**United College of Engineering and Research, Allahabad**

**Department of Computer Science & Engineering**

**B.Tech CSE- III Semester**

**Set-4**

**Course Name:** Discrete Structure and Theory of Logic  **AKTU Course Code:** KCS-303

**Time: 60 Minutes Max. Marks: 30**

* **All Questions are compulsory.**
* **All Questions carry one mark.**

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| **Q. No.** | **Questions** | **CO** |
| **1** | Which of the following sentence is a proposition? a) Get me a glass of milkshake b) God bless you! c) What is the time now? d) The only odd prime number is 2 | **CO4** |
| **2** | The truth value of ‘4+3=7 or 5 is not prime’. a) False b) True | **CO4** |
| **3** | Which of the following option is true? a) If the Sun is a planet, elephants will fly b) 3 +2 = 8 if 5-2 = 7 c) 1 > 3 and 3 is a positive integer d) -2 > 3 or 3 is a negative integer | **CO4** |
| **4** | What is the value of x after this statement, assuming the initial value of x is 5? **‘If x equals to one then x=x+2 else x=0’.** a) 1 b) 3 c) 0 d) 2 | **CO4** |
| **5** | Let P: If Sahil bowls, Saurabh hits a century.; Q: If Raju bowls, Sahil gets out on first ball. Now if P is true and Q is false then which of the following can be true? a) Raju bowled and Sahil got out on first ball b) Raju did not bowled c) Sahil bowled and Saurabh hits a century d) Sahil bowled and Saurabh got out | **CO4** |
| **6** | The truth value ‘9 is prime then 3 is even’. a) False b) True | **CO4** |
| **7** | Let P: I am in Delhi.; Q: Delhi is clean.; then q ^ p(q and p) is? a) Delhi is clean and I am in Delhi b) Delhi is not clean or I am in Delhi c) I am in Delhi and Delhi is not clean d) Delhi is clean but I am in Mumbai | **CO4** |
| **8** | Let P: This is a great website, Q: You should not come back here. Then ‘This is a great website and you should come back here.’ is best represented by? a) ~P V ~Q b) P ∧ ~Q c) P V Q d) P ∧ Q | **CO4** |
| **9** | Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then ‘We should be honest or dedicated but not overconfident.’ is best represented by? a) ~P V ~Q V R b) P ∧ ~Q ∧ R c) P V Q ∧ R d) P V Q ∧ ~R | **CO4** |
| **10** | Let P: I am in Bangalore.; Q: I love cricket.; then q -> p is? a) If I love cricket then I am in Bangalore b) If I am in Bangalore then I love cricket c) I am not in Bangalore d) I love cricket | **CO4** |
| **11** | Let p and q be two propositions. Consider the following two formulae in propositional logic.  **S1:** (¬p∧(p∨q))→q  **S2:** q→(¬p∧(p∨q))  Which one of the following choices is correct?   |  | | --- | | 1. Both S1 and S2 are tautologies. | | 1. S1 is a tautology but S2 is not a tautology | | 1. S1 is not a tautology but S2 is a tautology | | 1. Neither S1 nor S2 is a tautology | |  |
| **12** | Choose the correct choice(s) regarding the following proportional logic assertion S:  S:((P∧Q)→R)→((P∧Q)→(Q→R))   |  | | --- | | 1. S is neither a tautology nor a contradiction | | 1. S is a tautology | | 1. S is a contradiction | | 1. The antecedent of S is logically equivalent to the consequent of S | |  |
| **13** | Consider a Boolean function f(w,x,y,z) such that  f(w,0,0,z) = 1  f(1,x,1,z) = x+z  f(w,1,y,z) = wz+y  The number of literals in the minimal sum-of-products expression of f is \_\_\_\_\_\_\_\_\_  .   |  | | --- | | 1. 6 | | 1. 3 | | 1. 8 | | 1. 1 | |  |
| **14** | What is the logical translation of the following statement?  "None of my friends are perfect."  [gatecs201311](http://www.geeksforgeeks.org/wp-content/uploads/gq/2013/10/gatecs201311.png)   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **15** | [gatecs201320](http://www.geeksforgeeks.org/wp-content/uploads/gq/2013/10/gatecs201320.png)   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **16** | What is the correct translation of the following statement into mathematical logic? “Some real numbers are rational”   |  | | --- | | 1. A[gatecs2012logic](http://www.geeksforgeeks.org/wp-content/uploads/gq/2013/11/gatecs2012logic.png) | | 1. B | | 1. C | | 1. D | |  |
| **17** | Which one of the following options is CORRECT given three positive integers x, y and z, and a predicate?  P(x) = ¬(x=1)∧∀y(∃z(x=y\*z)⇒(y=x)∨(y=1))   |  | | --- | | 1. P(x) being true means that x has exactly two factors other than 1 and x | | 1. P(x) is always true irrespective of the value of x | | 1. P(x) being true means that x is a number other than 1 | | 1. P(x) being true means that x is a prime number | |  |
