness of Survey Delivery of End of the course Questionnaires instructions & Assessment Methods

\*SEE – Semester End Examination

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

- 1. Student activities / Inplant Training to be assessed through Rubrics.
- 2. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

<sup>\*</sup>CIE - Continuous Internal Evaluation

## **ANNEXURE**

# REPORT ON INPLANT TRAINING FORMAT FOR PREPARATION OF TRAINING REPORT

## **ARRANGEMENT OF CONTENTS:**

The sequence in which the training report material should be arranged and bound as follows:

- 1. Cover Page
- 2. Inner Title Page (Same as cover page)
- 3. Certificate by Company/Organization/Institute (Optional)
- 4. Acknowledgement
- 5. About the organization
- **6.** Table of Contents
- 7. List of Tables
- 8. List of Figures
- 9. Abbreviations and Nomenclature(If any)
- 10. Chapters
- 11. References
- 12. Data Sheet(If any)
- 13. Appendices ( If any)

The tables and figures shall be introduced in the appropriate places.

## **TYPING INSTRUCTIONS:**

- 1. The Inplant training report must be submitted in Two Copies (one for department and 2<sup>nd</sup> for library) duly signed by the HOD. Students should also submit the soft copy on CD in pdf format in the library.
- 2. The length of the training report may be about 40 to 50 page.
- 3. The training report shall be computer typed (English- British, Font -Times Roman, Size-12 point) and printed on A4 size paper.
- 4. The training report shall be hard bound with cover page in pink colour. The name of the students, degree, duration of training period, institute name shall be printed in Bold Black letters on the cover page
- 5. The training report shall be typed with 1.5 line spacing with a margin 3.5 cm on the left, 2.5 cm on the top, and 1.25 cm on the right and at bottom. Every page in the report must be numbered. The page numbering from acknowledgements and till the beginning of the introductory chapter, should be printed in small Roman numbers, i.e, i, ii, iii, iv...... The page number of the first page of each chapter should not be printed (but must be accounted for). All page numbers from the second page of each chapter should be printed using Arabic numerals, i.e. 2,3,4,5... All printed page numbers should be located at the bottom centre of the page.
- 6. In the training report, the title page [Refer sample sheet (inner title pages)] should be given first and printed in black letters.
- 7. The table of contents should list all headings and sub-headings. The title page and certificates will not find a place among the items listed in the Table of Contents. One and a half line spacing should be adopted for typing the matter under this head.
- 8. The list of tables should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.
- 9. The list of figures should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.
- 10. The list of symbols, abbreviation & nomenclature should be typed with one and a half line spacing. Standard symbols, abbreviation etc should be used.
- 11. Training report should consist of following chapters.
  - a. Chapter 1- Introduction
  - b. Chapter 2- Details of department/Areas where the student undergone

training.

(Report shall have chapters and each chapter should be numbered separately. A chapter may be further divided into several divisions and sub-divisions depending on the content

- c. Chapter 3- PO/Skills attained by training.
- d. Chapter 4- Conclusion by the student

# Government of Karnataka Department of Technical Education Bengaluru

	Course Titl	e: Project Work- II	
Software Product System Design	Scheme (L:T:P) : <b>0:2:4</b>	Total Contact Hours: 78	Course Code: 15CS67T
ode Design	Type of Course: Lectures, Self Study & Student Activity	Credit :03	Core/ Elective: Core
CIE- 25 Mar	ks		SEE- 50 Marks

## Pre requisites

Application learned concepts form the previous semester studied courses.

# **Course Objectives**

- 1. Learn the objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems/problems faced by industry/development of new facilities
- 2. Make the students come up with innovative/ new ideas in his area of interest.
- 3. Identify, analyze and develop opportunities as well as to solve broadly defined Computer Science & Engineering problems
- 4. Enhance students' appreciation of the values of social responsibility, legal and ethical principles, through the analysis and discussion of relevant articles and real time projects

## **Course outcome**

On successful completion of the course, the students will be able to:

	Course Outcome	CL	Linked PO	Allotted hours
CO1	Get an idea and confidence in designing, analysing and executing the project.	Analysis / creation	1 to 10	
CO2	Apply the knowledge of latest trends in software development engineering and relate their ideas while executing the project	Analysis / creation	1 to 10	
CO3	Have complete understanding of Executing the project	Analysis / creation	1 to 10	6hrs/Week
CO4	Prepare documents in team and enhance his written and oral communication presentations.	Analysis / creation	1 to 10	
CO5	Develop individual confidence to handle various engineering assignments and expose themselves to acquire life skills to meet societal challenges	Analysis / creation	1 to 10	
			TOTAL	78 Hours

