

(2½ Hours)

[Total Marks: 75]

- N.B. 1) All questions are compulsory.  
2) Figures to the right indicate marks.  
3) Illustrations, in-depth answers and diagrams will be appreciated.  
4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All (Each of 5Marks)

(15)

(a) Multiple Choice Questions:

(i) What type of web services do not keep any memory of what happens to it between requests?

- (A) stateful (B) stateless  
(C) singleton (D) none of these

(ii) Which element is a single root of every SOAP message?

- (A) <Envelope> (B) <Entity>  
(C) <soap> (D) <soapEnvelope>

(iii) Which of the following HTTP method should be used to create resource using RESTful web service?

- (A) GET (B) DELETE  
(C) PUT (D) OPTIONS

(iv) Which of the following is correct about URI in RESTful web services?

- (A) Each resource in REST is identified by its URI  
(B) Purpose of URI is to locate resource on the server hosting the web service  
(C) Both (A) and (B)  
(D) Neither (A) nor (B)

(v) WCF supports which transport schema?

- (A) HTTP (B) TCP  
(C) MSMQ (D) All of these

(b) Fill in the blanks:

(@QueryParam, SOAP, Reverse State Transfer, WSDL, UDDI, @Param, Representational State Transfer, Named, MSMQ)

(i) \_\_\_\_\_ is a de facto standard messaging protocol used by web services.

(ii) Web services can be published and discovered using \_\_\_\_\_.

(iii) \_\_\_\_\_ annotation of JAX-RS API binds the parameter passed to method to a query parameter in path.

- (iv) REST stands for \_\_\_\_\_.
- (v) In WCF, \_\_\_\_\_ pipes are used for one-way or duplex communication between different WCF applications on a single computer.

(c) Answer in 1 – 2 sentences:

- (i) What is SOA?
- (ii) What is JAX-WS?
- (iii) Describe the purpose of @javax.ws.rs.Produces annotation.
- (iv) What is OAUTH protocol used for?
- (v) What is the purpose of FaultContract in WCF?

**Q. 2 Attempt the following (Any THREE)**

(15)

- (a) What are web services? How do web services differ from web-based applications?
- (b) Explain various types of information that can be published in UDDI registry.
- (c) Explain SOAP communication model.
- (d) Explain any 5 key capabilities of ESB.
- (e) Write a note on portfolio analysis in Web Services Development Lifecycle.
- (f) Give example and illustrate the steps for creating a web service using JAX-WS.

**Q. 3 Attempt the following (Any THREE)**

(15)

- (a) Explain how HTTP GET Method is used to perform READ data action in RESTful Web Services.
- (b) Explain various grant types available in OAuth 2.0 protocol.
- (c) Describe the core constraints of RESTful system.
- (d) Explain the concept of HATEOS.
- (e) What are annotations? Explain @Path annotation used for defining RESTful resource.
- (f) How is JSON data processed in RESTful web services? Describe various Java APIs available for processing JSON.

**Q. 4 Attempt the following (Any THREE)**

(15)

- (a) Explain the following terms:
  - (i) Endpoint
  - (ii) Binding
- (b) Write a note on WCF Architecture.
- (c) Explain various hosting options available for WCF Web Services.
- (d) What do you understand by a contract in WCF? Explain the purpose and usage of ServiceContract attribute.
- (e) Write the steps involved in creating web service using WCF. Illustrate with a suitable example.
- (f) Describe any five features of WCF.

**Q. 5 Attempt the following (Any THREE)**

**(15)**

- (a) Describe various advantages of SOAP.
- (b) Explain various message patterns that can be used with WSDL.
- (c) Write a note on Web Application Description Language (WADL).
- (d) Explain the following core architectural elements of a RESTful system:
  - (i) Resource
  - (ii) Representation of a Resource
- (e) Explain the following Business Service Realization options:
  - (i) Green-field development
  - (ii) Meet-in-the-middle development

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(c) **Short Answers.**

- i) Define deterministic task environment.
- ii) List the parameters used to evaluate performance of Search algorithms.
- iii) What is supervised learning?
- iv) What are the examples of nonparametric model?
- v) What is maximum-likelihood learning?

