14/02/2022_Engineering Mathematics III_Electronics and Computer Science (ECS) _Sem III_R19

The question paper will have MCQs (for 20 marks) and subjective/descriptive questions (for 60 marks)

MCQ correct options and subjective questions answers to be written on papers. Scan all pages of answer papers of Q1 to Q4 and create single file in pdf format to upload in the link provided

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MCQ and Descriptive section

Question

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	$L[e^{-t}.sin3t]=?$
Option A:	$\dfrac{3}{s^2 - 2s + 10}$
Option B:	$\dfrac{3}{s^2 + 2s + 10}$
Option C:	$\dfrac{s}{s^2 - 2s + 10}$
Option D:	$\dfrac{s}{s^2 + 2s + 10}$
2.	$L\left[t^{3/2} + 1\right] =?$
Option A:	$\dfrac{\sqrt{\pi}}{2s^{5/2}} + \dfrac{1}{s}$
Option B:	$\dfrac{3\sqrt{\pi}}{2s^{5/2}} + \dfrac{1}{s}$
Option C:	$\dfrac{3\sqrt{\pi}}{4s^{5/2}} + \dfrac{1}{s}$
Option D:	$\dfrac{\sqrt{\pi}}{4s^{5/2}} + \dfrac{1}{s}$
3.	Find $L^{-1}\left[\dfrac{s-1}{s^2-2s+2}\right]$
Option A:	e^t
Option B:	$e^{-t}sint$
Option C:	$e^t sint$
Option D:	$e^t cost$
4.	Find $L^{-1}\left(\dfrac{1}{s(s^2+1)}\right)$
Option A:	$1 - sint$
Option B:	$1 + cost$
Option C:	$1 - cost$
Option D:	$1 + sint$
5.	In Fourier series of $f(x) = xcosx$ in $(-\pi, \pi)$. The value of a_n is
Option A:	0
Option B:	$\dfrac{-1}{2}$
Option C:	$\dfrac{(-1)^n}{n^2 - 1}$
Option D:	$\dfrac{1}{n^2 - 1}$

Question

6.	In Fourier series expansionfor $f(x) = x + cosx$ in $(0,2\pi)$, the value of a_0 is
Option A:	π
Option B:	-2π
Option C:	2π
Option D:	0
7.	The Cauchy-Riemann equation is
Option A:	$u_x = -v_y$ and $u_y = v_x$
Option B:	$u_x = v_y$ and $u_y = v_x$
Option C:	$u_x = v_y$ and $u_y = -v_x$
Option D:	$u_x = -v_x$ and $u_x = -v_x$
8.	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & -1 & 0 \\ -5 & 0 & 2 \end{bmatrix}$ Find Eigen Values of $A^2 - 2A^{-1} + I$
Option A:	4,4,4
Option B:	0,4,4
Option C:	1,4,4
Option D:	0,4,3
9.	The characteristic equation of the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ is
Option A:	$(x-1)(x-2)(x+2) = 0$
Option B:	$(x+2)(x+2)(x+1) = 0$
Option C:	$(x-2)(x-2)(x-1) = 0$
Option D:	$(x-1)(x-1)(x-2) = 0$
10.	If $\overline{F} = (x + 2y + az)\overline{\imath} + (bx - 3y - z)\overline{\jmath} + (4x + cy + 2z)\overline{k}$ is irrotational then
Option A:	$a = -4, b = 2, c = -1$
Option B:	$a = 4, b = 2, c = 1$
Option C:	$a = 4, b = 2, c = -1$
Option D:	$a = -4, b = -2, c = -1$

Question

Q2	Solve any Four out of Six 5 marks each
A	Evaluate $\int_0^\infty \dfrac{\cos 4t \,-\, \cos 3t}{t}\, dt$ by using Laplace transform.
B	Find $L^{-1}\left[\dfrac{s-1}{s^2+4s+29}\right]$
C	Find the Fourier Series for $f(x)=4-x^2$, in (-4, 4)
D	Show that the matrix $A=\begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ is diagonalisable
E	Find the orthogonal trajectory of the family of curves given by $e^x \cos y - xy = c$.
F	Show that $\bar{F}=(y^2-z^2+3yz-2x)i+(3xz+2xy)j+(3xy-2xz+2z)k$ is both irrotational and solenoidal.