## **Mapping Course Outcomes With Program Outcomes**

				Pro	gramn	ne Out	come			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course	Basic knowledge	Discipline knowledge	Experiments a practice	Engineering Tools	Engineer and society	Environment & & Sustainability	Ethics	Individual and Team work	Communicati on	Life long learning
PROJECT WORK	3	3	3	3	3	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If  $\geq$ 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1 If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

PROJECT WORK: 78 HRS

### **INTRODUCTION**

The objective of the project work is to enable the students in convenient groups of minimum of 3-4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

## ROAD MAP FOR THE PROJECT

- 1. Carry out a session or a seminar from the ISTE Student Chapter coordinator / Programme coordinator with the help of Innovation club / I I I cell for directing the students to identify project areas in the field of their interested including interdisciplinary areas.
- 2. Power point presentation in seminar should include detail description of project areas related to program, Project report formats, developing personnel writing skills.
- 3. The Students/Departments may at liberty to form the batch not less than 3 and maximum 4 and get registered with project coordinator / HOD at the end of V semester.
- 4. Students should take the approval from the Project committee/ Head of department for doing project.
- 5. After approval the batch of students will be published in department notice board along with guide in the end of  $5^{th}$  semester.
- 6. All students should finalize their Project immediately before commencement of SEE of 5<sup>th</sup> semester.
- 7. The types of project may include:
  - Preparation of a feasibility report
  - Design and development system
  - The improvement of existing system
  - Creation of New facilities
- 8. The project should be challenging but manageable within the resources and time

- available.
- 9. Students should undergo reviews for one times in 5<sup>th</sup> semester and at least 4 times in 6<sup>th</sup> semester during the internal assessment. Time table for IA should include project review. The guide should monitor the progress of Project work periodically and it should be finally evaluated for 25 marks at the end of 5<sup>th</sup> semester and for 25 marks at the end of 6<sup>th</sup> semester.
- 10. The IA marks will be evaluated based on oral presentation and assessment by the internal guide by adopting Rubrics being developed by Project committee.
- 11. Real time problems, Industry related problems, should be chosen and it is a Responsibilities of the project committee / Programme coordinator/ Innovation club / I.I.T. cell to choose the appropriate project and to accept the Project Proposal
- 12. **Identification of Topic:** The selection of topic is of crucial importance. It should be field of interest. It is advisable to choose the project can be completed on time and within the budget and resources. The topic should be clear, directional, focussed and feasible.
- 13. An outline of project proposal submitted & synopsis from student will initiate a dialogue between Student and Project coordinator who will then help you to work on the chosen topic and report.

## Thrust areas identified for Project work

Each student may be assigned any one of the following types of project/thesis work:

## According to the local needs, the following major projects are suggested:

Automation of booking in Hotel booking, Train / Bus reservation, Time table schedule, Cloud based projects, Robotic programming, Mobile Applications or any other software automation system that is need of the hour. Hardware projects related to IOT, robotics programming involving Python, Raspberry PI etc., may also be encouraged.

#### **Course Assessment and Evaluation Scheme for Project work**

	What		To whom	When/Where (Frequency in the course)	Max Evidence Marks Collected		Course out comes
nt met	1			CIE (At the end of 6th semester)	25	1. Project Synopsis. 2. Plan & Schedule 3. Industrial visit report	CO1, CO2, CO3,CO4,CO5
Direct Assessment met	CIE	ΥI	Students	SEE End of the course  50 2. Present hand of		<ol> <li>Project Report.</li> <li>Presentation hand outs.</li> <li>Project Model</li> </ol>	CO1, CO2, CO3,CO4,CO5
	SEE	End Exam		End of the course	Project report and project model / Study rep		odel / Study report
ct Assess	Stud Feedba cou	ick on	Studen	Middle of the course	Feedback forms CO1Deliv course		CO1Delivery of course

End of Course			CO1 to CO5
Survey			Effectiveness of
	F = 1 = 6 d = = = = = = = = = = = = = = = = =	Overtionmeimes	Delivery of
	End of the course	Questionnaires	instructions &
			Assessment
			Methods