**Q. 2 Attempt the following (Any THREE)(Each of 5Marks) (15)**

- (a) Write states, Initial States, Actions, Transition Model and Goal test to formulate 8 Queens problem.
- (b) Describe Utility based agent.
- (c) Describe general Graph-search algorithm.
- (d) Explain Thinking rationally and Acting rationally approaches of AI.
- (e) What is PEAS? Describe it for Satellite image analysis system, and Interactive English tutor.
- (f) Explain following task environment-
  - i) Single Agent vs. Multiagent
  - ii) Episodic vs. Sequential

**Q. 3 Attempt the following (Any THREE) (Each of 5Marks) (15)**

- (a) Describe Linear classifiers with hard threshold.
- (b) Explain Single-layer feed forward neural networks.
- (c) Explain the Restaurant wait problem with respect to decision trees representation.
- (d) Describe K-fold cross validation and LOOCV.
- (e) Describe Univariate linear regression.
- (f) Write a short note on Support Vector Machines.

**Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)**

- (a) Write a short note on Passive Reinforcement Learning.
- (b) Explain EM algorithm in detail.
- (c) Write a note on Naïve Bayes models.
- (d) What are beta distributions? Elaborate with example.
- (e) Write a short note on Hidden Markov Model.
- (f) Write a note on Statistical Learning.

**Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)**

- (a) Explain Uniform Cost Search with suitable example.
- (b) Write a short note on Learning agent.
- (c) What is entropy? How do we calculate it?
- (d) What is an artificial neuron network?
- (e) Explain applications of Reinforcement Learning.

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**Q. 1 Attempt All (Each of 5Marks)****(15)****(a) Multiple Choice Questions:**

1. On \_\_\_\_\_ the domain's configuration files resides.
  - a) Caching server
  - b) Primary server
  - c) Secondary server
  - d) Root name server
2. A LDAP directory is a tree of data entries that is hierarchical in nature and is called the Directory Information Tree (DIT).
  - a) True
  - b) False
3. Which of the following is not a valid run-level?
  - a) 3
  - b) 0
  - c) 8
  - d) 1
4. DHCP stands for \_\_\_\_\_.
  - a) Dynamic Host Creation Protocol
  - b) Dynamic Host Configuration Protocol
  - c) Defined Host Configuration Protocol
  - d) Dedicated Host creation Protocol
5. Which file is read by init to get the default runlevel?
  - a) /etc/profile
  - b) /etc/init
  - c) /etc/boot
  - d) /etc/inittab

**(b) Fill in the blanks : (www, mod\_ftp, jabber server, rules, org, directions, FTP server, IRC server, mod\_ssl)**

1. \_\_\_\_\_ is an open standard for instant messaging.
2. The vsftpd package is used for the \_\_\_\_\_ software.
3. A chain is simply a list of \_\_\_\_\_ that act on a packet flowing through the system.
4. \_\_\_\_\_ apache module provides strong cryptography for the Apache web server.
5. In website 'www.support.example.org.' \_\_\_\_\_ is the top level domain.

**(c) Short Answers:**

1. The /etc/passwd File.
2. Role of IMAP server.
3. What is IP Aliasing?
4. What is caching server?
5. Role of samba server.

**Q. 2 Attempt the following (Any THREE)(Each of 5Marks)**

- (a) What is the importance of /etc/fstab in linux file system? (15)
- (b) Explain the following variables supported in xinetd services:
- socket\_type
  - user
  - server
  - wait
  - protocol
- (c) Write steps to configure Netfilter.
- (d) What is GNU public license? Explain advantages and disadvantages of open source software.
- (e) What is kernel and where do you find kernel source code? Explain how to unpack the kernel source code.
- (f) Explain what are targets? List any 5 targets used in preparing the kernel.

**Q. 3 Attempt the following (Any THREE) (Each of 5Marks)**

- (a) Write a short note on FTP. (15)
- (b) Define Apache. Write its benefits.
- (c) Discuss POP in regards with following points:
- Reasons why POP was created?
  - Idea behind POP.
- (d) Explain OpenSSH.
- (e) Write syntax along with example to define Primary and Secondary Zone in named.conf file of BIND.
- (f) What is SMTP? Explain.

**Q. 4 Attempt the following (Any THREE) (Each of 5Marks)**

- (a) Write any five components of NFS. (15)
- (b) Explain steps to configure NIS Server.
- (c) State any five options of DHCP configuration file.
- (d) Discuss phpMyAdmin.
- (e) List and explain implementations of Distributed File Systems (DFS).
- (f) What is LDAP? Explain.