Q3	Solve any Four out of Six 5 marks each
A	Find $L[e^{-4t}\int_0^t u\ \sin 3u\ du]$
B	Find the inverse Laplace transform of $\dfrac{s}{(s^2+1)(s^2+4)}$ by using convolution
C	Find the Fourier series expansion of $f(x)=x^2,\ -1<x<1$.
D	Verify Cayley – Hamilton theorem for the matrix $A=\begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ and find A^{-1}
E	Find the analytic function f(z)=u+iv in terms of z where u=$x^2-y^2-2xy+2x-3y$
F	Evaluate by using Stoke's theorem $\int_C \bar{F}.\overline{dr}$ where $\bar{F}=x^2i+xy\,j$ and C is the boundary of the rectangle x=0,y=0, x=1, y=1

Q4	Solve any Four out of Six 5 marks each
A	Find $L[e^{-t}\cos 2t\cos t]$
B	Find the inverse Laplace transform of $\dfrac{1}{(s+1)(s-5)(s+2)}$
C	Find the half range cosine series of $f(x)=\dfrac{1}{2}(\pi-x)\sin x$ in $(0,\ \pi)$.
D	If $A=\begin{bmatrix} \pi & \frac{\pi}{4} \\ 0 & \frac{\pi}{2} \end{bmatrix}$, find $\cos A$.
E	Find the directional derivative of the scalar function $\emptyset(x,y,z)=xy+zy+zx$ at the point $(1,2,3)$ in the direction of $3\hat{\imath}+4\hat{\jmath}+5\hat{k}$.
F	Evaluate by using Green's theorem $\int_C (x^2-y)dx+(2y^2+x)dy$, where C is the closed region bounded by $y=4$ and $y=x^2$.

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16/02/2022_Electronic Devices (ED) _Electronics and Computer Science (ECS) _Sem III_R19

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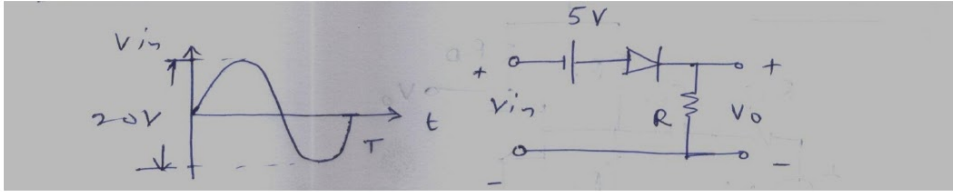MCQ and Descriptive section

Q.1	Choose the correct option for the following questions. All questions are compulsory & carry equal marks. (02 Marks Each)
1.	The transfer characteristics of a combinational clipper lie in which quadrants ?
Option A:	Quadrant I & II
Option B:	Quadrant II & III
Option C:	Quadrant I & III
Option D:	Quadrant II & IV
2.	Leakage current in P-N junction diode due to minority carriers happens on account of ?
Option A:	Extremely high forward bias voltage across the P-N junction diode terminals
Option B:	Presence of very high electric field (E) across the depletion region of P-N junction diode
Option C:	Increase in surrounding / ambient temperature
Option D:	Changes in the width of the depletion region or the depletion layer
3.	Capacitance of which semiconductor diode can be controlled by applying a reverse voltage ?
Option A:	Schottky diode
Option B:	Zener diode
Option C:	Varactor diode
Option D:	Photo diode
4.	Fill factor (FF) is a characteristic property of which of these optical semiconductor devices ?
Option A:	Solar cell
Option B:	Light emitting diode (LED)
Option C:	Photo diode
Option D:	Light dependent resistor (LDR)
5.	What is the function of a diode clamper circuit ?
Option A:	It changes the frequency of the applied AC input signal
Option B:	It changes the DC bias level of the applied AC input signal
Option C:	It changes the shape of the applied AC input signal
Option D:	It changes the phase shift of the applied AC input signal
6.	At equilibrium, entire depletion region or depletion layer in P-N junction contains only :-
Option A:	Positively & negatively charged immobile ions
Option B:	Free electrons as majority carriers
Option C:	Free holes as majority carriers
Option D:	Free electrons as minority carriers
7.	What kind of diode is formed by connecting a doped semiconductor region with a metal ?
Option A:	Varactor diode
Option B:	Zener diode
Option C:	Light emitting diode (LED)
Option D:	Schottky diode

