

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2015
EXAMINATION CATEGORY: TECHNICAL**

PAPER II: GENERAL SUBJECT KNOWLEDGE for *ICT* GROUP

Date	: 10 October 2015
Total Marks	: 100
Examination Time	: 90 minutes (1.5 hours)
Reading Time	: 15 minutes (prior to examination time)

GENERAL INSTRUCTIONS

1. Write your Registration Number clearly and correctly in the Answer Booklet.
2. The first 15 minutes are to check the number of pages, printing errors, clarify doubts and to read the instructions in Question Paper. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts, namely Part I and Part II.** **Part I** consists of **70 Multiple Choice Questions** of 1 (one) mark each; and **Part II** consists of **10 Short Answer questions** of 3 (three) marks each.
4. **All questions are compulsory.**
5. All answers must be written in the Answer Booklet provided to you. You will not be given any marks for answers written other than in the Answer Booklet. Ask for additional Answer Booklet if required.
6. All answers should be written with correct numbering of Part, Section and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating any or correct Part, Section and Question Number will NOT be evaluated and no marks would be awarded.
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
10. This paper has **19** printed pages in all, including this Instruction Page.

GOOD LUCK!

PART I : MULTIPLE CHOICE QUESTIONS

Choose the correct answer and write down the letter of the correct answer chosen in the Answer Booklet against the question number. E.g. 71 (c). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

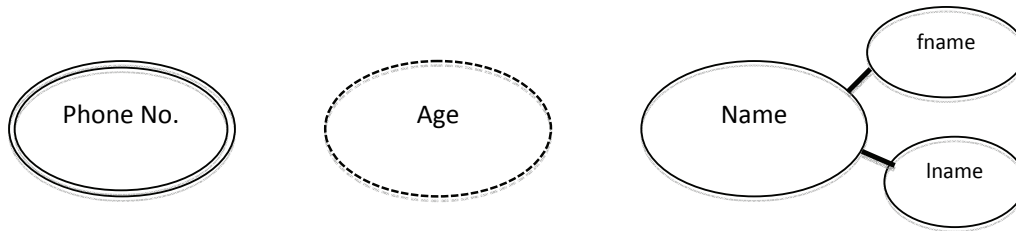
1. All of the following devices are output devices EXCEPT:
 - a. Laser printer
 - b. Graph Plotter
 - c. Buzzer
 - d. Web cam

2. Mechanism to protect private networks from outside attack is:
 - a. Firewall
 - b. Antivirus
 - c. Digital signature
 - d. Security camera

3. Which of the following is a functional requirement of a bicycle when it is taken as a system?
 - a. The cost of purchasing a bicycle
 - b. The bicycle to be used as mode of transportation
 - c. The comfort of a bicycle seat
 - d. Finished appearance of the bicycle

4. Telnet is a service that runs:
 - a. Television on net
 - b. Remote program
 - c. Virtual network
 - d. Cable tv network

5. Which type of attributes in ER-diagram are represented by following symbols in the given order:



- a. Multivalued attribute, Derived attribute and Composite attribute
 - b. Multivalued attribute, Composite attribute and Derived attribute
 - c. Composite attribute, Multivalued attribute, and Derived attribute
 - d. Composite attribute, Derived attribute and Multivalued attribute
6. Which of the following is NOT a method for information gathering during system analysis to develop new system for a company?
- a. Examine the existing documents of the company
 - b. Observe the current system of the company
 - c. Make appointments with the staffs of the company to develop a questionnaire
 - d. Organize meetings with the staffs of the company to understand the processes
7. Which of the following memory types will retain the information after the system is shutdown and restarted?
- a. dRAM
 - b. sRAM
 - c. ROM
 - d. Cache Memory
8. Which Test is conducted to validate the accomplishment of user requirements in an information system?
- a. Unit Test
 - b. Acceptance Test
 - c. System Test
 - d. Integration Test

Table

<i>CID</i>	<i>Name</i>	<i>School</i>	<i>Address</i>
10606000123	Sonam Tshering	Thimphu Primary School	Thimphu
20702300788	Karma Wangmo	Merak Primay Sshool	Trashigang
11808500910	Dorji Penjor	Chumey Primary School	Bumthang
11066624551	Lhamo	Minjey Primary School	Lhuntse

Study the above table and answer the question No. 9 and 10.