| **18** | Suppose the predicate F(x, y, t) is used to represent the statement that person x can fool person y at time t. which one of the statements below expresses best the meaning of the formula ∀x∃y∃t(¬F(x, y, t))?   |  | | --- | | 1. Everyone can fool some person at some time | | 1. No one can fool everyone all the time | | 1. Everyone cannot fool some person all the time | | 1. No one can fool some person at some time | |  |
| **19** | Which one of the following is the most appropriate logical formula to represent the statement? "Gold and silver ornaments are precious". The following notations are used: G(x): x is a gold ornament S(x): x is a silver ornament P(x): x is precious   |  | | --- | | 1. ∀x(P(x)→(G(x)∧S(x))) | | 1. ∀x((G(x)∧S(x))→P(x)) | | 1. ∃x((G(x)∧S(x))→P(x) | | 1. ∀x((G(x)∨S(x))→P(x)) | |  |
| **20** | [CSE_2009_26](https://www.geeksforgeeks.org/wp-content/uploads/gq/2015/01/CSE_2009_26.jpg)  Which of the above two are equivalent?   |  | | --- | | 1. II and IV | | 1. II and III | | 1. I and IV | | 1. I and III | |  |
| **21** | P and Q are two propositions. Which of the following logical expressions are equivalent?  q29   |  | | --- | | 1. All of I, II, III and IV | | 1. Only I, II and IV | | 1. Only I, II and III | | 1. Only I and II | |  |
| **22** | Let Graph(x) be a predicate which denotes that x is a graph. Let Connected(x) be a predicate which denotes that x is connected. Which of the following first order logic sentences DOES NOT represent the statement: “Not every graph is connected”? [cs200722](http://www.geeksforgeeks.org/wp-content/uploads/gq/2014/02/cs200722.gif)   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **23** | Which one of the following propositional logic formulas is TRUE when exactly two of  p, q, and r are TRUE?  [GATECS2014Q63](http://www.geeksforgeeks.org/wp-content/uploads/gq/2014/04/GATECS2014Q63.png)   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **24** | Which one of the following Boolean expressions is NOT a tautology?    GATECS2014Q63   |  | | --- | | 1. D | | 1. C | | 1. B | | 1. A | |  |
| **25** | The CORRECT formula for the sentence, “not all rainy days are cold” is [GATECS2014Q67](http://www.geeksforgeeks.org/wp-content/uploads/gq/2014/04/GATECS2014Q67.png)   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **26** | Which one of the first order predicate calculus statements given below correctly express the following English statement?   Tigers and lions attack if they are hungry or threatened.  GATECS2006Q26   |  | | --- | | 1. A | | 1. B | | 1. C | | 1. D | |  |
| **27** | Consider the following propositional statements: P1 : ((A ∧ B) → C)) ≡ ((A → C) ∧ (B → C)) P2 : ((A ∨ B) → C)) ≡ ((A → C) ∨ (B → C)) Which one of the following is true?   |  | | --- | | 1. P1 is a tautology, but not P2 | | 1. P2 is a tautology, but not P1 | | 1. P1 and P2 are both tautologies | | 1. Both P1 and P2 are not tautologies | |  |
| **28** | A logical binary relation □ ,is defined as follows:  GATE2006_Q28  Let ~ be the unary negation (NOT) operator, with higher precedence than □.   Which one of the following is equivalent to A∧B ?  **(A)** (~A □ B)  **(B)** ~(A □ ~B)  **(C)** ~(~A □ ~B)  **(D)** ~(~A □ B)   |  | | --- | | 1. D | | 1. C | | 1. B | | 1. A | |  |
| **29** | Let P, Q and R be three atomic prepositional assertions. Let X denote (P v Q) → R and Y denote (P → R) v (Q → R). Which one of the following is a tautology?   |  | | --- | | 1. X ≡ Y | | 1. X → Y | | 1. Y → X | | 1. ¬ Y → X | |  |
| **30** | What is the first order predicate calculus statement equivalent to the following? Every teacher is liked by some student   |  | | --- | | 1. ∀(x) [teacher (x) → ∃ (y) [student (y) → likes (y, x)]] | | 1. ∀ (x) [teacher (x) → ∃ (y) [student (y) ^ likes (y, x)]] | | 1. ∃ (y) ∀ (x) [teacher (x) → [student (y) ^ likes (y, x)]] | | 1. ∀ (x) [teacher (x) ^ ∃ (y) [student (y) → likes (y, x)]] | |  |

Answer

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| 1-D | 2-B | 3-A | 4-C | 5-C | 6-B | 7- A | 8-B | 9-D | 10-A |
| 11-B | 12-B,D | 13-A | 14-D | 15-A,D | 16-C | 17-D | 18-B | 19-D | 20-C |
| 21-C | 22-D | 23-B | 24-C | 25-D | 26-D | 27-D | 28-A | 29-B | 30-B |