NEW

Part II 3-Tier

2015

COMPUTER SCIENCE

(Honours)

PAPER—VA (Set-I)

(PRACTICAL)

Full Marks : 50

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Answer any *two questions.*

Section—I

(*Analog Circuits*)

Answer any *one* question : 20

1. Design a full wave bridge rectifier. Study its voltage regulation. Calculate its ripple factor and percentage of regulation.

[CKT–6, Data–10, Calculation–4]

2. Study line regulation and load regulation using a Zener diode.

[CKT–5, Data–10, Discussion–5]

3. Study the use of diodes as clipper and clamper.

[CKT–8, Data–10, Discussion–2]

4. Design a square wave oscillator using 555 timer.

[CKT–8, Data–8, Discussion–4]

5. Measure input offset voltage and input offset current of an OPAMP (IC–741).

[CKT–6, Data–10, Calculation–4]

6. Study the use of OPAMP as inverting and non-inverting amplifier.

[CKT–6, Data–8, Drawing of graphs–4, Discussions–2]

7. Study the use of OPAMP as adder and differentiator.

[CKT–8, Data–8, Discussions–4]

8. Study the use of OPAMP as subtractor and integrator.

[CKT–8, Data–8, Discussions–4]

9. Design a high pass filter using an OPAMP.

[CKT–6, Data–10, Discussions–4]

Section—II

(*Digital Circuits*)

Answer any *one* question : 20

1. Construct and study AND, OR, NOT gates using diodes and transistor.

[CKT–9, Data–7, Discussion–4]

2. Design a circuit to convert BCD numbers to corresponding Gray Codes.

[Theory–5, CKT–10, Data–5]

3. Design a 4 : 1 MUX using NAND gates.

[Theory–5, CKT–10, Data–5]

4. Design a 'Seven Segment display' unit.

[CKT–10, Data–6, Discussion–4]

5. Design S–R, J–K and J–K master slave flip-flops using basic gates.

[CKT–12, Data–6, Discussion–2]

6. Design a 4-bit register (shift left and shift right) using flip-flops.

[CKT–12, Data–6, Discussion–2]

7. Design a MOD-12 counter using J–K master slave flip-flop.

[CKT–10, Data–6, Discussion–4]

Laboratory Note Book : **5**

Viva Voce : **5**

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Answer any *two* questions taking *one* from each group (Lottery Basis).

Section—I

(*Analog Circuits*)

[Marks : 20]

Answer any *one* question.

1. Construct a bridge rectifier with capacitor filter. Plot $(I_L - V_L)$ graph. Hence calculate percentage of regulation.

[Circuit–6, Data–10, Calculation–4]

2. Design an integrator circuit using OPAMP.

[Circuit–6, Data–10, Calculation–4]

3. Design a three bit weighted resistor D/A converter using OPAMP.

[Circuit–6, Data–10, Calculation–4]

4. Construct an astable Multivibrator circuit using IC 555. Measure its frequency and duty cycle by CRO.

[Circuit–6, Data–10, Calculation–4]

5. Design a voltage regulator circuit using transistor and a Zener diode. Study its regulations.

[Circuit–6, Data–10, Calculation–4]

6. Design a 4 bit R–2R ladder D/A converter using OPAMP.

[Circuit–6, Data–10, Calculation–4]

7. Design an active high pass filter using IC 741.

[Circuit–6, Data–10, Calculation–4]

Section—II

(*Digital Electronics*)

[Marks : 20]

Answer any *one* question.

1. Construct a BCD adder using IC 7483.

[Circuit–9, Data–7, Discussion–4]

2. Construct a clocked J–K flip-flop by using NAND gates. Verify its operation.

[Circuit–9, Data–7, Discussion–4]

3. Design a circuit to convert BCD numbers to corresponding grey code.

[Circuit–9, Data–7, Discussion–4]

4. Design mod–10 counters and verify its operation.

[Circuit–9, Data–7, Discussion–4]

5. Design a decade counter using J–K master-slave flip-flop.

[Circuit–9, Data–7, Discussion–4]

6. Design a 4:1 MUX using only NAND gates. Also construct 8:1 MUX from 4:1 MUX.

[Circuit–9, Data–7, Discussion–4]

7. Construct a Half-adder with minimum number of NAND gates and verify its truth table.

[Circuit–9, Data–7, Discussion–4]

8. Design a four bit 2's complement subtractor using 7483 and XOR gate.

[Circuit–9, Data–7, Discussion–4]

Practical Note Book. : ***5***

Viva-voce : ***5***

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Answer any *two questions.*

Section–I

(*Fortran - 77*)

[Marks : 20]

(Problem should alloted by lottery basis.)

