

**PAPER III: SUBJECT SPECIALIZATION PAPER for IT 3 YEARS (Technical)**

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2012  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER for IT 3 YEARS**

---

<b>Date</b>	: 14 October 2012
<b>Total Marks</b>	: 100
<b>Examination Time</b>	: 150 minutes (2.5 hours)
<b>Reading Time</b>	: 15 Minutes (prior to examination time)

---

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY:**

1. Write your Roll Number clearly on the Answer Booklet in the space provided.
2. The first 15 minutes is being provided to check the number of pages, printing errors, clarify doubts and to read the instructions. You are NOT PERMITTED TO WRITE during this time.
3. Use either Blue or Black ink pen or ball point pen for the written part and Pencils for the sketches and drawings.
4. All answers should be written on the Answer Booklet provided. Candidates are not allowed to write anything on the question paper or any other materials.
5. All answers must be labeled with appropriate question numbers (Section, Question and sub-Question Numbers wherever applicable). Unlabelled answers will not be assessed.
6. This paper is divided into two sections-namely SECTION A and SECTION B.
7. SECTION A consists of two parts: Part I and Part II.  
Part I consists of 30 Multiple-Choice Questions carrying one (1) mark each and is compulsory. The answer of your choice should be clearly written in whole along with the question and option number on your answer booklet. Eg. 31(c).  
Part II consists of four (4) short answer questions of five (5) marks each and all questions are compulsory.
8. SECTION B consists of two Case Studies. Choose only ONE case study and answer the questions under your choice. Each case study carries fifty (50) marks in total.
9. This Paper consists of eight (8) pages including this Instruction page.

**SECTION A**

**PART I - Multiple Choice Questions (30 Marks)**

Choose the correct answer and write down the letter of the correct answer chosen in the Answer Sheet against the question number. E.g. 31 (c). Each question carries ONE mark.

- 1) Three basic characteristics that differentiate microprocessors are:
  - a) instruction set, bandwidth and clock speed
  - b) size, look and feel
  - c) design, size and number of chips
  - d) no of spikes, chip and processor speed
- 2) The minimum size of a TCP header is
  - a) 8 bits
  - b) 20 bytes
  - c) 20 bits
  - d) 60 bytes
- 3) The following is **TRUE** when the SYN flag bit in a TCP header is set to 1
  - a) Payload field is encrypted
  - b) Data transfer is complete
  - c) The sequence number value is the starting sequence number
  - d) None of the above
- 4) Which of the following TCP segment fields takes care of flow control during data transfer
  - a) Source Port
  - b) Destination Port
  - c) Data Offset
  - d) Window Size
- 5) \_\_\_\_\_ is a model for determining the cost of a software:
  - a) COCOMO
  - b) SDLC
  - c) KLOC
  - d) DFD
- 6) In an IPV4 header the fields *Destination Address* and *Protocol* represents
  - a) Destination port number and UDP protocol
  - b) Destination Host IP address and the Higher layer protocol using the IP protocol
  - c) MAC address of the host and the ARP protocol
  - d) None of the above

PAPER III: SUBJECT SPECIALIZATION PAPER for IT 3 YEARS (Technical)

- 7) Spectrum of a signal is
  - a) The range of frequencies it contains
  - b) The maximum amplitude of the signal
  - c) The fundamental frequency of the signal
  - d) All of the above
- 8) The following are all signal transmission impairments EXCEPT
  - a) Attenuation
  - b) Delay Distortion
  - c) Noise
  - d) Frequency Modulation
- 9) Which of the following guided transmission media is not affected by electromagnetic field
  - a) Optical Fiber
  - b) Coaxial Cable
  - c) CAT 3 UTP
  - d) CAT 5 UTP
- 10) Microwave frequencies are frequencies falling in the range
  - a) 30MHz-1GHz
  - b) 1GHz-40GHz
  - c) 100Hz-1KHz
  - d) 1KHz-100MHz
- 11) IEEE 802.11 is a
  - a) High level programming language
  - b) Wireless networking standard
  - c) Ethernet LAN standard
  - d) Microprocessor
- 12) Which of the following is **NOT** a UML Behavioral Diagram
  - a) Activity diagram
  - b) State machine diagram
  - c) Use case diagram
  - d) Class diagram
- 13) A *Fork* in a UML activity diagram depicts
  - a) Decision making activity
  - b) Start activity
  - c) Beginning of a parallel activity
  - d) End of a parallel activity

