

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2018  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER II: GENERAL SUBJECT KNOWLEDGE PAPER FOR ICT**

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<b>Date</b>	: 6 October 2018
<b>Total Marks</b>	: 100
<b>Writing Time</b>	: 90 minutes (1.5 hours)
<b>Reading Time</b>	: 15 Minutes (prior to writing time)

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**GENERAL INSTRUCTIONS:**

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is being provided to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts: Part I & 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 should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
6. All answers should be written with correct numbering of Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the correct Part and Question Number will NOT be evaluated and no marks will be awarded.
7. Begin each Section and 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. Use of any other paper including paper for rough work is not permitted.
10. **You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
11. This paper has **15 printed pages**, including this instruction page.

**GOOD LUCK**

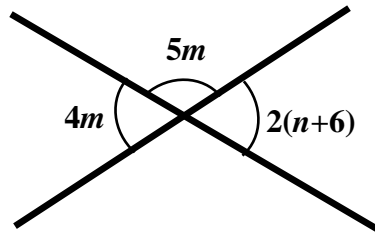
Part I

Multiple Choice Questions (70 marks)

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

1. Approximately, how many Megabytes are there in a Terabyte?
  - a)  $10^3$
  - b)  $10^4$
  - c)  $10^5$
  - d)  $10^6$
2. A total of 2200 candidates appeared for PE examination of RCSC in 2017, of which 45% are men. If  $\frac{2}{3}$  of men and  $\frac{4}{5}$  of women passed the exam, what is the overall pass percentage?
  - a) 55 %
  - b) 68 %
  - c) 74 %
  - d) 82 %
3. From a standard deck of cards, what is the approximate probability of drawing two aces in a row without replacement?
  - a) 0.45%
  - b) 0.0045%
  - c) 0.59%
  - d) 0.0059%
4. If x, y and z are in arithmetic progression, what would be the relation between x, y and z?
  - a)  $2x = y + z$
  - b)  $2z = x + y$
  - c)  $2y = x + z$
  - d)  $y = 2x + 2z$
5. What is the domain of function  $f(x) = x^{1/2}$  ?
  - a)  $\{0, \infty\}$
  - b)  $\{-\infty, \infty\}$
  - c)  $\{-\infty, 0\}$
  - d)  $\{1/2, \infty\}$

6. In the following figure, what is the value of  $n$ , if the angles are measured in degrees?



- a)  $n = 37$   
 b)  $n = 34$   
 c)  $n = 25$   
 d)  $n = 22$
7. The equation  $x^2 + 4x + 5 = 0$  has:  
 a) Irrational roots  
 b) Integer roots  
 c) Real roots  
 d) Complex roots
8. What is the range of a function?  
 a) It is the maximum set of numbers, which a function can take values  
 b) It is the maximum set of numbers for which a function is defined  
 c) It is set of natural numbers for which a function is defined  
 d) It is set of negative numbers, which a function can take values
9. Karma buys a bicycle at Nu 32,000, and sells it to his friend Sonam at 20% loss. Sonam sells the bicycle to Dawa at 10% profit. Dawa finally sells the same bicycle to Penjor at 10% profit. How much did Penjor pay for the bicycle?  
 a) Penjor paid more than Karma  
 b) Penjor paid equal to Karma  
 c) Penjor paid less than Karma  
 d) Penjor paid less than Sonam
10. Which of the following statement is CORRECT about the equation:  $4y = x + 4$ ?  
 a) The equation is parallel to the line:  $4y = 16x + 2$   
 b) The equation is parallel to the line:  $4y = -x + 4$   
 c) The equation is perpendicular to the line:  $4y = x + 2$   
 d) The equation is perpendicular to the line:  $4y = -16x + 1$

11. Dorji can finish digging a paddy field in 6 days. Dorji and his father together can finish digging the same paddy field in 4 days. How many days would Dorji's father take to dig the field alone?
- a) 8 days
  - b) 10 days
  - c) 12 days
  - d) 15 days
12. For the equation:  $5m + 2n = 50$ , where  $m$  and  $n$  are integer values, and  $m \geq 0$ ,  $n \geq 0$ , how many possible pair of values of  $(m, n)$  are there?
- a) 4 possible pair of values
  - b) 5 possible pair of values
  - c) 6 possible pair of values
  - d) 7 possible pair of values
13. In data structure, how many stacks are needed to implement a queue?
- a) 2 stacks
  - b) 3 stacks
  - c) 4 stacks
  - d) 5 stacks
14. In Thimphu, the number of people aged under 30 years is 3 times as many as number of people who are 30 years or older. What would be the ratio of number of people under 30 years to the total population of Thimphu?
- a)  $\frac{1}{3}$
  - b)  $\frac{2}{3}$
  - c)  $\frac{1}{4}$
  - d)  $\frac{3}{4}$
15. How many subsets are there in a set  $S = \{2, 4, 6, 8, 10\}$ ?
- a) 40
  - b) 32
  - c) 24
  - d) 16

