U.G. 3rd Semester Examination - 2020
MATHEMATICS
Course Code : BMTMSEHT305

Course Title : Logic and Sets

Full Marks : 50 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Answer all the questions by choosing correct alternative: $2\times25=50$

1. Which of the following is a proposition?
   a) God bless you! b) Open the door.
   c) Do you speak English? d) 3+3=7.
2. Symbols used to connect simple propositions in propositional logic
   a) Truth functions b) Necessary condition
   c) Connectives d) Destructive dilemma
3. The theory of sets was developed by which Mathematician?
   a) Newton b) Cantor c) Euler d) Cayley
4. A set is a collection of well defined______.
   a) letters b) objects c) alphabets d) numbers
5. The set $A=\{x\in\mathbb{N} \mid x^2-3x+1=0\}$ is
   a) Null set b) Finite set c) Infinite set d) None of these
6. Least upper bound of the set [0, 1] is
   a) 0 b) 1 c) (–1) d) ∞
7. Which of the following is incorrect?
   a) $(A\cap B)^c=A^c\cup B^c$ b) $(A\cap B)^c=A^c\cap B^c$
   c) $A-B=A\cap B^c$ d) $A-(B\cup C)=(A-B)\cap(A-C)$
8. If A and B are sets and $A\cap B=A\cup B$, then
   a) $A=\phi$ b) $B=\phi$ c) A=B d) None of these
9. If $n(A)=115,\ n(B)=326,\ n(A-B)=47$, then what is $n(A\cup B)$ equal to?
   a) 373 b) 372 c) 165 d) 394
10. If A={1, 2, 3, 4} and B={1, 2}, then n(A×B) is equal to
    a) 6 b) 8 c) 16 d) None of these
11. If A = {1, 2}, the power set of A is
    a) $\{\{1\},\{2\}\}$ b) $\{\phi,\{1,2\}\}$ c) $\{\phi,\{1\},\{2\}\}$ d) None of these
12. Which of the following is not true?
    a) $p\vee F\equiv p$ b) $p\vee T\equiv T$ c) $p\wedge F\equiv F$ d) $p\wedge T\equiv T$

13. Which of the following is correct?

a) $n(A \cup B)+n(A \cap B)=n(A)$ b) $n(A \cup B)+n(A \cap B)=n(B)$

c) $n(A \cup B)+n(A \cap B)=n(A)+n(B)$ d) $n(A \cup B)+n(A \cap B)=n(A)-n(B)$

14. Give another representation of the following set $A=\{x \in \mathbb{N} \mid x \text{ is a divisor of } 12\}$

a) $\{1, 2, 3, 4, 6\}$ b) $\{2, 4, 6, 12\}$ c) $\{1, 2, 3, 4, 8, 12\}$ d) $\{1, 2, 3, 4, 6, 12\}$

15. Which of the following proposition is true?

a) 2×3=6 and 2+3=6 b) 2×3=5 or 2+3=6

c) 1+3=5 if 5–3=2 d) 1+3=4 if 4–3=2

16. In propositional logic, which of the following is equivalent to : $(p \Rightarrow q)$?

a) $: p \vee : q$ b) $: p \vee q$ c) $p \vee \sim q$ d) $\sim p \wedge \sim q$

17. The order of a set A is 3 and that of a set B is 2. What is the number of relations from A to B?

a) 4 b) 6 c) 32 d) 64

18. If A={1, 2, 3}, Then the relation R={(1, 1), (2, 2), (2, 3)} is

a) Reflexive b) Symmetric c) Transitive d) None of these

19. "The inverse of an equivalence relation is an equivalence relation"– This statement is

a) Always true b) Always false

c) Sometimes true d) True only in one scenario.

20. What is the cardinality of the power set of the set {1, 2, 3, 4, 5}?

a) 5 b) 25 c) 32 d) 10

21. Which one of the following is <u>NOT</u> an infinite set?

a) $\{z \in \mathbb{C} \mid |z|=1\}$

b) $\{z \in \mathbb{C} \mid z^n=1, \text{ for } n \in \{1,2,...,10\}\}$

c) $\mathbb{R}-\mathbb{Q}$

d) The set of all bijective mappings from $\mathbb{N} \to \mathbb{N}$

22. Find the <u>negation</u> of the proposition "Subhajit smartphone has <u>atleast</u> 4GB RAM."

a) Subhajit's smartphone has less than 4GB RAM.

b) Subhajit's smartphone has more than 4GB RAM.

c) Subhajit's smartphone has no RAM.

d) Subhajit's has no smartphone.

23. Let p: if is cold and q: if is raining. Then $p \wedge \sim q$ is

a) If is cold and raining b) If is not cold but raining

c) If is cold and not raining d) If is not cold and not raining

24. Which of the following is a tautology?

a) $p \vee q$ b) $p \wedge q$ c) $p \vee \sim p$ d) $p \wedge \sim p$

25. The symmetric difference of the sets {1, 2, 3, 4} and {2, 4, 5} is

a) {1, 3} b) {2, 4} c) {1, 2, 3, 4, 5} d) {1, 3, 5}

———————