- 14) Encapsulation in OOP means
- a) Packaging method and the data in an object and giving access to the object data through interfaces
  - b) Packaging the method and the data in an array
  - c) Instantiating a class by using a constructor
  - d) Ability of objects to provide context when methods or operators are called on the object.
- 15) Which of the following statements is **NOT TRUE** about Java abstract classes
- a) Abstract classes cannot be instantiated
  - b) An abstract class must be defined using the **Abstract** keyword
  - c) An abstract class must have at least one abstract method
  - d) A non abstract subclass does not need to provide implementation for all the inherited abstract methods.
- 16) The **finalize** method in Java programming is used for
- a) Releasing non java resources held by an object before it is garbage collected
  - b) Finalizing types of variables declared in a class
  - c) For deleting objects without references
  - d) All of the Above
- 17) All the following are benefits of using Stored procedures **EXCEPT**
- a) Create once, call many times and from many applications
  - b) A single statement can execute multiple lines of T-SQL Code
  - c) Users can be given access to execute a stored procedure without giving permission to the objects accessed by the stored procedure
  - d) Code reuse is minimal
- 18) Locking, a concurrency control measure in database, cannot prevent
- a) Lost updates
  - b) Dirty read
  - c) Inconsistent analysis or non repeatable read
  - d) Violation of Foreign Key Constraint
- 19) The following are all Relational Database Management Solutions **EXCEPT**
- a) Oracle Express Edition
  - b) MS SQL Server 2008
  - c) MySql
  - d) ASP.Net
- 20) Which of the following is not a type of Cloud computing
- a) Infrastructure as a Service
  - b) Security as a Service
  - c) Platform as a Service
  - d) Connectivity as a Service

PAPER III: SUBJECT SPECIALIZATION PAPER for IT 3 YEARS (Technical)

---

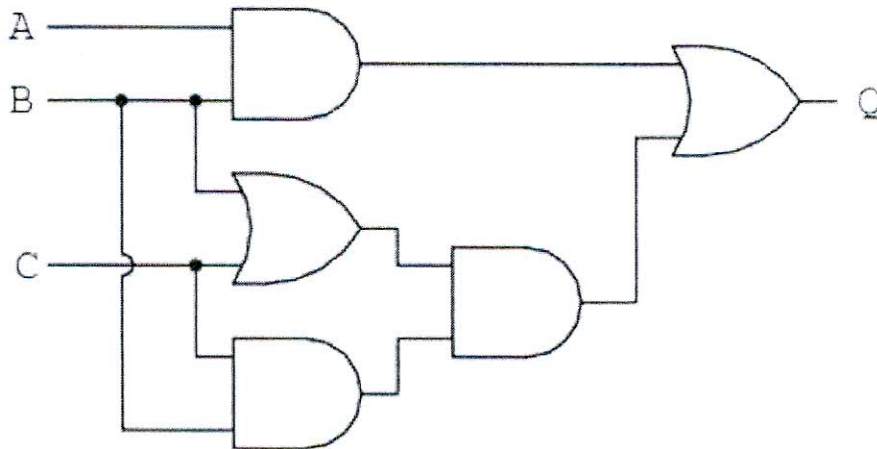
- 21) *Pair Programming* is a
- Agile system development technique
  - Programming language
  - Scripting language
  - A partnership between a software and a hardware programmer
- 22) Which of the following cannot be used to determine quality of Software:
- Conformance to requirements
  - Fitness for the purpose
  - Level of satisfaction
  - High cost
- 23) IIS in Windows Operating System is the equivalent of \_\_\_\_\_ in Linux
- Sendmail
  - IPtables
  - Apache
  - Xwindows
- 24) The operations “push” and “pop” are applied on
- Array
  - Enum
  - Stacks
  - Binary trees
- 25) The simplest form of the Boolean expression  $F = BC + B\bar{C} + BA$  is
- $F=B$
  - $F=B+BA$
  - $F=A+B$
  - $F=A+BC$
- 26) The result of the postfix notation of expression: 20, 30, +, 50, 40, -, \*
- 300
  - 500
  - 140
  - 60
- 27) \_\_\_\_\_ is not a type of software testing
- Unit testing
  - Integration testing
  - Beta testing
  - Boolean testing
- 28) Shell scripting is mostly used to
- Program operating system of Windows, UNIX, etc.
  - Program command line of an operating system
  - All of above
  - None of above

