DEPARTMENT OF INFORMATION TECHNOLOGY

II B.TECH I SEMESTER R15 SUPPLEMENTARY PREVIOUS QUESTION PAPERS

LIST OF SUBJECTS

CODE	NAME OF THE SUBJECT
R15A0504	Data Structures using C++
R15A0461	Digital Logic Design
R15A0503	Mathematical Foundation of Computer Science
R15A0024	Probability and Statistics
R15A0401	Electronic Devices and Circuits

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
II B.Tech I Semester Supplementary Examinations, July/August 2021
Data Structures using C++
(CSE & IT)

Roll No										

Time: 3 hours Max. Marks: 75

Answer Any **Five** Questions
All Questions carries equal marks.
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1 What is Quick Sort? Illustrate Quick sort procedure with example and write its **[15M]** Pseudo code in C++

2 Write C++ program for Selection sort? What is the Time complexity of selection **[15M]** sort?

3 what is Linked List? What are the types of linked lists? Explain them with **[15M]** examples.

4 Explain and define below concepts
   a) Threaded Binary Tree **[5M]**
   b) Stack Operations **[5M]**
   c) List ADT **[5M]**

5 What is External Sorting ?explain briefly about External sorting Algorithm with **[15M]** example.

6 How would You implement Priority Queues using Heap? Write its Pseudo code **[15M]** in C++.

7 Explain the Following
   a) Collision Resolution Techniques in Hashing **[5M]**
   b) Compare Hashing and Skip Lists **[5M]**
   c) quadratic probing **[5M]**

8 What is AVL Tree? How to Construct AVL Tree? Discuss the Procedure of Insert **[15M]** a Node in AVL Tfree.

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Digital Logic Design
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1   Convert decimal +49 and +29 to binary, using the signed 2's-complement   **[15M]**
representation and enough digits to accommodate the numbers. Then perform the
binary equivalent of(+29) + (-49), (-29) + (+49), and (-29) + (-49). Convert the
answers back to decimal and verify that they are correct.

2   Find the SOP and POS forms of the following Boolean function using K-   **[15M]**
Map and draw the logic diagram for output expressions.
$$F(A, B, C, D) = \Sigma m(0,1,2,5,7,8,9,10,12) + d(3,6,15)$$

3   With the use of maps, find the simplest sum-of-products form of the function $F =$ **[15M]**
fg and draw corresponding logic diagram where
$$f = abc' + c'd + a'cd' + b'cz'$$
and
$$g = (a + b + c' + d')(b' + c' + d)(a' + c + d')$$

4   Define Multiplexer? Use 2×1 multiplexer to implement the logic function: **[15M]**
$F(A, B, C, D) = \Sigma m(1, 2, 4, 7, 9, 11, 13, 15)$

5 a Write the truth table of 3-bit gray to binary code conversion. Show the realization   **[7M]**
using 4:1MUXs.

5 b Design full adder using logic gats   **[8M]**

6   Design 4X 16 decoder using 3X8 decoder.   **[15M]**

7   Design a synchronous counter using D flip-flop that can function as a BCD up   **[15M]**
counter when the mode control = 0 and when mode control = 1 it gives the count in
the sequences 0,3,6,2,4,9,7,11, 0,3,6,2…..

8   Draw a PLA circuit to implement the functions   **[15M]**
F1 = A'B + AC + A'BC'
F2 = (AC + AB + BC)'

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Mathematical Foundation of Computer Science
(CSE & IT)

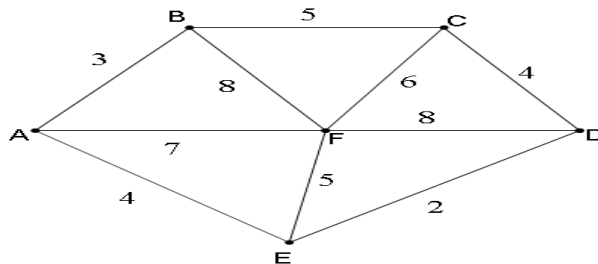| Roll No										

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1   Obtain the PDNF for $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q V \neg P))$ **[15M]**

2   Obtain the PCNF for $P \rightarrow (P \wedge (Q \rightarrow P))$ **[15M]**

3   A) Let f and g be the functions from positive real numbers to positive real   **[7M]**
     numbers defined by $f(x) = 2x$, $g(x) = x^2$ calculate fog and gof
     B) Let $f(x) = x+3$, $g(x) = x^3$ be two functions defined on the set of real   **[8M]**
     numbers. Show that gof ≠ fog.

4   Draw the Hasse Diagram for the   **[15M]**
     i) Divisors of 6   ii)Divisors of 12

5   How many ways are there to select the 2 cards such that: **[15M]**
     (a) the first card is an ace and the second card is a king?
     (b) the first card is an ace and the second is not a king?
     (c) the first card is a heart and the second is a club?
     (d) the first card is a heart and the second is a king?
     (e) the first card is a heart and the second is not a king?