**Q. 5 Attempt the following (Any THREE) (Each of 5Marks)**

- (a) Write five predefined chains of IPTables. (15)
- (b) List and explain DNS record types.
- (c) Explain any five common directives or options that are used in Apache's configuration file.
- (d) Write a short note on PostgreSQL.
- (e) Define the following terms:
- Physical Volume
  - Logical Volume
  - Physical extent
  - Logical Extent
  - Volume group

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Q.1 Attempt All (Each of 5Marks)

(15M)

(a) Multiple Choice Questions

1. Which Testing is performed first?
  - a) Black box testing
  - b) White box testing
  - c) Dynamic testing
  - d) Static testing
2. Boundary value testing
  - a) Is the same as equivalence partitioning tests
  - b) Tests combinations of input circumstances
  - c) Test boundary conditions on, below and above the edges of input and output equivalence classes
  - d) Is used in white box testing strategy
3. Which of the following is / are not a Iterative Model?
  - a) RAD
  - b) Incremental
  - c) V model
  - d) Spiral Model
4. The difference between testing and debugging is -
  - a) In testing, the objective is to establish whether the system is running as per specifications, whereas in debugging the objective is to locate and correct the errors in a system.
  - b) Both are the same except that debugging is unstructured, whereas testing is structured
  - c) Debugging phase produces testing phase
  - d) None of these
5. In Which of the following situation defects will arise?
  - a) No knowledge of system
  - b) System is used in wrong way
  - c) Incorrect setup of testing environment
  - d) All the above

(b) Fill in the blanks.

(Test Planning, Measure quality, Test Stub, Fix defect, Test specification, Test Driver, Requirements, Code, Test Closure)

1. Testing helps us to \_\_\_\_\_ of product by finding defects in product
2. Test cases are designed during \_\_\_\_\_
3. \_\_\_\_\_ calls the function and passes it test data.
4. Acceptance test cases are based on \_\_\_\_\_
5. \_\_\_\_\_ is not a Software Development Life Cycle Phase?

(c) Short Answers.

1. What is error?
2. Define SQA.
3. What is inspection?
4. Define defect.
5. Define cost of quality.

Q. 2 Attempt the following (Any THREE)(Each of 5Marks)

(15M)

- (a) Write in brief about QA, QC, QM.
- (b) Discuss roles & responsibilities in review.
- (c) Write note on Black box testing.
- (d) Differentiate between Inspection & Walkthrough
- (e) Write note basis path testing
- (f) Discuss types of Software Quality factors.

Q. 3 Attempt the following (Any THREE) (Each of 5Marks)

(15M)

- (a) Write a note on Alpha and Beta Testing in Validation Testing.
- (b) Define Software Metric. Give its purpose. Explain its types.
- (c) Explain the steps of Defect Management Process.
- (d) Discuss "Strategic Approach To Software Testing".
- (e) What is the format of Defect Report? Explain.
- (f) Explain Top-down Integration testing.

Q. 4 Attempt the following (Any THREE) (Each of 5Marks)

(15)

- (a) Write a note on SQA Plan.
- (b) Explain Pareto Diagram with example.
- (c) List types of Quality Costs. Explain in detail.
- (d) Define Six-Sigma. Explain its basic steps.
- (e) How to measure quality cost?
- (f) Discuss Formal Technical Review in detail.

- Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)
- (a) Explain different phases of SDLC.
  - (b) What is System Testing? Explain its any two types.
  - (c) Explain the following:-
    - i. ISO
    - ii. ISO 9000
    - iii. ISO 9000 series
  - (d) Differentiate between Verification and Validation.
  - (e) What are the measures of Reliability and Availability? Explain.
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**Q. 1 Attempt All(Each of 5Marks)****(15M)****(a) Multiple Choice Question**

- i) Message \_\_\_\_\_ means that the data must arrive at the receiver exactly as it is sent. a) Access Control b) Non repudiation c) Masquerade d) Integrity
- ii) Which one of the following is passive attack?  
a) Masquerade b) Traffic analysis c) Repudiation d) Replay
- iii) A firewall is specific form of a) router b) bridge c) Operating System d) Architecture
- iv) To sign a document digitally we need a) Sender's Private key b) Sender's Public key c) Receiver's Private key d) Receiver's Public key
- v) DES is an acronym for. a) Data encryption Standard b) Digital encryption Standard c) Data encryption System d) Double encryption Standard