- 29) Operator overloading in OOP is an example of
- a) Inheritance
  - b) Polymorphism
  - c) Garbage Collection
  - d) Encapsulation
- 30) Which of the following is the most advanced data transmission technique for Wide Area Networks
- a) ATM
  - b) Packet Switching
  - c) Circuit Switching
  - d) Frame Relay

**PART – II : Short Answer Questions (20 marks)**

**Answer ALL the questions. Each question carries 5 marks.**

- 1) Discuss the differences between circuit switching and packet switching. Provide an example each for the two modes of switching. (5 Marks)
- 2) Transmission Control Protocol (TCP) is said to be a connection oriented reliable data transmission protocol. What does it mean? Briefly discuss how a typical TCP data transfer takes place. ( 5marks)
- 3) Write the Boolean expression for the following circuit. (5 marks)



- 4) What is an Interface in Java Programming? Explain briefly with the help of a Java code illustration.(5 marks)

**SECTION B : Case Study**

Choose either Case 1 or Case 2 from this Section. Each Case carries 50 marks.  
Mark for each sub-question is indicated in the brackets.

**CASE 1**

RCSC would like to enhance its online information system for civil service – Civil Service Information System (CSIS) to rationalize processes and include new features. Considering you are the manager and know the following:

- a. enhancement of the existing, complex system will require experienced and expert programmers to do the work
- b. limited user involvement
- c. Require high reliability
- d. budget availability for only this fiscal year

**Questions**

1. Formulate a plan for the project: “Enhancement of CSIS” (10)
2. Which Software Development Life Cycle Model would you recommend and why? - Explain the Model suitability (10)
3. What are Risk Management activities/processes you would undertake? Explain Risk identification methods and Treatments (10)
4. What do you think is the effect of software quality and schedule on cost? Describe atleast five software quality attributes. (10)
5. Explain Software testing methods and the levels of testing (10)

**CASE 2**

You have been recruited as a systems administrator in a newly established Company named DrukIT. The company deals in sale of electronic equipments. The Company has over 100 employees under different divisions, and all the division are housed in the same building. The Company plans to open sale counters in other districts. The organization has no IT infrastructure. The organization, however, intends to set up a Local Area Network and have the following IT services.

1. A fast and secure local area network with dedicated Internet Connection for available 24/7.
2. A private email facility for all the employees.
3. A small in-house database to manage the personnel information of the Company. The database should be able to generate information on the personal details of employees like (Name, Address, Age, and Qualification). The system should generate details about employee leave status. Every employee is entitled for a

**PAPER III: SUBJECT SPECIALIZATION PAPER for IT 3 YEARS (Technical)**

---

total of one month leave in a year. The leave could be taken as a full month or on random days.

4. A company website to upload information about the business of the Company
5. The company will buy a business solution software to manage the business which includes sales, accounting and supplier related works
6. The business solution software is a client server distributed .NET windows application.
7. The sales counters in the districts will use the client version of the business solution to update sales information and check stock availability.
8. These sales counter must be able to access the business solutions software in a reliable and secure manner
9. The sales people in the districts should also be able to access resources on the company LAN at the head office.

**Questions**

1. (a) List all the network equipments, servers, power supply requirements, other required items from ISP like domain name registration, etc that may be required in setting up the LAN that will incur cost to the Company. Also, describe the utility of the network equipments. (5 marks)  
(b) What is a layer 3 switch? How is it different from a Bridge? (5 Marks)
2. (a) Draw a layout of the local area network, with clear labels, that exhaustively captures the specified requirements of the Company. (5 marks)  
  
(b) Name the protocols which function on a Local Area Network along with their function. (5 Marks)
3. (a) How would you set up the private email facility? List down all the required software and connectivity requirements. (5 Marks)  
(b) What is SMTP? Briefly discuss how it works. (5 Marks)
4. (a) How would you connect the sales counter terminals securely to the Company LAN? Explain your options with the help of diagrams. (5 marks)  
(b) What are the protocols that are available for securing data transfer over the Internet? (5 Marks)
5. (a) Provide an E-R model for the in-house personnel database. Clearly label the E-R model with all the relevant properties like cardinality, relationship, multi valued attributes, etc. (5 Marks)  
(b) What do you mean by Data Definition Language (DDL) in SQL? Write down three DDL statements in context of your E-R model. (5 Marks)