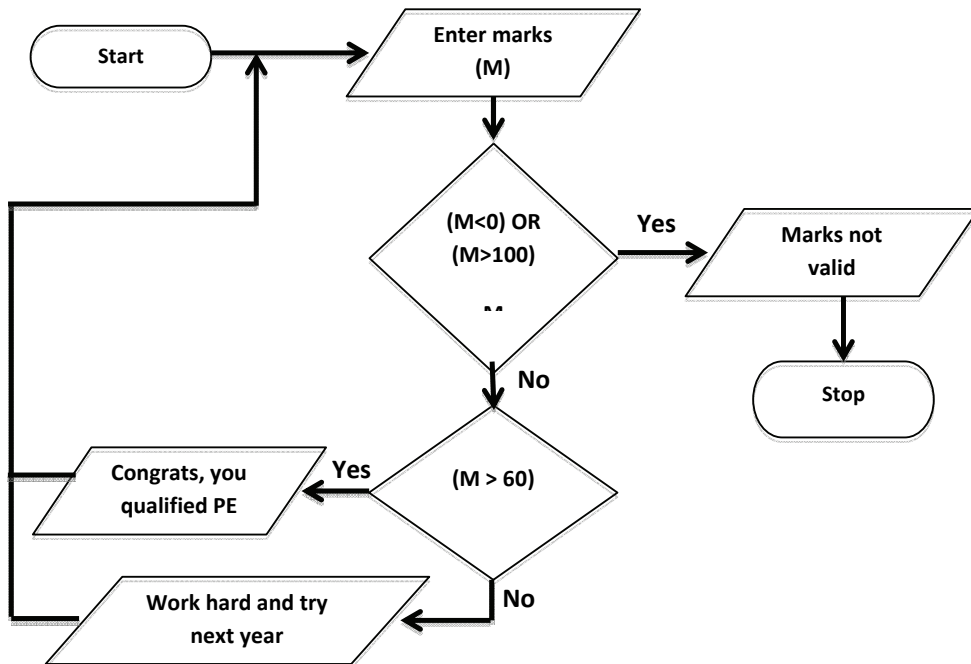
9. Which statement is correct?
- 'CID' is a record and 'Thimphu' is data value
 - 'School' is a field name and "Lhamo" is a data value
 - '11066624551' is attribute of the table
 - There are 16 records in the table
10. Which of the following SQL statements will give an error during execution assuming all data types is alphanumeric:
- INSERT INTO table (CID, Address) VALUES (12345678901, Chukha);
 - INSERT INTO table VALUES (12345678901, 'Dorji', 'Chukha', 'Druk School');
 - INSERT INTO table VALUES (12345678901, '0000', null, null);
 - INSERT INTO table (Name, School) VALUES (12345678901, 9999);
11. What is output of the following code?

```
//Java code for loop
public class Loop {
    public static void main(String[] args){
        int i=0;
        for(;i<4;i++){
            System.out.print(i<2);
            System.out.print(", ");
        }
    }
}
```

- Infinite loop
- True, False, False, False,
- True, True, False, False,
- True, True, True, False,

12. An example of a Closed System in our body is:
- Blood circulatory System
 - Respiratory System
 - Digestive System
 - Excretory System
13. The Network Access Layer of TCP/IP model is equivalent to which layers of the OSI model?
- Physical Layer and Data Link Layer
 - Data Link Layer and Network Layer
 - Physical Layer and Network Layer
 - Network Layer and Transport Layer
14. Which of the following servers converts the web address into IP address?
- Web Server
 - DNS Server
 - DHCP Server
 - FTP Server
15. **GPRS** in mobile communication stands for:
- General Packet Radio Session
 - General Packet Radio Service
 - Global Packet Radio Session
 - Global Packet Radio Service
16. What is binary representation of number $(125)_{16}$?
- 000001110101
 - 000001111101
 - 000100010101
 - 000100100101

Use the given flowchart of RCSC PE process to answer questions No. 17 and 18.