8.	Which of these filters has the best value of the ripple factor (γ) amongst all ?
Option A:	Capacitor (C) Filter
Option B:	Inductor (L) Filter
Option C:	Inductor & Capacitor (L-C) Filter
Option D:	C-L-C or 'π' Filter
9.	How many more diodes are needed for full wave bridge type rectifier over center-tapped ?
Option A:	One (01)
Option B:	Two (02)
Option C:	Three (03)
Option D:	Four (04)
10.	What is the output expression for DC (average) voltage of any full wave rectifier ?
Option A:	$V_{dc} = V_m$
Option B:	$V_{dc} = 2V_m$
Option C:	$V_{dc} = 2V_m/\pi$
Option D:	$V_{dc} = V_m/\pi$

Q.2	Solve any Four out of Six	(05 Marks Each)
A	State & explain the Shockley's current equation of the P-N junction diode.	
B	For the circuit shown below in Fig. 1 draw output waveform if an input signal of 20 V peak-to-peak is applied. **Fig. 1 for Q.2 (B)**	
C	Explain the working principle & operation of solar cell with a neat sketch.	
D	Sketch & explain with appropriate waveforms the capacitor (C) filter.	
E	Draw the circuit diagram & explain the operation of full wave bridge rectifier.	
F	Differentiate between Zener breakdown & avalanche breakdown.	

Q.3	Solve any Two out of Three	(10 Marks Each)
A	With neat sketch, describe structure, construction, operation & V-I characteristics of the Schottky diode.	
B	Explain how a PN junction is formed with a neat diagram.	
C	For (any) full wave rectifier, define 'ripple factor' & derive expression for ripple factor (γ).	

Q.4	Solve any Two out of Three	(10 Marks Each)
A	With neat sketch, describe the operation of center-tapped full-wave rectifier with appropriate waveforms.	
B	Explain the V-I characteristics of a photo diode with a neat sketch. What is meant by 'dark current' ?	
C	Describe the operation of the Zener diode voltage regulator with a neat sketch.	

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18/02/2022_Digital Electronics_Electronics and Computer Science (ECS) _Sem III_R19

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MCQ correct options and subjective questions answers to be written on papers. Scan all pages of answer papers of Q1 to Q4 and create single file in pdf format to upload in the link provided

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    MCQ and Descriptive section

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In 2's complement subtraction method, if a carry is produced after the calculation,
Option A:	Carry is added to the final answer and 2's complement is calculated.
Option B:	Carry is discarded and 2's complement of answer is calculated.
Option C:	Carry is discarded to get the final answer.
Option D:	Carry is added to the 2's complement of the final answer.
2.	In Verilog Programming, if A = 4'b1001, A>>2 = ?
Option A:	0100
Option B:	0001
Option C:	0110
Option D:	0010
3.	The BCD addition of $(9)_{BCD}$ and $(5)_{BCD}$ is
Option A:	$(14)_{BCD}$
Option B:	$(1110)_{BCD}$
Option C:	$(E)_{BCD}$
Option D:	$(00010100)_{BCD}$
4.	A PLD which is devoid of AND-OR planes is
Option A:	PAL
Option B:	CPLD
Option C:	FPGA
Option D:	SPLD
5.	Which among these is a Ripple Counter with Divide by 2 and Divide by 8 sections?
Option A:	IC 74163
Option B:	IC 7490
Option C:	IC 7492
Option D:	IC 7493
6.	The number of similar gates which can be driven by a gate is called as _____
Option A:	Power dissipation
Option B:	Noise margin
Option C:	Fan-out
Option D:	Speed
7.	Which of the given logic family has the most favourable Noise Margin?
Option A:	TTL
Option B:	CMOS
Option C:	RTL
Option D:	ECL
8.	The number of Flip Flops used in designing a Mealy Machine Sequence detector, for the sequence 11000 will be _____
Option A:	3
Option B:	4
Option C:	5
Option D:	6

Question

9.	How many maximum number of Half adders can IC7483, 4 bit parallel adder have?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
10.	In Verilog HDL, the symbol X stands for
Option A:	AND each bit
Option B:	Undefined
Option C:	Multiplication
Option D:	Hexadecimal

Q2 (20 Marks)	Solve any Four out of Six . 5 marks each
A	With a neat diagram, explain the working of 4- bit Carry Look Ahead Adder.
B	Explain TTL to CMOS interfacing with an example.
C	Design Full Adder circuit using IC74138.
D	Implement IC 7490 as a Mod-6 counter.
E	Using Continuous Assignment statements and Net Data Types, Write a program for a Half Subtractor using Verilog HDL.
F	Implement a NOR Gate using CMOS.