<sup>\*</sup>CIE – Continuous Internal Evaluation

## **Project report**

## The Project Report should consist of following items.

- 1. The project report must contain the following:
  - ♦ Introduction
  - ♦ Objectives
  - ♦ Tools/Environment Used
  - ♦ Analysis Document (This should include SRS in proper structure based on Software Engineering concepts, E-R diagrams/Class diagrams/any related diagrams (if the former are not applicable), Data flow diagrams/other similar diagrams (if the former is not applicable), Data dictionary)
  - ♦ Design Document (Modularization details, Data integrity & constraints including database design, Procedural design, User interface design)
  - ◆ Program code (Complete code (well indented)/Detailed specification instead of code\*, Comments & Description. The program code should always be developed in such a way that it includes complete error handling, passing of parameters as required, placement of procedure/function statements as needed.)
  - ◆ Testing (Test case designs are to be included separately for Unit testing, Integration testing, System testing; Reports of the outcome of Unit testing, Integration testing, System testing are to be included separately. Also, details of debugging and code improvement are to be included.)
  - ♦ Input and Output Screens
  - ♦ Implementation of Security for the Software developed (In case, you have set up a User Name and Password for your software, you should ensure the security of User Name and Password during transmission to server)
  - ♦ Limitations of the Project
  - ◆ Future Application of the Project
  - ♦ References and Bibliography
- 2. Project reports should be typed neatly in Times New Roman letters with font size 14 for titles and 12 for text on both sides of the paper with 1.5 line spacing on a A4 size paper (210 x 297 mm). The margins should be: Left 1.5", Right 1", Top and Bottom 0.75".
- 3. The total number of reports (**Soft bound**) to be prepared are
- One copy to the department /library
- One copy to the concerned guide(s)
- One copy to the candidate.

<sup>\*</sup>SEE – Semester End Examination

- 2. Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.
- 4. Every copy of the report must contain
- ➤ Inner title page (White)
- Outer title page with a plastic cover
- ➤ Candidate declaration and Certificate in the format enclosed both from the institution and the organization where the project is carried out.
- An abstract not exceeding 100 words, indicating salient features of the work.

## 5. The organization of the report should be as follows

1. Inner title page	
2. Table of Contents	
3. Candidate Declarationi	
4. Project guide Certificateii	
5. Certificateiii	
6. Acknowledgmentsiv	Usually
7. List of table & figures (optional)v	numbered in roman
8. Abstractvi	Toman
9. Chapter 1	
References / Bibliography	

Chapters(to be numbered in Arabic) containing Introduction-, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.

The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.

The chapter must be left or right justified (font size 16). Followed by the title of chapter centred (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 12.

The figures and tables must be numbered chapter wise

The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.

**Reference or Bibliography:** The references should be **numbered serially** in the order of their occurrence in the text and their numbers should be indicated within square

brackets for e.g. [3]. The section on references should list them in serial order in the following format.

- 1. For textbooks –
- 2. For papers -Y
- 3. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g.
- $\bullet V = IZ \qquad .....(3.2)$

All equation numbers should be right justified.

## CIE ASSESSMENT FOR FINAL REVIEW (VI Semester)

SN	Particulars	Marks
1	Log of Activity ( Plan & Schedule)	05
2	Report	10
3	Presentation	10
	Total	25

## **Project Review Committee should consists of**

- 1. Head of the Department
- 2. Two Staff members of the Department
- 3. Course Co-ordinator
- 4. Representative from Innovation Club of the Polytechnics/Engineering faculty/ Industry Institute Interaction Cell.

All students of  $6^{th}$  Semester should compulsorily attend each Review Proceedings of the meeting should be maintained in the department and shown during I.A. Verification.

# STAGES OF PROJECT REVIEW IN 6<sup>TH</sup> SEMESTER

Review	Activity					
I Review	Presentation on (a)data collected, (b) processing of Data (c) Experimental work conducted, (d) Finalization of contents of the project					
II Review	Presentation on (a) Results,(b) Discussion of Results (c) Conclusions Submission of Draft copy of Project Report					
III Review	Final Project Presentation and submission of Project Report					

## **SCHEME OF EVALUATION (SEE)**

SN	Particulars	Marks
1	Presentation	20
2	Demonstration	20
3	Viva-Voce	10
	TOTAL	50

# MODEL OF RUBRICS FOR ASSESSING REVIEWS OF PROJECT FOR CIE

Student name	Reg.	Dimension		Scale					Students Score				
			Unsatisfactory	Developing	satisfactory	Good	Exemplary	1	2	3	4	5	
		Collection of data	Does not collect any information relating to the topic	Collects very limited informatio n; some relate to the topic	Collect much informati on; but very limited relate to the topic	Collects some basic informati on; most refer to the topic	Collects a great deal of informati on; all refer to the topic						
		Fulfil team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles						
		Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.						
		Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometime s talk too much	Listens and speaks a fair amount						
						Grand Av	erage/Total						

## **APPENDIX 1 (Cover page)**

(A typical Specimen of Cover Page )<Font Style Times New Roman – Bold>

# TITLE OF PROJECT REPORT

<Font Size 18><1.5 line spacing>

## A PROJECT REPORT

<Font Size 14>

Submitted by

<Font Size 14><Italic>

# NAME OF THE CANDIDATE(S)

<Font Size 16>

in partial fulfillment for the award of the diploma

of

<Font Size 14><1.5 line spacing><Italic>

**DIPLOMA IN** 

**PROGRAMME** 

<Font Size 16>

IN

DEPARTMENT OF

**ENGINEERING** 

<Font Size 14> LOGO

## NAME OF THE COLLEGE

<Font Size 14>

# DEPARTMENT OF TECHNICAL EDUCATION BENGALURU-560001

<Font Size 16><1.5 line spacing>

Year of submission: (MONTH & YEAR)