16. A dice is rolled and a coin is tossed. What is the probability that a dice shows multiple of 3 and the coin shows a head?
- a)  $\frac{1}{2}$
  - b)  $\frac{1}{3}$
  - c)  $\frac{1}{4}$
  - d)  $\frac{1}{6}$
17. An echo occurs when a sound wave is \_\_\_\_\_.
- a) Absorbed
  - b) Transmitted
  - c) Refracted
  - d) Reflected
18. What is the definition of 1 Hertz?
- a) It is frequency unit defined as 1 cycle per second
  - b) It is frequency unit defined as 10 cycles per second
  - c) It is frequency unit defined as 100 cycles per second
  - d) It is frequency unit defined as 1000 cycles per second
19. What does Newton's third law of motion indicate?
- a) Force is mass times acceleration.
  - b) An outside force on an object can change its motion or its direction.
  - c) Every action has an equal and opposite reaction.
  - d) An object at rest will remain at rest, until an external force is applied.
20. What is acceleration?
- a) Change in mass/change in time
  - b) Change in velocity/change in time
  - c) Change in distance/change in time
  - d) Change in speed/change in time
21. What is the force on an object with mass of 500g moving at an acceleration of  $10 \text{ m/s}^2$ ?
- a) 5 N
  - b) 50 N
  - c) 500 N
  - d) 5000 N

22. An ohmmeter is an instrument for measuring \_\_\_\_\_.
- a) Current
  - b) Voltage
  - c) Wattage
  - d) Resistance
23. If a tuning fork has a frequency of 250 Hz, how many cycles per second does it vibrate?
- a) 25 cycles per second
  - b) 250 cycles per second
  - c) 2,500 cycles per second
  - d) 25,000 cycles per second
24. Materials with lots of free electrons are called \_\_\_\_\_.
- a) Semiconductors
  - b) Conductors
  - c) Insulators
  - d) Resistors
25. Which of the following quantity remains same in parallel circuits?
- a) Voltage
  - b) Current
  - c) Both voltage and current
  - d) Neither current nor voltage
26. What is the current (I), if power(P) = 50 watt and Resistance(R) = 2  $\Omega$ ?
- a) 25 A
  - b) 100 A
  - c) 5 A
  - d) 50 A
27. If  $f(x) = x^2 - x + 1$  and  $h(x) = x + 2$ , then the composition of  $(f \circ h)(x)$  is:
- a)  $x^2 + x + 7$
  - b)  $x^2 + 3x + 3$
  - c)  $x^2 + 3x + 7$
  - d)  $x^2 + x + 3$

28. Which of the following functions shows distributive law?
- a)  $AB(C + D) = ABC + ABD$
  - b)  $AB(CD) = AC(BD)$
  - c)  $(AB)' = A' + B'$
  - d)  $(A + B)' = A'B'$
29. Which of the following is NOT an input device?
- a) Keyboard
  - b) Barcode reader
  - c) Headphones
  - d) Scanner
30. Which of the following is correct regarding class B of IP address?
- a) Network bit -16, Host bit -16
  - b) Network bit - 8, Host bit - 24
  - c) Network bit - 24, Host bit - 8
  - d) Network bit - 16, Host bit - 8
31. Which language is used for database schema?
- a) HLL
  - b) DCL
  - c) DML
  - d) DDL
32. In database transaction properties, which of the following has “all-or-none” property?
- a) Isolation
  - b) Atomicity
  - c) Durability
  - d) Consistency
33. “AS” clause is used in SQL for:
- a) Selection operation
  - b) Join Operation
  - c) Rename operation
  - d) Projection operation
34. How many bits are there in a MAC address?
- a) 32
  - b) 56
  - c) 16
  - d) 48