**(b) Fill in the blanks**

(Message Digest, crossover ,encrypted, Transport ,asymmetric cryptography, mutation)

- i) For confidentiality, data to be sent is \_\_\_\_\_.
- ii) A polymorphic virus undergoes \_\_\_\_\_.
- iii) SHA -512 is a \_\_\_\_\_ algorithm.
- iv) Digital signature uses \_\_\_\_\_ cryptography.
- v) SSL is a \_\_\_\_\_ Layer protocol. Transport

**(c) Short Answers**

- i) Define block cipher?
- ii) What is Fiestel cipher?
- iii) List out any two virus countermeasures.
- iv) List out the functions used for rounds of AES?
- v) Define Honeypot.

**Q. 2 Attempt the following (Any THREE)(Each of 5Marks)****(15M)**

- (a) List and explain different categories of security services.
- (b) Explain Vigenere cipher giving proper example.
- (c) Write an overview of DES algorithm.
- (d) Explain ECB model of operation of block cipher.
- (e) Explain Asymmetric cryptography with its application.
- (f) Define security attack. Explain its different types?

- Q. 3 Attempt the following (Any THREE) (Each of 5Marks) (15M)**
- (a) Differentiate between stream cipher and block cipher.
  - (b) Discuss MAC in detail.
  - (c) Explain digital signature process.
  - (d) Discuss Diffie Hellman key exchange process.
  - (e) Write a short note on Kerberos.
  - (f) Explain the concept of Digital Certificate in detail.
- Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)**
- (a) Explain PGP with different services offered by it.
  - (b) Discuss SSL handshaking protocol in detail.
  - (c) Define Intrusion. Explain different approaches of Intrusion detection.
  - (d) Define malicious software. Explain different types of viruses.
  - (e) Explain capabilities and limitations of firewall.
  - (f) Explain Secure Electronic Transaction.
- Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)**
- (a) Explain different aspects of Network security.
  - (b) Explain different modes of operations of IPSec protocol.
  - (c) Explain Man in middle attack.
  - (d) Explain lifecycle of virus.
  - (e) Encrypt NOTHING IS AS IT SEEMS and decrypt MKHSE LWYAE ATSOL using Rail Fence cipher.
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Q. 1 Attempt All (Each of 5 Marks)

(15M)

(a) Multiple Choice Questions

1. IoT-A stands for \_\_\_\_\_
  - a) Internet of Things Address
  - b) Internet of Things Architecture
  - c) Internet of Things Area
  - d) Industrial of things Architecture
2. What is the Ethernet/LAN cable used in RPi?
  - a) Cat5
  - b) Cat5e
  - c) Cat6
  - d) RJ45
3. What is the default user in Debain on Raspberry Pi?
  - a) Default
  - b) User
  - c) Pi
  - d) Root
4. Gyroscope is used for \_\_\_\_\_
  - a) Anti-theft
  - b) Capacitive proximity sensing
  - c) Gaming
  - d) Angle detection
5. Data in network layer is transferred in the form of \_\_\_\_\_
  - a) Layers
  - b) Packets
  - c) Bytes
  - d) Bits

(b) Fill in the blanks

( personal, private, IPv4, IPv6, auto repeat request, auto repeat question, 3, 6, TCP, UDP)

1. In 6 LoWPAN, P stands for.....
2. 32 bit IP addressing is in .....
3. ARQ stands for .....
4. Gyro Sensor MPU 6050 collects ..... axis rotation data.
5. Voice & Data transmission is governed by ..... protocol.

(c) **Explain in Brief**

1. Define IoT. Explain architecting means in IoT.
2. Full form of IEEE.
3. In 6LoWPAN, 6 stand for what?
4. Explain, why low energy architecture needed for IoT?
5. State some applications of IoT& justify why it is IoT?

