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PEC
EXPLORE INNOVATE EXCEL

PUNJAB ENGINEERING COLLEGE
(Deemed to be University)
Mid-Term Examination (February 2019)

Programme: **CSE (Ist Year)**
Course Name: **Digital Electronic & Logic Design**
Maximum Marks: **30**

Year/Semester: **2019/Even**
Course Code: **CSN-103**
Time allowed: **1.30 Hrs**

Notes:

- All questions are compulsory.
- The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right **course code**.

Q. No.		Questions	Marks
1.		Convert (634) 8 to binary?	1
2.	a	Find the complement of the Functions $F_1 = x'yz' + x'y'z$ and $F_2 = x(y'z' + yz)$ by applying De Morgan's theorem as many times as necessary?	3
	b	Simplify the following expression $Y = (A + B)(A + C')(B' + C')$?	
	c	Prove that $ABC + ABC' + AB'C + A'BC = AB + AC + BC$?	
3.		When using Hamming code, the following symbol is received: 0 1 0 1 1 1 0 1 Assuming a 1-bit error, what was the original stored symbol? Write down your answer as a 4-bit binary, with no spaces.	3
4.		Implement Boolean Expression using MUX 8 x 1 $F(A, B, C, D) = \sum_{m} (0,2,4,5,7,10,12,14,15)$	5
5.		Design a Circuit to convert 3-bit binary code to Gray code and implement the same using 4 X 1 Mux?	5
6.		Implement a full adder using 3x8 Decoder?	3
7.		Design a digital system whose output is defined as logically low if the 4-bit input binary number is a multiple of 3; otherwise, the output will be logically high. The output is defined if and only if the input binary number is greater than 2. Implement the digital system using NAND gates.	5
8.		A logic Circuit have three Inputs ABC and the Outputs F is high when majority of Inputs are Logic 1. (i) Minimize the Function. (ii) Implement the Circuits.	

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PEC UNIVERSITY OF TECHNOLOGY

Mid-term Examination (Feb 2019)

Programme: B.E. (ECE & CSE)
Course Name: Vector Calculus, Fourier Series and Laplace transform
Maximum Marks: 25
Year/Semester: 18192
Course Code: MAN-105
Time allowed: 1 hour 30 mins
NOTES:

- All questions are compulsory
- Unless stated otherwise, the symbol have their usual meanings in context with subject
- The candidates before starting to write the solutions should please check the question paper for any discrepancy.

Q.No.	Questions	Marks
1	Find the directional derivative of $\phi(x,y,z) = x^2yz + 4xz^2$ at (1, -2, 1) in the direction of $2\hat{i} - \hat{j} - 2\hat{k}$.	(4)
2	Apply Gauss Divergence theorem to evaluate $\iint_S \vec{F}.\hat{n}\,dS$ where $\vec{F} = 4xz\hat{i} - y^2\hat{j} + yz\hat{k}$ and S is the surface of the cube bounded by $x=0,\ x=1, y=0, y=1, z=0, z=1$.	(4)
3	Prove that $(y^2 - z^2 + 3yz - 2x)\hat{i} + (3xz + 2xy)\hat{j} + (3xy - 2xz + 2z)\hat{k}$ is both solenoidal and irrotational.	(2)
4	Evaluate $\iint_S \vec{A}.\hat{n}\,dS$ where $\vec{A} = (x+y^2)\hat{i} - 2x\hat{j} + 2yz\hat{k}$ and S is the surface of the plane $2x + y + 2z = 6$ in the first octant.	(4)
5	Using Green's theorem evaluate $\oint_C (\cos x \sin y - xy)dx + (\sin x \cos y)dy$ where C is the circle $x^2 + y^2 = 1$	(2)
6	Verify Stoke's theorem for $\vec{A} = y^2\hat{i} + xy\hat{j} - xz\hat{k}$ where S is the hemisphere $x^2 + y^2 + z^2 = a^2,\ z \geq 0$	(4)
7	If $\vec{A} = (2xy + z^3)\hat{i} + x^2\hat{j} + 3xz^2\hat{k}$ (a) Prove that the line integral $\int_C \vec{A}.d\vec{r}$ is independent of curve C joining two given points $P_1(1, -2, 1)$ and $P_2(3, 1, 4)$. (b) Show that there exists a scalar function f such that $\vec{A} = \nabla f$ and find f. (c) Find the work done in moving an object from P_1 to P_2.	(2) (2) (1)

Course Name: Data Structures | **Year/Semester: 1st year/18192**
Maximum Marks: 25 | **Course Code: CSN102**
Notes: | **Time allowed: 1 Hr 30 Minutes**

- All questions are compulsory.
- Unless stated otherwise, the symbols have their usual meanings in context with subject. Assume suitably and state, additional data required, if any.

Q. No.		Mar
1.	Solve the recurrence relation using substitution method. Show each step clearly. $T(n) = T(n/2) + n/2$	5
2.	Evaluate below postfix expression. Show status of stack and operations at each step: 2 3 2 ^ ^ 8 2 / / 5 2 * 6 - +	5
	Below is the code for DLL where "Node" is a class defining structure of a node. Assume insertion in DLL are done by creating node dynamically. Write a C++ function ***int deleteEnd()*** to delete last node(pointed by tail) in DLL which returns '1' when list is empty and '0' otherwise.	5

```
class Node {
        public:
                int data;
                Node * next;
                Node * prev;
};

class DLL {
        private:
                Node * head;  //points to first node in DLL
                Node * tail;  //points to last node in DLL

        public:
                DLL() {
                        head = NULL;
                        tail = NULL;
                }
                //function to insert
                //function to display
                int deleteEnd();  //complete the function
};
```

4.	Determine the time and space complexity of the most efficient algorithm below operations in terms of '**n**' where n is the input size. a. insertEnd in Deque implemented using DLL b. deleteEnd in Deque implemented using SLL c. deleteEnd in Deque implemented usin CLL	6
5.	Consider the following scenario: An investment bank wants to collect trading data from multiple stock exchange offices. Each stock exchange office records live trading data including the timing information when trade happened. Investment bank can download the recorded data from various stock exchange offices in real-time and keep it in ascending order according to the timing information. Data collected from all sources goes to single consolidating process which at end of day stores whole data in a single file. Due to network congestion and other unknown reasons, bank might receive recent trading data from some exchange before old trading data from other exchange. Hence, the consolidating process at investment bank needs to sort data before finally storing in a single file. Assume, total few millions trading data gets recorded daily, each record has 80-100 fields and delayed data is received with 10%-20% chances. Mention any other necessary assumptions made. Being technical head at the bank, suggest a choice of data structure(among discussed so far in the course) and functioning of the consolidating process. Justify. (max 300 words)	4