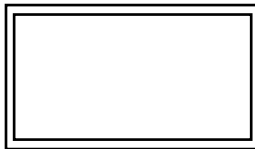
35. Which of the following layers is the middle layer of OSI model?
- a) Session Layer
  - b) Transport Layer
  - c) Network Layer
  - d) Presentation Layer
36. The data travels in one direction. Which of the following network topologies has such characteristic?
- a) Bus Topology
  - b) Ring Topology
  - c) Star Topology
  - d) Mesh Topology
37. Which of the following device is odd one?
- a) Monitor
  - b) Keyboard
  - c) Mouse
  - d) Touch pad
38. Which of the following set has only universal logic gates?
- a) {NAND, NOT}
  - b) {AND, NOR, EOR}
  - c) {OR, AND, NOT}
  - d) {NAND, NOR}
39. An optimal scheduling algorithm in operating system in terms of minimizing the average waiting time of given set of processes is \_\_\_\_\_.
- a) FCFS Scheduling algorithm
  - b) Round robin scheduling algorithm
  - c) SJF scheduling algorithm
  - d) Non-preemptive priority scheduling algorithm
40. The number of processes completed per unit time is called \_\_\_\_\_.
- a) Output
  - b) Throughput
  - c) Efficiency
  - d) Capacity



41. What does a datastore in a Data Flow Diagram (DFD) represent?
- a) A sequential file
  - b) A disk store
  - c) A random access memory
  - d) A repository of data
42. Which of the following is not a guideline for drawing a data flow diagram?
- a) Develop a context diagram
  - b) Display the physical locations of data files
  - c) Subdivide the DFD
  - d) Determine the system boundaries
43. Which of the following statements is considered as a condition for fair scheduling algorithm?
- a) No process faces starvation.
  - b) When a process is staved, detect it and run it with high priority.
  - c) A stack is used for scheduling
  - d) A queue is used for scheduling.
44. For  $A \cup B \cap C$  in the following truth table, how many HIGH outputs are produced?

A	B	C	$A \cup B \cap C$
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

- a) There is one high output
  - b) There are two high outputs
  - c) There are three high outputs
  - d) There are four high outputs
45. Among the three processing units of the computer: CPU, APU and GPU, which is the combined one of the other two processing units?
- a) GPU
  - b) CPU
  - c) APU
  - d) All the processing units are distinct and cannot be combined

46. How many AND gates are required to realize  $Y = CD + XZW + K$ ?
- a) 1
  - b) 2
  - c) 3
  - d) 4
47. Which command can copy files and entire directory trees?
- a) Cut
  - b) Paste
  - c) copy
  - d) xcopy
48. What is a Trojan?
- a) It is a malware, which can self-replicate.
  - b) It is a malware which, when executed, can make multiple copies to harm the system.
  - c) It is a malware, which serves to provide ads and pop-ups.
  - d) It is a malware often disguised as legitimate software.
49. Which of the following is an example of non-functional requirement of a system?
- a) The system must interoperate with two other existing systems.
  - b) The system must have login screen for user authentication.
  - c) The system must generate different user-defined reports.
  - d) The system must present the user with a display of number of records in a database.
50. In ER-diagram, what is represented by the following symbol?
- 
- a) Strong entity
  - b) Parent entity
  - c) Weak entity
  - d) Main entity
51. What should you do first before performing an upgrade to an operating system?
- a) Backup the old operating system
  - b) Backup critical data
  - c) Format the drive
  - d) Check the disk

52. When the individual modules of a system are combined and then test is performed to uncover faults in their relational functions, the type of testing is called \_\_\_\_\_.
- a) Integration Testing
  - b) White-box Testing
  - c) System Testing
  - d) Reliability Testing
53. A linear sequential model of software development is also known as \_\_\_\_\_.
- a) Spiral model
  - b) Waterfall model
  - c) Prototyping model
  - d) V-shaped model
54. Which of the following keyword is used with '**switch**' statement?
- a) Continue
  - b) Exit
  - c) Break
  - d) Do
55. Why IP protocol is considered as unreliable?
- a) A packet may be lost
  - b) Packets may arrive out of order
  - c) Duplicate packets may be generated
  - d) All of the above.
56. Which of the following is not decision-making statement?
- a) if
  - b) if-else
  - c) switch
  - d) do-while
57. Your computer's sound card is not working. In device manager, what would indicate that the device's driver is not functioning properly?
- a) There is yellow circle and exclamation point on the device
  - b) There is a pop-up message notifying the malfunction of the device
  - c) The device driver is not listed in device manager
  - d) There is red X mark on the device