17. Which of the following statements about the algorithm represented by the flow chart is correct?

- a. It stops when the users enters a minus value
- b. It displays the message “Congrats, you qualified for PE” when the user enters 60
- c. It displays the message “Work hard & try next year” when the user enters 55
- d. It stops when user enters value 0

18. The parallelogram shaped symbol in the flowchart above represents:

- a. Input/Output
- b. Decision
- c. Process/Task
- d. Comments

19. Which of the following is valid octal number?

- a. 777
- b. 128
- c. 009
- d. 558

20. Which of the following can impair the signal?
- Attenuation
 - Noise
 - Distortion
 - All of the above
21. The sum of two prime numbers is:
- Always odd
 - Always even
 - Always prime
 - None of the above
22. The equation $2x^2 + 6x + 2 = 0$ has:
- Integer roots
 - No real roots
 - Real and irrational roots
 - Complex fractional roots
23. A random sample of international flights from Paro showed that 79% of flights arrived within 15 minutes of their scheduled arrival time, and this estimate has a margin of 3% of error at a 95% confidence level. Which of the following conclusion is the best?
- Exactly 79% arrived within 15 minutes of their scheduled time
 - Between 76% and 82% arrived within 15 minutes of their scheduled time
 - Exactly 95% arrived within 15 minutes of their scheduled time
 - Between 92% and 98% arrived within 15 minutes of their scheduled time
24. A shopkeeper sold two different pairs of socks at Nu.120 each. Based on his calculation, he made 20% profit on one pair and incurred 20% loss on the other. What is the overall net profit or net loss from the sale?
- There is no loss or gain
 - There is loss of Nu.10
 - There is profit of Nu.10
 - Cannot determine the overall net gain/loss

25. The equivalent expression of $\frac{\left(\frac{2}{a+b}\right)}{2(a+b)}$ is:

a. 1

b. 4

c. $\frac{1}{a^2+b^2}$

d. $\frac{1}{a^2+2ab+b^2}$

26. During the recent Thimphu Tsechu, *Sersho Gho* has been marked down the price by Nu.2000 to attract the sale. An additional discount of 10% was provided on the new price. If the customer paid Nu. 45,000, what was the original price of the *Sersho Gho*?

a. Nu. 48,000

b. Nu. 52,000

c. Nu. 62,000

d. Nu. 72,000

27. A school has 55% girls and 45% boys. If 81% of the girls and 90% of the boys passed their internal assessment, what is the overall pass percentage of the students?

a. 85.50 %

b. 85.35 %

c. 85.20 %

d. 85.05 %

28. Dechen and Sonam were roadside Momo sellers. In the first week, Dechen sold 30% more plates of Momo than Sonam did. The following week, Dechen sold 20 plates of Momo, while Sonam sold none. Overall, if Dechen sold 40% more plates of Momo than Sonam, how many plates of Momo did Sonam sell in total?

a. 80 plates

b. 100 plates

c. 120 plates

d. 130 plates

29. Which of the following equations is a line that passes through the point (-1, -6) and has a slope of 4?
- a. $y = 4x + 10$
 - b. $2y = 8x + 4$
 - c. $3y = 12x - 6$
 - d. $y = 4x + 2$
30. Which of the following is TRUE about the equation: $y = \frac{1}{3}x - 3$?
- a. The equation passes through the points **P(18, -3)**
 - b. The equation is perpendicular to the equation: $3y = -9x + 2$
 - c. The equation is parallel to the equation: $2y = -\frac{2}{3}x + 7$
 - d. The equation passes through the origin
31. Your father has Nu. 100,000 to invest and decides to make a yearly income of Nu. 6000 from the investment plan. He invests Nu.60,000 at 5% per annum interest rate. At what rate should your father invest the remaining amount to meet the objective of his investment plan?
- a. 4.5%
 - b. 5.5%
 - c. 6.5%
 - d. 7.5%
32. Mr. Thinley, an enthusiast biker, travelled a distance of 50 km on his first trip. On second trip, he travelled 300 km while going three times as fast. His new time compared with old time was:
- a. Three times
 - b. Twice as much
 - c. Same
 - d. Half as much

33. If $10^{2y} = 25$, then 10^{-y} equals:

- a. $\frac{1}{5}$
- b. $\frac{-1}{5}$
- c. $\frac{1}{25}$
- d. $\frac{-1}{25}$

34. When a number n is divided by 7, the remainder is 2. Which of the following is the remainder when $2n + 1$ is divided by 7?