Q3 (20 Marks Each)	Solve any Two Questions out of Three. 10 marks each
A	Convert the following number systems 1) $(75.6)_{10}$ to Binary 2) $(1100101)_2$ into Octal 3) $(37)_8$ into Hexadecimal 4) $(100)_{10}$ into BCD 5) $(FE)_{16}$ into octal
B	Design IC74163 to count from binary equivalents of 3 to 15.
C	With neat diagrams, explain PLA and PAL types of Logic Devices. Differentiate between them. Using PAL type device, design and implement $F(A,B,C)= \sum m(0,2, 3,7)$

Q4. (20 Marks)	
A	**Solve any Two.** **5 marks each**
i.	Using Procedural Assignment Statements, write a code in Verilog HDL to implement 4 bit up- down counter.
ii.	Using IC 7485, design an 8- bit comparator.
iii.	Write a Short Note on CPLD Devices.
B	**Solve any One.** **10 marks each**
i.	Design a Non-Overlapping Moore Sequence Detector for the sequence 1101.
ii.	Explain with suitable pin diagram, the working of IC74194 detailing every pin. In brief, describe it's working as Johnson's counter.

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21/02/2022_Data Structures and Algorithms_Electronics and Computer Science (ECS) _Sem III_R19

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MCQ correct options and subjective questions answers to be written on papers. Scan all pages of answer papers of Q1 to Q4 and create single file in pdf format to upload in the link provided

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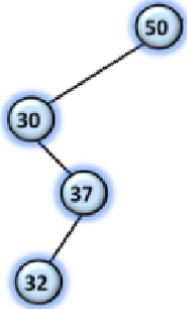   MCQ and Descriptive section

Question

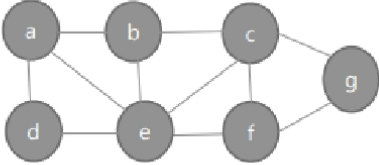| Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The node that has no children is referred as
Option A:	Parent node
Option B:	Root node
Option C:	Leaf node
Option D:	Sibling
2.	The given array is arr = {1,2,4,3}. Bubble sort is used to sort the array elements. How many iterations will be done to sort the array?
Option A:	3
Option B:	2
Option C:	1
Option D:	4
3.	To insert a new node in the beginning of a list, which of these statements have to be written.
Option A:	temp->link=start; start=NULL;
Option B:	temp->link=start; start=temp;
Option C:	start->link=temp; temp=start;
Option D:	start->link=temp; temp=NULL;
4.	What will be the equivalent postfix expression for this infix expression? P%(Q-R)+S*T
Option A:	PQR%-ST+*
Option B:	PQR-%ST*+
Option C:	PQ-R%-ST+*PQ-R%-ST
Option D:	%PQR-ST+*
5.	What will be the result when this postfix expression is evaluated (all operands are single digit). 532^+28*22+/-4+
Option A:	12
Option B:	14
Option C:	15
Option D:	10
6.	What is the number of edges present in a complete graph having n vertices?
Option A:	(n*(n+1))/2
Option B:	(n*(n-1))/2
Option C:	N
Option D:	Information given is insufficient
7.	Which of these is not an application of a linked list?
Option A:	To implement file systems
Option B:	For separate chaining in hash-tables
Option C:	To implement non-binary trees
Option D:	Random Access of elements

Question

8.	A normal queue, if implemented using an array of size MAX_SIZE, gets full when
Option A:	Rear=MAX_SIZE-1
Option B:	Front=(rear+1) mod MAX_SIZE
Option C:	Front=rear+1
Option D:	Rear=front
9.	What data structure would you mostly likely see in a non-recursive implementation of a recursive algorithm?
Option A:	Linked List
Option B:	Stack
Option C:	Queue
Option D:	Tree
10.	An adjacency matrix representation of a graph cannot contain information of:
Option A:	Nodes
Option B:	Edges
Option C:	Direction of edges
Option D:	Parallel edges

Q2.	Solve any Four out of Six5 marks each
A	Explain linear and non linear data structures with examples
B	Explain various techniques of graph representation.
C	What is recursion? Write a recursive function to calculate sum of n natural numbers
D	Explain infix, prefix, postfix expressions with examples.
E	Compare binary search and linear search algorithms.
F	Write inorder, preorder and postorder traversal of the following binary tree.

