KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
DEEMED TO BE UNIVERSITY, BHUBANESWAR – 24
(Decld. U/S 3 of UGC Act, 1956)
OFFICE OF THE CONTROLLER OF EXAMINATIONS

Sample Question Format

KIIT Deemed to be University
Online Mid Semester Examination(Spring Semester-2021)

Subject Name & Code: Discrete Mathematics, MA 2013 **Applicable to Courses: CSCE, ECS**

Full Marks=20 **Time:1 Hour**

SECTION-A(Answer All Questions. All questions carry 2 Marks)
Time:20 Minutes **(5×2=10 Marks)**

Question No	Question Type(MCQ/SAT)	Question	CO Mapping
Q.No:1(a)		Which of the following proposition 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	Propositional Logic and Equivalence Ans-(a)
		The contrapositive of the statement, "You win the game if you know the rules but are not overconfident" is (a) If you lose the game then you don't know the rules or you are overconfident. (b) A sufficient condition that you win the game is that you know the rules or you are not overconfident. (c) If you know the rules and are overconfident then you win the game. (d) A necessary condition that you know the rules or you are not overconfident is that you win the game.	Propositional Logic and Equivalence Ans-(a)
		The converse of the statement "Getting elected follows from knowing the right people" is (a) If you know the right people, then you are getting elected. (b) If you are getting elected, then you know the right people. (c) Getting elected is necessary for knowing the right people. (d) None of these.	Propositional Logic and Equivalence Ans-(b)
		$(P \vee R) \wedge (P \rightarrow R) \wedge (Q \rightarrow R)$ is equivalent to (a) P (b) Q (c) R (d) T	Propositional Logic and Equivalence Ans-(c)
Q.No:1(b)		Which of the following propositions is true if the domain consists of all real numbers ? (a) $\exists x(x^2 = -1)$	Predicates and Quantifiers Ans-(b)

		(b) $\exists x(x^4 < x^2)$ (c) $\forall x\ (2x > x)$ (d) None of these	
		Which of the following statements is NOT equivalent to the statement, "There exists either a computer scientist or a mathematician who knows both discrete math and Java?" (a) There exists a person who is a computer scientist and who knows both discrete math and Java or there exists a person who is a mathematician and who knows both discrete math and Java. (b) There exists a person who is a computer scientist or there exists a person who is a mathematician who knows discrete math or who knows Java. (c) There exists a person who is a computer scientist and who knows both discrete math and Java or there exists a mathematician who knows both discrete math and Java. (d) There exists a person who is a computer scientist or a mathematician who knows both discrete math and Java.	Predicates and Quantifiers Ans-(b)
		Find the correct translation of "There is a student in your school who is not happy" into logical expression. Given $S(x)$: x is a student in your school, $H(x)$: x is not happy. (a) $\exists x(S(x) \rightarrow H(x))$ (b) $\exists x(S(x) \rightarrow \sim H(x))$ (c) $\exists x(S(x) \wedge H(x))$ (d) $\exists x(S(x) \wedge \sim H(x))$	Predicates and Quantifiers Ans-(c)
		Which of the following equivalences are correct? (i) $\forall x(P(x) \wedge Q(x)) \equiv \forall xP(x) \wedge \forall xQ(x)$ (ii) $\forall x(P(x) \vee Q(x)) \equiv \forall xP(x) \vee \forall xQ(x)$ (iii) $\exists x(P(x) \vee Q(x)) \equiv \exists xP(x) \vee \exists xQ(x)$ (iv) $\exists x(P(x) \wedge Q(x)) \equiv \exists xP(x) \wedge \exists xQ(x)$ (a) (i) and (ii) (b) (i) and (iii) (c) (ii) and (iv) (d) (i) and (iv)	Predicates and Quantifiers Ans-(b)
Q.No:1(c)		Which of the following is correct regarding the argument "All parrots like fruit. My pet bird is not a parrot. Therefore, my pet bird does not like fruit?" (a) Correct due to modus ponens (b) Correct due to modus tollens (c) Fallacy due to affirming the conclusion (d) Fallacy due to denying the hypothesis	Rules of Inference Ans-(d)
		What rules of inference are used in this argument? "It is either colder than Himalaya today or the pollution is harmful. It is hotter than Himalaya today. Therefore, the pollution is harmful."	Rules of Inference