6   Consider only 8-letter words with 3 different vowels and 5 different consonants.   **[15M]**
     (a) How many such words can be formed?
     (b) How many such words contain the letter a?
     (c) How many contain the letters a and b?
     (d) How many contain the letters b and c?
     (e) How many contain the letters a,b, and c?

7   Solve the recurrence relation. $a_n + 4a_{n-1} + 3 a_{n-2} = 0$, n≥2, with initial conditions   **[15M]**
     $a_0 = 2$, $a_1 = 4$

8   Using Krushkal's algorithm, find the minimum cost spanning tree for the   **[15M]**
     following weighted graph

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Code No: R15A0024

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
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Probability and Statistics
(CSE & IT)

Roll No										

Time: 3 hours   **Max. Marks: 75**

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***

1   A continuous random variable has the probability density function   **[15M]**
$$f(x) = \begin{cases} kxe^{-\lambda x}; x \geq 0, \lambda > 0 \\ \quad 0, Otherwise \end{cases}$$
Determine (i) **k** (ii) Mean (iii) Variance

2   The weights of 300 students are normally distributed with mean 68 kgs and   **[15M]**
standard deviation 3 kgs. How many students have weights (i) greater than 72 kgs
(ii) less than or equal to 64 kgs (iii) between 65 and 71 kgs

3   Find Karl Pearson's coefficient of correlation from the following   **[15M]**

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

4   Given the bi-variate data: **[15M]**

X	1	5	3	2	1	1	7	3
Y	6	1	0	0	1	2	1	5

(a) Find the Regression line of Y on X and hence predict Y if X=10
(b) Find the Regression line of X on Y and hence predict X if Y=2.5

5   A population consists of 5,10,14,18,13,24. Consider all possible samples of sizes   **[15M]**
two which can be drawn without replacement from the population. Find (i) The
mean of the population (ii) The standard deviation of the population (iii) The
mean of the sampling distribution of means (iv)The standard deviation of
sampling distribution of means

6   It is claimed that a random sample of 49 tyres has a mean life of 15,200 km. This   **[15M]**
sample was drawn from a population whose mean is 15,150 km and a S.D. of
1200 km. Test the significance at 0.05 level.

7   Two horses A and B were tested according to the time (in sec) to run a particular   **[15M]**
    track with the following results

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	-

   Test whether the two horses have the same running capacity (5% values of t for
   11 dof=2.2)

8   A car park contains 5 cars. The arrival of cars is Poisson with mean rate of 10 per   **[15M]**
    hour. The length of time each car spends in the car park has negative exponential
    distribution with mean 2 hours. How many cars are in the car park on average and
    what is the probability of a newly arriving customer finding the car park full and
    having to park his car elsewhere?

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II B.Tech I Semester Supplementary Examinations, July/August 2021
Electronic Devices and Circuits
(ECE, CSE & IT)

Roll No										

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1 Explain Forward and Reverse bias of the PN junction diode and plot V-I characteristic of the diode. **[15M]**

2 Explain the operation of Varactor diode and plot how the transition capacitance varies with applied reverse voltage. **[15M]**

3 Derive the expression for the ripple factor of a half-wave rectifier with shunt capacitor filter. **[15M]**

4 Draw and explain the Full wave rectifier with neat diagram and derive the ripple factor and efficiency. **[15M]**

5 Draw the input and output characteristics of common emitter configuration and explain in detail. **[15M]**

6 The h-parameter a.c. equivalent circuit of a transistor in CE model is shown in Fig. **[15M]**
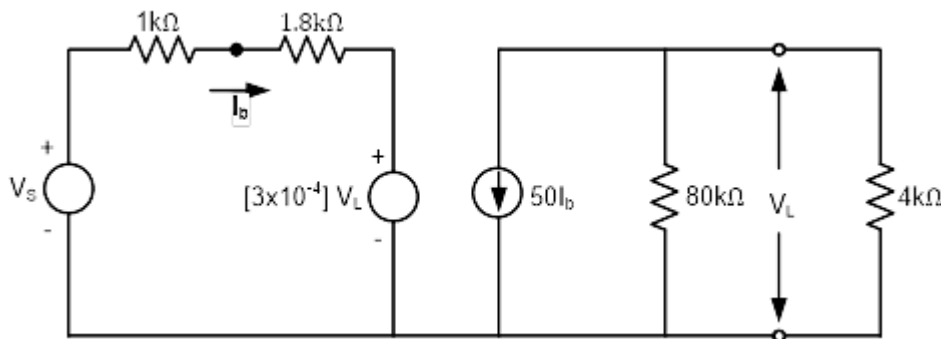
Calculate A_I, $A_v = \dfrac{V_L}{V_S}$, Z_{in} and Z_{out}.

7 Derive the expression for stability factor of self-bias circuit. **[15M]**

8 With the help of neat diagram explain the voltage divider biasing method for FET **[15M]**

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