**Q. 2 Attempt the following (Any THREE)**

(15M)

- (a) Explain in brief the design principles that should be considered while designing the architecture of IOT.
- (b) Explain with block diagram the IOT Functional model.
- (c) Discuss features of ETSI M2M high level architecture with diagram.
- (d) Explain different M2M service capabilities with example.
- (e) How ITU-T IoT reference model works?
- (f) Discuss the following in brief
  - Sensors
  - RFID Tags

**Q. 3 Attempt the following (Any THREE)**

(15M)

- (a) Explain in short RPL and CORPL. What is the difference between these protocols?
- (b) Discuss the working of ZigBee and its topologies with devices.
- (c) Write a short note on 6LoWPAN with its functions and characteristic.
- (d) Write a short note on DHCP with its applications in IoT.
- (e) What are the difference between IPv4 and IPv6 protocol?
- (f) Write a short note on wireless HART.

**Q. 4 Attempt the following (Any THREE)**

(15 M)

- (a) Differentiate between TCP and MPTCP.
- (b) How UDP works? Explain with an example.
- (c) Discuss request and response architecture of HTTP.
- (d) Discuss different types of actors associated in MQTT protocol.
- (e) How XMPP helps in communication between two nodes/devices?
- (f) Discuss in brief working of OMA.

**Q. 5 Attempt the following (Any THREE)**

(15 M)

- (a) What are the objectives of IoT architecture?
- (b) Explain ideology "From IoT architecture to system Solution" with one example.
- (c) Discuss architecture and application of DASH7 protocol.
- (d) Explain Bluetooth low energy protocol with reference to data transmission.
- (e) Write a short note on AMQP and its working.

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Duration 2<sup>1/2</sup> Hours

Marks:75

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- 1) All questions are compulsory
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**Q1 a** Choose the correct answer from the given options 5

- 1 Identify the technique used to avoid flickering in animation
  - a) Blending
  - b) Swap chain
  - c) z-Buffering
  - d) None
- 2 Which one of the following is not a DirectX 11 library
  - a) d3d11.lib
  - b) dxgi.lib
  - c) dxerr.lib
  - d) dxgilib
- 3 Light bulb is a typical example of
  - a) Point light
  - b) Parallel light
  - c) Spot light
  - d) None of the above
- 4 Which is the color that controls colour transparency
  - a) Green
  - b) Alpha
  - c) Blue
  - d) Red
- 5 Using right hand rule, the angle of rotation about the x axis is called
  - a) Roll
  - b) yaw
  - c) pitch
  - d) None

**Q1 b** Answer in one or two sentences 5

- 1 Define 2D reflection
- 2 What is the task of input assembler stage in rendering pipeline
- 3 Define Clipping
- 4 Centre of gravity of a triangle
- 5 What are colliders in Unity

**Q1 c** Fill in the blanks taking value from the pool (Blending, Network manager, Gravity, Start, AR, VR) 5

- 1 The \_\_\_\_\_ method will be called if a GameObject is active
- 2 All rigid bodies are associated with \_\_\_\_\_ feature
- 3 \_\_\_\_\_ is a technique used to identify pixels of an object in front of another
- 4 Pokemon Go is a typical example of \_\_\_\_\_ experience
- 5 The features of Multi player game is managed by \_\_\_\_\_

**Q2 Answer any Three from the following 15**

- 1 Explain in detail the different 2D transformations
- 2 Describe the use of Lambert's law in lighting calculation
- 3 Write a short note on direction cosines
- 4 Define the term swap chain and explain how it is implemented
- 5 Describe the stages in rendering pipeline
- 6 Define a Shader and explain any two GPU shaders

**Q3 Answer any Three from the following 15**

- 1 Describe the process of interpolating two vectors
- 2 Explain cubic interpolation
- 3 Obtain the intersection points of two straight lines and two line segments
- 4 Describe the use of hessian normal form
- 5 Obtain the point of intersection of a circle with straight line
- 6 Write a short note on uniform B-Spline

**Q4 Answer any Three from the following 15**

- 1 What are smart Glasses? State their application
- 2 Define HMD and explain any two such devices
- 3 Describe the management of multiple players in game development
- 4 Define AR and give its applications
- 5 Explain Prefab in Unity
- 6 Discuss start() and update() methods in unity C# script

**Q5 Answer any Three from the following 15**

- 1 Describe the features of GPU
- 2 Explain the multisampling antialiasing technique
- 3 Write a short note on interpolating quaternions
- 4 Explain the terms Hierarchy, asset, and scene in relation to unity
- 5 Define Components and explain how they are used with game objects

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