- a. 3
- b. 4
- c. 5
- d. 6

35. In a class, $\frac{3}{4}$ of girls like English and $\frac{1}{2}$ like Dzongkha. $\frac{1}{4}$ of those who like Dzongkha do not like English. How many girls from the class like neither English nor Dzongkha?

- a. $\frac{7}{8}$
- b. $\frac{5}{8}$
- c. $\frac{3}{8}$
- d. $\frac{1}{8}$

36. Pema can finish a piece of work in 6 days and Dawa can finish the same work in 8 days. If they worked together for 3 days, what percentage of work is still remaining?

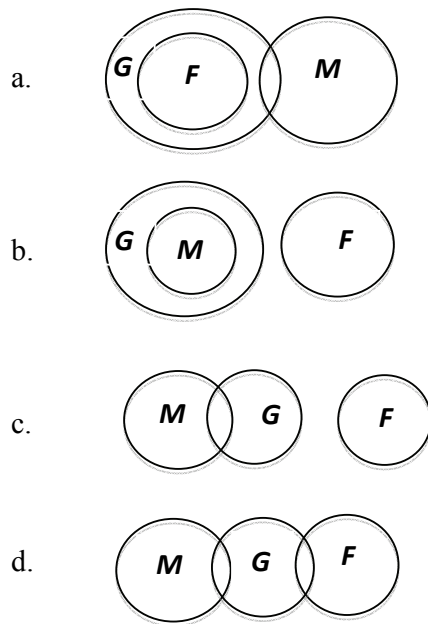
- a. 87.5%
- b. 62.5%
- c. 33.5%
- d. 12.5%

37. When a database processes a transaction, it is either fully completed or not executed at all. Which of the following properties implements this rule?

- a. Isolation
- b. Atomicity
- c. Durability
- d. Consistency

38. Which diagram best illustrates the relationship among the given terms:

M = Male, G = Graduates, F=Female Graduates



39. **One Newton** of force is equivalent to:

- a. An amount of force needed to accelerate 1000 grams of mass at the rate of 1 meter per second
- b. An amount of force needed to accelerate 100 grams of mass at the rate of 1 meter per second
- c. An amount of force needed to accelerate 10 grams of mass at the rate of 1 meter per second
- d. An amount of force needed to accelerate 1 gram of mass at the rate of 1 meter per second

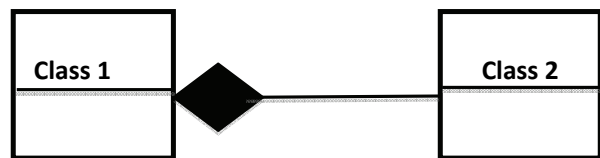
40. Three unbiased coins are tossed. What is the probability of getting at most two heads?

- a. $3/4$
- b. $1/4$
- c. $7/8$
- d. $3/8$

41. Which of the following data communication is used in frequency division multiplexing?

- a. Digital signal
- b. Analog signal
- c. Laser beam
- d. Infrared beam

42. Given UML class diagram is an example of:



- a. Association
- b. Aggregation
- c. Composition
- d. Relation

43. A computer program that converts an entire program into machine language is called a/an

- a. Interpreter
- b. Simulator
- c. Compiler
- d. Assembler

44. Which of the following is not the layer of TCP/IP protocol?

- a. Application layer
- b. Session Layer
- c. Transport Layer
- a. Internetwork Layer

