CHRISTIAN SERVICE UNIVERSITY COLLEGE

KUMASI – GHANA

Mature Applicants Entrance Examination, 2019/2020 Academic Year

ACCESS COURSE

LOGIC AND APTITUDE TEST

June, 2019 Duration: 1Hour 15 Minutes

SECTION A [40 marks]

INSTRUCTION TO CANDIDATES

- *Answer all questions.*
- **CIRCLE** the **LETTER** of the correct answer

Index number ....

Signature ....

Date .....

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1. The sum of ages of 5 children born at the intervals of 3 years each is 50 years. What is the age of the youngest child?
   A. 4 years
   B. 8 years
   C. 10 years
   D. 12 years

2. Mr. A is 2 years older than Mr. B who is twice as old as Mr. C. If the total of their ages is 27, how old is Mr. B?
   A. 5
   B. 8
   C. 9
   D. 10

3. Which one of the following is not a prime number?
   A. 31
   B. 61
   C. 71
   D. 91

4. If $a = 0.1039, then \sqrt{4a^2 - 4a + 1} + 3a$ is:
   A. 0.1039
   B. 0.2098
   C. 1.1039
   D. 2.1039

5. $1397 \times 1397 = ?$
   A. 1951609
   B. 1981709
   C. 18362619
   D. 2031719

6. Three candidates contested an election and received 1136, 7636, 11628 votes respectively. What percentage of the total votes did the winning candidate get?
   A. 57%
   B. 60%
   C. 65%
   D. 90%

7. The population of a town increased from 175000 to 262500 in a decade. What is the average percentage increase of population per year?
   A. 43%
   B. 50%
   C. 60%
   D. 87.5%

8. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.
   A. 4
   B. 7
   C. 9
   D. 13

9. Which of the following fraction is the largest?
   A. $\frac{7}{8}$
   B. $\frac{17}{4}$
   C. $\frac{31}{40}$
   D. $\frac{63}{80}$

10. Consider the proposition "**Today is Friday or it is raining today**". Which of the following explains the proposition?
   A. The proposition is false on any day that is either a Friday or a rainy day including rainy Friday
   B. It is only false on days that are not Fridays when it does not rain
   C. It is only true on days that are not Fridays when it does not rain
   D. The proposition is not true on any day that is either a Friday or a rainy day including rainy Friday

11. Which of the following is not a proposition?
   A. The book is mine
   B. The questions are easy
   C. Drive carefully
   D. I am confused

"You can access the internet from campus only if you are a computer science major or you are not a freshman"

12. Write all simple propositions in the compound proposition above.
   A. You can access the internet from campus only
   B. You are computer science major only
   C. You can access the internet from campus and you are computer science only
   D. You can access the internet from campus, you are computer science and you are a freshman

13. Which of the following is a tautology?
   A. $(p \rightarrow q) \rightarrow (q \rightarrow p)$
   B. $(p \leftrightarrow q) \vee (p \leftrightarrow q)$
   C. $(p \rightarrow q) \wedge (p \rightarrow q)$
   D. $(p \vee q) \rightarrow (p \wedge q)$

14. Find the contrapositive of the implication "A positive integer is a prime only if it has no divisors other than 1 and itself"
    A. If a positive integer has a divisor other than 1 and itself, then it is not prime
    B. A positive integer has no divisors other than 1 and itself, if is not prime
    C. If a positive integer has a divisor other than 1 and itself, then it is prime
    D. A positive integer has a divisor other than 1 and itself, if it is prime

15. Which of the following is true about argument?
    A. Argument is a statement.
    B. Argument is a proposition
    C. Argument is yes or no
    D. Argument is a sequence of propositions and a conclusion

16. All the following statements are propositions except:
    A. Washinton D.C is the capital of U.S
    B. Toronto is the capital of Canada
    C. $x + y = z$
    D. $2+2 = 3$

17. If P, Q and R are three statements/Propositions such that P→Q and Q→R, then by the chain rule, P→R
    A. True
    B. False

18. For any two statements/Propositions P and Q, P→Q means Q is true only when P is true.
    A. True
    B. False

19. The converse of a statement/Proposition is the exact form of the statement/Proposition.
    A. True
    B. False

20. An argument is valid if and only if conclusion follows from other statements/Propositions (the Premises)
    A. True
    B. False
21. The statements/Propositions P and Q are equivalent if and only if either of P→Q and its converse Q→P is true
    A. True
    B. False

22. P: Mansa is my friend
    Q: All my friends do well in history

Which of the following statements/propositions is a valid conclusion from the above statements/propositions?

A. Mansa is not a Historian
B. Mansa does well in History
C. Mansa does not know History
D. Mansa sometimes does well in History
E. Mansa does not do history

23. Consider the following statement/Proposition:
If one works hard one must pass his or her examination.
Which of the following is a valid conclusion from the statement/proposition?
A. John is hardworking and so must pass his examination with distinction.
B. Yaw is not hardworking and must fail his examination.
C. Kwaku did not pass his examination so he did not work hard.
D. Ama is hardworking and so her parents must like her.

Let p, q and r be the propositions.
p: You have malaria
q: You miss the examination
r: you pass the course

Use the information to questions 24-27.