		(a) Conjunction (b) Modus ponens (c) Disjunctive syllogism (d) Hypothetical syllogism	Ans-(c)
		"Parul is out for a trip or it is not snowing" and "It is snowing or Raju is playing chess" imply that _____ (a) Parul is out for trip (b) Raju is playing chess (c) Parul is out for a trip and Raju is playing chess (d) Parul is out for a trip or Raju is playing chess	Rules of Inference Ans-(d)
		What conclusion you get from the following statements. (i) If n is a real number such that $n > 1$, then $n^2 > 1$. Suppose that $n^2 > 1$. Then $n > 1$. (ii) If n is a real number with $n > 3$, then $n^2 > 9$. Suppose that $n^2 \leq 9$. Then $n \leq 3$. (a) (i) is correct and (ii) is incorrect. (b) (i) is incorrect and (ii) is correct. (c) Both are correct. (d) Both are incorrect.	Rules of Inference Ans-(b)
Q.No:1(d)		The bit strings for the sets are 1111100000 and 1010101010. The union of these sets is _____ a) 1010100000 b) 1010101101 c) 1111111100 d) 1111101010	Set Ans-(d)
		If A has 4 elements B has 8 elements then the minimum and maximum number of elements in A U B are _____ a) 4, 8 b) 8, 12 c) 4, 12 d) 12, 12	Set Ans-(b)
		If A is {{Φ}, {Φ, {Φ}}}, then the power set of A has how many element? a) 2 b) 4 c) 1 d) 8	Set Ans-(b)
		There are 345 students at a college who have taken a course in Calculus, 202 who have taken a course in Discrete Mathematics, and 188 who have taken a course in both Calculus and Discrete Mathematics. How many students have taken a course in either calculus or Discrete Mathematics? (a) 369 (b) 547 (c) 735 (d) 359	Set Ans-(d)
Q.No:1(e)		The number of reflexive as well as symmetric	Relation

		relations on a set with 15 distinct elements is _____ a. 2^{210} b. 2^{15} c. 2^{120} d. 2^{105}	Ans-(d)
		The number of symmetric relations on a set with 15 distinct elements is _____ a. 2^{210} b. 2^{15} c. 2^{120} d. 2^{105}	Relation Ans-(c)
		The number of reflexive relations on a set with 15 distinct elements is _____ a. 2^{210} b. 2^{15} c. 2^{120} d. 2^{105}	Relation Ans-(a)
		The relation $R = \{(x, y) \mid x + y = 0\}$ on the set of real numbers is (a) Symmetric, Transitive and not Reflexive (b) Reflexive, Symmetric and not Transitive (c) Symmetric, not Reflexive and not Transitive (d) Reflexive, Symmetric and Transitive	Relation Ans-(c)

SECTION-B(Answer Any One Question. Each Question carries 10 Marks)

Time: 30 Minutes **(1×10=10 Marks)**

Question No. (Question Bank)	Question	CO Mapping
Question No:2	Find converse, inverse and contrapositive of the following statements in the form "If p, then q" (a) It snows whenever the wind blows from the northeast. (b) You will reach the summit unless you begin your climb too late. (c) To be a citizen of this country, it is sufficient that you were born in the United States. (d) It is necessary to walk 8 miles to get to the top of Long's Peak.	Propositional Logic
Question No:3	Show that the compound statement $[(p \to q) \wedge (q \to r)] \to (p \to r)$ is a tautology by using truth tables and without using truth tables.	Propositional equivalence
Question No:4	Translate each of these statements into logical expressions using predicates, quantifiers, and logical connectives. (a) Not everybody is your friend or someone is perfect. (b) There is a person in your school who is not	Predicates and Quantifiers

	happy. (c) Everyone in your class has studied Calculus and C++. (d) No one is perfect (e) Someone in your class can not speak Hindi	
Question No:5	Using the rules of inference show that the following argument is valid. If *A* works hard, then either *B* or *C* will enjoy themselves. If *B* enjoys himself, then *A* will not work hard. If *D* enjoys himself, then *C* will not. Therefore, if *A* works hard, *D* will not enjoy himself.	Rules of Inference
Question No:6	(a) Using strong induction, prove that for each positive integer n, the n^{th} Fibonacci number F_n is less than $\left(\frac{7}{4}\right)^n$. (b) Use mathematical induction to prove that $1^2 + 3^2 + 5^2 + \ldots + (2n-1)^2 = n(2n-1)(2n+1)/3, \quad n \geq 1$.	Induction

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