

Re- Minor/Mid-Term Examination- ONLINE MODE
(Non-CBCS/CBCS)
B.Tech CSE/IT 3rd SEM
(November, 2020)

Subject Code: BCS-203	Subject: Discrete Structures
Time: 1 Hour	Maximum Marks: 30
Note: Q. 1 is compulsory. Attempt any one question from the rest.	

Q1		(5*3=15)
	<p>(a)</p> <p>a.1) Show that $(P \rightarrow (Q \vee R)) \wedge P \wedge \sim Q \wedge \sim R$ is a contradiction without using truth table.</p> <p>a.2) Show that $Q \vee (P \wedge \sim Q) \vee (\sim P \wedge \sim Q)$ is a tautology without using a truth table.</p> <p>(b) Translate each of these statements into logical expressions</p> <p>(i) if it rains, crops grow well and when crops grow well farmers are happy</p> <p>(ii) It is not true that when it rains water problems get solved.</p> <p>(iii) if today is Thursday then Ramaswamy will go for swimming.</p> <p>(c) Examine the validity of the argument: It is not true that everyone knows C++. If someone does not know C++, that person likes music. A person who like music is happy and so there is someone who is happy.</p>	
Q2		(7.5+7.5=15)
	<p>(a)</p> <p>a.1) Define R on Z as xRy if $x-y$ is a multiple of 3. Show that this is an equivalence relation and find out all equivalence classes.</p> <p>a.2) Let $f, g, h: R \rightarrow R$ be defined as $f(x) = 3x-4$, $g(x) = x^2$, $h(x) = e^x$ find fof, goh, hog and gof.</p> <p>(b)</p> <p>b.1) Let $f: R \rightarrow R$ be defined as $f(x) = ax^2 + bx + c$ with $a \neq 0$. show that f is not onto.</p> <p>b.2) Let relation R be defined on</p> <p>(i) Z as mRn, if n is a multiple of m. Check whether R is a partial order relation or not.</p> <p>(ii) N as mRn, if n is a multiple of m. Check whether R is a partial order relation or not.</p>	
Q3		(7.5+7.5=15)
	<p>(a) Using mathematical Induction Show that</p> $\sum_{k=1}^n k^2 - 3k = \frac{n(n+1)(n-4)}{3}$ <p>(b)</p> <p>b.1) Using Pigeonhole principle find out that how many numbers must be selected from the set $\{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$ to guarantee that at least one pair adds up to 22.</p> <p>b.2) Using proof by contradiction prove that: The sum of a rational number and an irrational number is irrational.</p>	

Declaration of the Paper Setter

I have followed these instructions during paper setting with best of my knowledge

a. No direct questions such as definitions, comparisons, diagrams etc has been given where the student can use the book/ online resources directly to answer the question and

b. Ensured that each and every question is verified through google and the same is not directly available and

c. Ensured that the paper covers entire syllabus, all the questions are un-ambiguous, as per the format and followed university norms for setting up the question paper.

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Declaration of the departmental Moderation Committee

The above paper is moderated and followed above guidelines

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