<Font Size 14>

# **APPENDIX 2 (Title page)**

(A typical Specimen of Title Page) <Font Style Times New Roman – Bold>

# A Project Report on

#### <TITLE OF THE PROJECT WORK>

Submitted for partial fulfilment of the requirements for the award of the of

#### DIPLOMA IN COMPUTER SCIENCE AND ENGINEERING

## BY BATCH

<Mr. / Ms. Name of the Student (Reg No.)>

<Mr. / Ms. Name of the Student (Reg No.)>

<Mr. / Ms. Name of the Student (Reg No.)>

<Mr. / Ms. Name of the Student (Reg No.)>

<Mr. / Ms. Name of the Student (Reg No.)>

Under the guidance of

<Name of the Staff> Lecturer Department of

Department of
<<NAME OF INSTITUTE>>
<<ADDRESS OF INSTITUTE>>

# **APPENDIX 3 (Candidate declaration)**

# **CANDIDATE'S DECLARATION**

I, the student of Diploma in Computer Science and
Engineering Department bearing Register Numberof
Polytechnic, hereby declare that, I owe full responsibility for the
information, results and conclusions provided in this project work titled
"" submitted to <b>Board of Technical Examinations</b> ,
Government of Karnataka for the award of Diploma in Computer Science and
Engineering. To the best of my knowledge, this project work has not been submitted in part
or full elsewhere in any other institution/organization for the award of any
certificate/diploma/degree. I have completely taken care in acknowledging the contribution of
others in this academic work. I further declare that in case of any violation of intellectual
property rights and particulars declared, found at any stage, I, as the candidate will be solely
responsible for the same.
Date:
Place: Signature of candidate
Name:
Reg No:

# **APPENDIX 4 (Project Guide Certificate)**

(A typical specimen of Bonafide Certificate) <Font Style Times New Roman> Name of the institute <Font Style Times New Roman – size -18> **Department** <Font Style Times New Roman – size -16> **BONAFIDE CERTIFICATE** <Font Style Times New Roman – size -16> <Font Style Times New Roman – size -14> Certified that this project report " TITLE OF THE **PROJECT** the bonafide work of " "is **NAME** OF THE " bearing Register Nos " CANDIDATE(S)\_ " of this institution who carried out the project work under my supervision. <<Signature of the Project Guide>> << Signature of the Head of Department>> **SIGNATURE SIGNATURE** <<Name>> <<Name>> Guide **Head of Department** <<Academic Designation>> << Department>> << Full address of the Dept & College << Full address of the Dept & College >>

## **APPENDIX 5 (Certificate)**

# DEPARTMENT OF TECHNICAL EDUCATION

# NAME OF THE INSTITUTION

Address with pin code

Department of	

# **CERTIFICATE**

Certified that this project report	entitled "	"which
is being submitted by Mr./Ms		_, Reg. No,
a bonafide student of	in partial fulfilm	nent for the award of <b>Diploma</b>
inEngine	eering during the year	is record of students
own work carried out under my	//our guidance. It is certified th	nat all corrections/suggestions
indicated for internal Assessme	nt have been incorporated in t	he Report and one copy of it
being deposited in the polytechn	ic library.	
The project report has been app	proved as it satisfies the acaden	nic requirements in respect of
Project work prescribed for the s	said diploma.	
It is further understood that by t	this certificate the undersigned of	do not endorse or approve any
statement made, opinion express	sed or conclusion drawn there is	n but approve the project only
for the purpose for which it is su	bmitted.	
(Name)	(Name)	(Name)
Guide(s)	Head of Department	Principal
Name and signature Examiner		
1		
2		

# APPENDIX-6 (PROJECT-TIME LINE)

	Task	Responsibility	V Semester			VI Semester							
SL.No			1	3	4 to	7	1	2	4	5	11	13	14
			to 2	3	6	to 14	1	to 3	4	to 10	to 12	13	14
1	Seminar regarding Project work	HOD / coordinator											
2	Batch formation &Guide allocation	HOD											
3	Identification of project	Students / Guide											
4	Project synopsis Submission	Students											
5	Finalizations of Project	Students / Guide											
6	Literature survey	Students / Guide											
7	Identification of facility to do PW	Guide											
8	Study & design of system and Phase 1 presentation	Students / Guide											
9	Results discussion / performance testing	Students											
10	Review of Project work by guide	Students											
11	Project report submission and Phase 2 presentation	Students / Guide											