Question

Q3 .	Solve any Two Questions out of Three 10 marks each
A	Explain Quick sort algorithm and write C program for the same.
B	Write a C program to implement singly linked list that performs following functions: 1. Insert a node in the beginning 2. Delete a specified node 3. Search for a specific value 4. Displaying the list
C	Write an algorithm for implementing queue using array

Q4.	Solve any Two Questions out of Three 10 marks each
A.	Explain the properties of binary search tree. Construct Binary search tree for following elements. 47, 12, 75, 88, 90, 73, 57, 1, 85, 50, 62
B.	Explain BFS and DFS algorithm with an example. Apply BFS and DFS on following graph
C.	Sort the following array using each of the three sorting algorithms. 26 48 12 92 28 6 33 i. Bubble Sort ii. Insertion Sort iii. Selection Sort.

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23/02/2022_ Database Management Systems_Electronics and Computer Science (ECS) _Sem III_R19

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    MCQ and Descriptive section

Question

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	What do you mean by one to many relationships?
Option A:	One class may have many teachers
Option B:	One teacher can have many classes
Option C:	Many classes may have many teachers
Option D:	Many teachers may have many classes
2.	Which one of the following is a type of Data Manipulation Command?
Option A:	Create
Option B:	Alter
Option C:	Delete
Option D:	Enter
3.	Select the attributes which made up of more than one single attribute.
Option A:	Multi-value attribute
Option B:	Derived attribute
Option C:	Single value attribute
Option D:	Composite attribute
4.	If there is more than one key for relation schema in DBMS then each key in relation schema is classified as
Option A:	Prime key
Option B:	Super key
Option C:	Candidate key
Option D:	Foreign key
5.	What is ACID properties of Transactions?
Option A:	Atomicity, Consistency, Isolation, Database
Option B:	Atomicity, Consistency, Isolation, Durability
Option C:	Atomicity, Consistency, Inconsistent, Durability
Option D:	Automatically, Concurrency, Isolation, Durability
6.	If E1 and E2 are relational algebra expressions, then which of the following is NOT a relational algebra expression ?
Option A:	E1 ∪ E2
Option B:	E1 - E2
Option C:	E1 / E2
Option D:	E1 × E2
7.	Which of the following is not a valid SQL type?
Option A:	Decimal
Option B:	Numeric
Option C:	Float
Option D:	Character

Question

8.	The database language that allows us to access data in a database is called :
Option A:	DCL
Option B:	DML
Option C:	DDL
Option D:	DPL
9.	In mathematical term Table is referred as
Option A:	Relation
Option B:	Domain
Option C:	Attribute
Option D:	Tupple
10.	Which of the following is not a property of transactions?
Option A:	Atomicity
Option B:	Isolation
Option C:	Concurrency
Option D:	Durability

Q2.	Solve any Four out of Six5 marks each
A	Differentiate between file system and database system with an example
B	Explain Weak entity, Strong entity and total participation.
C	Define DBA. Discuss role DBA.
D	What are the different types of data models?
E	Explain Constraints in SQL
F	Explain Select, Project , Rename operators in relational algebra

Q3.	Solve any Two Questions out of Three 10 marks each
A	Consider the following schema for institute Library. Student (Rollno, Name, Father_name, Branch) Book (ISBN, Title, Author, Publisher) Issue (Rollno, ISBN, Date_of_Issue) Write SQL queries for the following statements i. List Roll Number and Name of all students of the branch CSE. ii. Find the name of students who have issued a book published by ABC publisher. iii. List title of all books and their author issued by student Prashant iv, List title of all books issued on or before 1st FEB 2021.
B	Draw the Database Architecture and explain in detail.
C	Explain the need of normalization.

Question

Q4.	
A	**Solve any Two** **5 marks each**
i.	Explain views in SQL.
ii.	Explain functional dependency in DBMS.
iii.	Write ACID properties of transaction.
B	**Solve any One** **10 marks each**
i.	Construct ER diagram and convert into Relational Model for Company Which has several Employees working on different types of projects. Several Employees are working on one department. Every Employee has Manager. Several Employees are supervised by one Employee.
ii.	Explain Data definition language and Data manipulation Language.

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