Answer any *one* : 20

1. Write a program to find a real root of $x^2 - 5x + 2 = 0$ by Newton Raphson method correct upto 4 decimal places. 20

2. Solve the following system by Gauss elimination method :

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 3z = 8$$

20

3. Write a program to solve a system of equations by Gauss-Seidel method :

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$2x + 2y + 10z = 14$$

20

4. Write a program to find $F(x_i)$ by Lagrange interpolation formula from the data $\{x_i, f(x_i)\}$, i = 1, 2, ...N. Use it to find f(15) from the following data :

x	10	25	47	81
f(x)	14·1321	17·2172	19·1729	21·1892

20

5. Write a program to evaluate $\int_{0.1}^{0.9} \left(1 + \frac{\text{Sin}x}{x}\right) dx$ by Simpson's $^3/_8$th rule. 20

6. Write a program to find the root of an equation by bisection method using

$$5x - 4 \text{ Sin } x - 8 = 0$$

20

7. Write a program to calculate the coefficient of correlation from a given set of values $\{x_i, y_i\}$, i = 1, 2, ... N. Use it for

x :	89	86	74	65	63	66	67
y :	82	91·5	84	75	72	70·5	75

20

8. Write a program to search an element from an array of elements using Binary Search technique. 20

9. Solve the following equation using Euler's method for $x = 1$, by taking $h = 0{\cdot}2$:

$$\frac{dy}{dx} = (x + y),\ y = 1,\ \text{when } x = 0.$$ 20

10. Write a program to check whether a given number is a palindrom or not. 20

Section–II

(*C-language*)

(Problem should alloted by lottery.)

Answer any *one* : 20

1. Write a program to count the number of occurrence of each letter in a user given string. 20

2. Write a program to find all the Armstrong numbers between 100 to 999. 20

3. Write a program to generate the first 10 positive integers that are divisible by 7. 20

4. Write a program to count the number of vowel and consonant in a string. 20

5. Write a program to calculate the sum of the n natural numbers using recursion, 1 + 2 + 3 + ... + n. 20

6. Write a program to remove the repeated letters from a given string. 20

7. Write a program to print an array using pointer. 20

8. Write a program for reading a string and printing the string in the following form the string is 'MADAM'. Output will be

   M
   M A
   M A D
   M A D A
   M A D A M 20

9. Write a program to generate non-fibonacci numbers upto n. 20

10. Write a program to generate n random numbers and print which are not prime. 20

P N B : 5 Marks

Viva : 5 Marks

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Section–I

(*Fortran – 77*)

[Marks : 20]

(Problem should alloted by lottery basis.)

Answer any *one* question.

1. Write a program to find f(x) for a given value of x using Newton's forward interpolation formula from a given set of values {x, f(x)}. Use it to find f(x) for x = 1·05 from the following data : 20

x :	1·0	1·1	1·2	1·3	1·4
f(x) :	0·24197	0·21785	0·19419	0·17137	0·14973

2. Write a program to find the sum of the following series :

$$COS(x) = 1 - \frac{x^2}{\lfloor 2} + \frac{x^4}{\lfloor 4} - \frac{x^6}{\lfloor 6} + \ldots\ldots \infty$$ 20

3. Using Runge Kutta method of order 4 to find the value of y for x = 0·3 in steps of 0·1, if $\frac{dy}{dx} = x^2 + y^2$, given that y = 1 when x = 0. 20

4. Write a program to find the SD and first four moments about mean for a discrete distribution. Test the program using the following data :

   24, 2, 18, 74, 40, 61, 15, 90, 31, 14, 8 20

5. Write a program to sort a given set of data by insertion sort technique. Use it for the following :

   84, 71, 14, 32, 29, 95, 54, 42, 61, 29, 8 20

6. Write a program to print first 20 non-fibonacci numbers 20

7. Write a program to calculate the root of a given equation by Bisection method :

   $x^3 - 3x - 2 = 0$ 20

8. Evaluate the integration $\int_0^{\pi/4} \sqrt{1 - 0 \cdot 162 \sin^2\theta}\, d\theta$ by Trapezoidal rule using 10 subintervals.

9. Write a program to convert a binary number to its equivalent decimal. 20

10. Write a program to determine whether a given year is a leap-year or not. 20

Section–II

(*C – Language*)

[Marks : 20]

(Problem should alloted by lottery basis.)

Answer any *one* question.

1. Write a program to find the value of cosx from the following series. Use it to find the values of cosx for $x = 15°$ & $18°$ taking terms $\geq 10^{-4}$.

$$COS(x) = 1 - \frac{x^2}{\lfloor 2} + \frac{x^4}{\lfloor 4} - \cdots$$ 20

2. Write a program to sort a given data set by quick sort method. Use it for the following

82, 8, 21, 63, 95, 26, 29, 105, 81 20

3. Write a program to print the number of words in a sentence. 20

4. Write a program to convert a binary number to a HEX number. 20

5. Write a program to calculate first 10 Fibonacci numbers using recursion.

6. Write a program to multiply two matrices A and B of order m × n and n × p respectively.

7. Write a C program to find the sum of the following series —

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots\ldots$$ 20

8. Without using any in build function. Write a program to reverse a given string. 20

9. Write a program to display strong numbers between a and b. 20

10. Write an "efficient" program to search a number within an array. 20

P N B : 05 Marks

Viva : 05 Marks