Write the following statements in symbolic form:

24. Having malaria is necessary and sufficient for missing the examination.
A. $p \rightarrow q$
B. $p \leftrightarrow q$
C. $q \rightarrow p$
D. $q \leftrightarrow p$
E. None of the above

25. If you pass the course then either you do not have malaria or you do not miss the examination.
A. $r \rightarrow \sim(p \vee q)$
B. $r \vee (\sim p \vee \sim q)$
C. $r \rightarrow (\sim p \vee \sim q)$
D. $r \vee \sim (p \vee q)$

26. It is not the case that if you miss the examination, you either have malaria or failed the course.
A. $\sim (q \rightarrow p \vee \sim r)$
B. $\sim q \rightarrow p \vee r$
C. $\sim q \rightarrow p \vee \sim r$
D. $q \rightarrow p \vee \sim r$

27. If you have malaria and miss the examination, you will fail the course.
    A. $(p \wedge q) \wedge \sim r$
    B. $p \rightarrow q \wedge \sim r$
    C. $(p \wedge q) \rightarrow \sim r$
    D. $(p \vee q) \sim r$

28. A compound proposition which is always true is called:
    A. Contradiction
    B. Tautology
    C. Contingency
    D. None of the above

29. Logic rules can be applied in building circuits.
    A. True
    B. fals

30. One major responsibility of every citizen is to
    A. Break the law
    B. instigate people to go on strike.
    C. pay one's taxes promptly
    D. a deviant.

31. Commission for Human Rights and Administrative Justice (CHIRAJ) is constitutional machinery whose duty is to
    A. Confer privileges on people in society.
    B. prosecute deviants in society
    C. ensure that right of citizens are not abused
    D. ensure executive arm of government works efficiently.

32. In an analogy, the witness in chief of the petitioners said "if a thief escapes the notice of a sleeping watch man and succeeds in stealing "tilapia", the owner of that tilapia still has a right to enforce the law and to ensure that his tilapia is returned to him. It will not be said that because his watchman slept on the job, his right of ownership of the tilapia has been taken away from him"
    , Who said this?.
    A. Nana Addo Danquah Akuffo Addo
    B. Dr. Mamud Bawumia
    C. Mr. Asiedu Nketia
    D. None of the above

33. Which political party in Ghana petitioned the supreme court on the 2012 general election:
    A. News Patriotic Party
    B. National Democratic Party
    C. None Patriotic Party
    D. New Patriotic Party

34. If I am on a staircase and on the fifth stairs and I decide to take 5 steps upwards, then 3 steps downwards and then another 4 steps upwards, which stairs will I be standing on?
A. 9^{th} stairs
B. 10^{th} stairs
C. 11^{th} stairs
D. 12^{th} stairs

35. When I was six years, I was twice the age of my sister. Now my sister is 25 years old, how old am I now?
A. 28 years
B. 50 years
C. 22 years
D. 47 years

36. If Kumasi is a city in Ghana, and Kumasi is located in South Africa, then it implies Ghana is in.....
A. West Africa
B. Central Africa
C. South Africa
D. East Africa

37. All the following are abilities and activities involving logical criticism **except,**
A. Accepting every word said or written without evaluating the statement.
B. Assessing what is said or heard carefully to avoid fallacies.
C. Seeking evidence when this is appropriate of what is said or written to avoid ambiguity.
D. Putting various pieces of information together in coherent way to arrive at the truth.

38. All the following are **not** part of abilities and activities involving Logical Reasoning **except**
A. Ignoring every laughable statement that is said except written.
B. Analyzing every word written only but not said.
C. Attempting to avoid mistakes in thinking.
D. Getting angry at every fallacious word spoken in the public domain only.

39. The following are all part of ***skills*** needed for Logical Criticism **except,**

A. Logical criticism is an aspect of ontology.
B. Sensitivity to different uses of language to avoid ambiguous use of words.
C. Awareness of the distinction between the truth of sentences and the support they would provide for some other sentences if they were true.
D. The ability to recognize arguments, to identify their parts, to supply missing premisses that are unstated, and to sort out the premisses and conclusion of an argument from the context in which it is stated.

40. All P is Q, All Q is R. Therefore all R is .....
A. C
B. P
C. B
D. A

Index Number: ..... Signature: ..... Date: .....

1.

(a) Express the statement "if somebody is female and is a parent, then the person is someone's mother" as a logical expression. **[6 marks]**

(b) Two statements P and Q are defined by
P: an angle is 90^0
Q: an angle is a right angle

Write down the following implications i,ii and iii in full:

i. $P \Rightarrow Q$ **[2 marks]**
ii. $Q \Rightarrow P$ **[2 marks]**
iii. $P \Leftrightarrow Q$ **[2 marks]**
iv. Determine whether P and Q are equivalent. **[2 marks]**

(c) i. Define logic and explain logic proposition. **[4 marks]**
ii. What do we use truth table for in logic? **[2marks]**

(d) If the following statements are all true, namely;
p: Mambosi is in Ghana
q: Amanda is a driver

Express the compound propositions i and ii below in symbolic form.

i. Mambosi is not in Ghana and Amanda is a driver. **[2 marks]**
ii. Mambosi is not in Ghana or Amanda is a driver. **[2 marks]**
iii. Using truth table, find the truth value of i and ii. **[6 marks]**