45. Which of the following network topologies provides the greatest amount of redundancy?

- a. Bus Topology
- b. Ring Topology
- c. Star Topology
- d. Mesh Topology

46. Which of the following is NOT mandatory in variable declaration in Java programming?

- a. An assignment
- b. A semicolon
- c. An identifier
- d. A data type

47. Find the odd one:

- a. Iterative
- b. Agile
- c. Spiral
- d. Object-oriented

48. A context diagram is used as:

- a. A first step in developing a detailed DFD of a system
- b. A system analysis method for very complex systems
- c. An aid to system designs
- d. An aid to programmers

49. The rules of thumb that may solve a given problem, but do not guarantee a solution is:

- a. Strong methods
- b. Weak methods
- c. Heuristic
- d. Probabilistic

50. An algorithm that calls itself directly or indirectly is known as:

- a. Sub algorithm
- b. Recursive algorithm
- c. Polish notation algorithm
- d. Traversal algorithm

51. For the given IP address: 192.168.0.50, which portion indicates network ID and host ID?

- a. First 4 bits are network ID and following 28 bits are host ID
- b. First 8 bits are network ID and following 24 bits are host ID
- c. First 16 bits are network ID and following 16 bits are host ID
- d. First 24 bits are network ID and following 8 bits are host ID

52. Software maintenance refers to the support phase of software development which includes:
- a. Correction
 - b. Adaption
 - c. Enhancement
 - d. All of the above
53. A computer program that converts an entire program into machine language is called:
- a. Compiler
 - b. Debugger
 - c. Interpreter
 - d. Simulator
54. The ALU of a computer normally contains a number of high speed storage elements called:
- a. Buses
 - b. Registers
 - c. Transistors
 - d. Microprocessors
55. The output of an XOR gate with three inputs, A, B and C is **HIGH** when:
- a. $A = 0, B = 1$ and $C = 1$
 - b. $A = 0, B = 0$ and $C = 0$
 - c. $A = 1, B = 0$ and $C = 1$
 - d. $A = 1, B = 0$ and $C = 0$
56. Most demultiplexers facilitate which type of conversion?
- a. Decimal to Hexadecimal
 - b. Single input to Multiple outputs
 - c. AC to DC
 - d. Odd parity to Even parity

57. The devices that provide the means for a computer to communicate with users or other computers are referred to as:

- a. CPU
- b. ALU
- c. I/O
- d. CU

58. What is the cardinality of the Power set of the set $\{0, 1, 2\}$?

- a. 8
- b. 6
- c. 9
- d. 7

59. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected is:

- a. $21/46$
- b. $25/117$
- c. $1/50$
- d. $3/25$

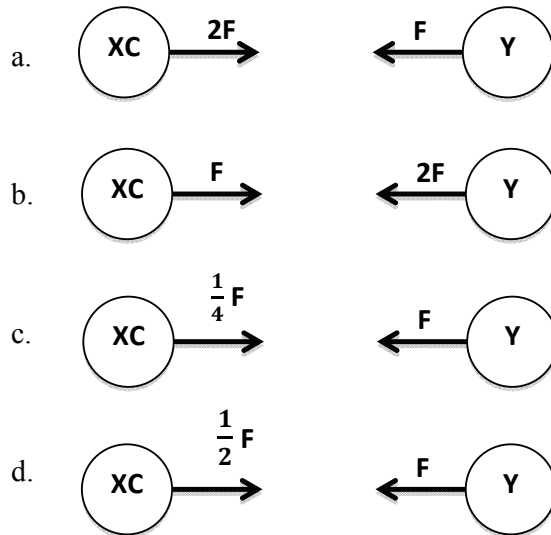
60. A sine wave is:

- a. Periodic and Discrete
- b. Periodic and Continuous
- c. Aperiodic and Continuous
- d. Aperiodic and Discrete

61. Before a data can be transmitted, they must be transformed to:

- a. Periodic signals
- b. Electromagnetic signals
- c. Low frequency sine waves
- d. Aperiodic signals

62. Two identical spheres X and Y exert a force F on each other. If mass of sphere X is doubled, which of the following diagram represents the force exerted by each sphere?