58. How many bits are used by IPv4 address?

- a) 16 bits
- b) 32 bits
- c) 56 bits
- d) 64 bits

59. What is output of the following code?

```
#include<stdio.h>
int myFunction(int n)
{
    int result = 0;
    int number;
    while (n > 0)
    {
        number = n % 10;
        result = result*10 + number;
        n /= 10;
    }
    return result;
}
int main() {
    printf("%d", myFunction(230156));
}
```

- a) 321065
- b) 316205
- c) 651032
- d) 613502

60. Bluetooth falls under which type of network?

- a) WAN
- b) PAN
- c) LAN
- d) VPN

61. **ODBC** in database stands for:

- a) Object database connectivity
- b) Oracle database connectivity
- c) Obtain database connectivity
- d) Open database connectivity

62. What does safe mode in windows allow you to do?
- a) Boot the systems without scanning the drives.
  - b) Skip loading the registry files.
  - c) Run windows without any drivers.
  - d) Start windows using only basic files and drivers.
63. What is octal representation of decimal number 100?
- a) 140
  - b) 142
  - c) 144
  - d) 146
64. What is the equivalent Boolean function of:  $F = A + A'B$ ?
- a)  $F = AB$
  - b)  $F = A'B$
  - c)  $F = A+B$
  - d)  $F = A'+B'$
65. MAC address is an example of \_\_\_\_\_.
- a) Physical Layer
  - b) Data Link Layer
  - c) Network Layer
  - d) Transport Layer
66. Which of the following can be software?
- a) Router
  - b) Firewall
  - c) Gateway
  - d) Modem
67. Which of the following is NOT the protocols of Application?
- a) FTP
  - b) Telnet
  - c) DNS
  - d) TCP
68. Which of the following is expression for XOR digital circuit?
- a)  $f = xy' + x'y$
  - b)  $f = x'y' + xy$
  - c)  $f = x' + y' + xy$
  - d)  $f = x + y + x'y'$

69. What is the result of multiplying binary numbers: 1101 x 1011?

- a) 10001111
- b) 10111111
- c) 01001111
- d) 01010111

70. A computer has 512MB of RAM. It also has 64MB of shared video memory. How much RAM is available to the operating system?

- a) 576 MB
- b) 256 MB
- c) 448 MB
- d) 512 MB

**PART II – Short Answer Questions (30 marks)**

**Answer ALL 10 short answer questions. Each question carries 3 marks.**

1. Briefly explain the following ICT terminologies.

(3 marks)

- a) *Bandwidth*
- b) *HTML*
- c) *Ethernet*

2. What is a hacker? How do you know that your computer systems are hacked?

(1+2 =3 marks)

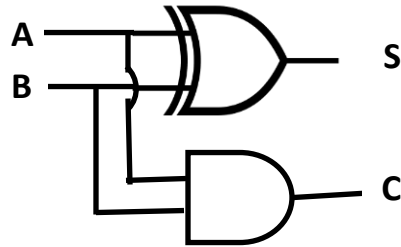
3. In a class of 100 students with their IDs from 1 to 100, all even numbered IDs opted Mathematics, IDs which are multiple of 3 opted Science and IDs which are multiple of 5 opted Dzongkha. How many students did not choose any of the three subjects? (3 marks)

4. Explain the following network topologies.

(3 marks)

- a) *Bus Topology*
- b) *Star Topology*
- c) *Ring Topology*

5. Half adder circuit is used to add single-bit binary numbers which has two inputs A and B, and two outputs S and C as shown below. Write down the truth table for the half adder circuit. (3 marks)



6. In the structure provided below, write a Recursive Function using any programming language to calculate the Factorial of any natural number. (3 marks)

```

int factorial (int n)
{
.....
.....
.....
}
    
```

7. In terms of Object-Oriented Programming (OOP), explain its principles: *Encapsulation*, *Polymorphism* and *Inheritance*. (3 marks)

8. You are provided with Boolean function:  $F = AB + A(B+C') + B(B+C)$   
 Simply the function and represent the simplified function using logic gates. (2+1=3 marks)

9. Consider a relation schema  $R = (A, B, C, D, E, F)$  on which the following functional dependencies hold:  $\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$ . What are the candidate keys of R? (3 marks)

10. Using mathematical induction, prove that the sum of natural numbers:  

$$1 + 2 + 3 + 4 + \dots + n = \frac{n(n+1)}{2}$$
 (3 marks)

**TASHI DELEK**