63. A periodic signal completes one cycle in 0.001 second. What is the frequency?

- 1 Hz
- 100 Hz
- 1 KHz
- 1 MHz

64. If $f(x) = x^2 - 16$ and $g(x) = x + 4$, then the composition of $(f \circ g)(x)$ is:

- $(x^2 - 16)(x + 4)$
- $x(x + 8)$
- $x^2 + x - 12$
- $x^2 - 12$

65. In frequency-domain plot, the horizontal axis measures:

- Signal amplitude
- Phase
- Frequency
- Slope

66. Which of the following statement is NOT correct for *SWITCH* statement in a programming?
- Duplicate case is not possible.
 - Nested switch case is possible.
 - Switch case statement is more efficient than equivalent *if else* ladder.
 - A switch statement without any case is not possible.
67. Which is the correct integer value of uppercase/lowercase character A as per ASCII?
- A = 65, a = 97
 - A = 97, a = 65
 - A = 65, a = 87
 - A = 61, a = 97
68. Which particle is negatively charged ion?
- Hydrogen (H) with 1 proton, 0 neutron and 1 electron
 - Sodium (Na) with 11 protons, 12 neutrons and 10 electrons
 - Chlorine (Cl) with 17 protons, 18 neutrons and 18 electrons
 - Magnesium (Mg) with 12 protons, 12 neutrons and 12 electrons
69. Generally, scientists choose to frame a problem in order to:
- Just find a fast solution to solve the problem
 - Clarify what is known, what restrictions exist and to identify the ultimate goal
 - Prove that there is only one solution to each problem
 - Make the solution look more presentable
70. In the study of Physics, an **Observation**:
- Is information gathered through vision
 - Can be made by seeing and hearing
 - Can yield only one possible explanation for a phenomenon
 - Is information gathered by using one or more senses

PART II: SHORT ANSWER QUESTIONS

Answer all questions. Each question carries THREE marks.

1. What do you understand by the following terminologies? *(1x3 = 3 marks)*
 - a. Phishing
 - b. Pharming
 - c. Spam

2. After a system has been implemented, it needs to be evaluated. Identify at least three evaluation strategies and state a reason why each is needed. *(3 marks)*

3. a. What is Hybrid/Tree network topology? *(1 mark)*
b. Draw a simple diagram of such hybrid network topology. *(2 marks)*

4. The sum of three numbers is 55. The ratio of the first to the second is 1:4, and the ratio of the second to the third is 2:3. Find three numbers. *(3 marks)*

5. What are the differences between Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM) *(3 marks)*

6. A company wants all its offices to be able to communicate using ICT systems. They are considering using **fax**, **e-mail** and **bulletin boards**. Give one advantage and one disadvantage of using each system. *(3 marks)*

7. Explain what do you understand by volatile and non-volatile memory in computing system? Give one example for volatile and non-volatile memory. *(3 marks)*

8. a. Draw an image formed by converging lens (convex lens) when an object is placed between $2f$ and f , where f is focal point of the lens. *(2 marks)*
b. Give any two characteristics of the image formed in (a). *(1 mark)*

9. Your friend's computer is running slow and he has asked your help to fix the problem, as he does not have sufficient knowledge about computers. Give at least 3 technical steps that you would take to fix the problem. (3 marks)

10. A randomly selected 50 people were checked for health problems at JDWNR hospital in Thimphu. From the group of 50 people, 10 were found to be healthy and every person of the remaining 40 were found to have either high blood pressure, a high level of cholesterol or both. If 20 have high blood pressure and 25 have high level of cholesterol:

a. How many people have both high blood pressure and cholesterol? (1 mark)

b. If a person is selected from the sampled group, what is the probability that he/she has high blood pressure? ($\frac{1}{2}$ mark)

c. Through calculations from the given statistics, prove that:

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) \quad (1\frac{1}{2} \text{ marks})$$

Given: $P(A)$ = Probability of having high blood pressure, $P(B)$ = Probability of having high cholesterol, $P(A \text{ and } B)$ = Probability of having both, and $P(A \text{ or } B)$ = Probability of having either high blood pressure or high cholesterol.

