SH-III/Electronics/301/C-5(T)/19

B.Sc. 3rd Semester (Honours) Examination, 2019-20
ELECTRONICS

Course ID : 31711   **Course Code : SH/ELC/301/C-5(T)**

Course Title: Electronic Circuits

Time: 1 Hour 15 Minutes   **Full Marks: 25**

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any three* of the following questions: 1×3=3

    (a) What is the slope of DC load line in diode circuits?

    (b) Why h-parameters are called hybrid parameters?

    (c) What do you mean by 'feed back' in an amplifier circuit?

    (d) What is rectification?

    (e) What are clipping circuits?

    (f) Draw the out-put wave form of a capacitor shunted filter.

2. Answer *any three* of the following questions: 2×3=6

    (a) What is PIV (Peak Inverse Voltage)?

    (b) What is ac load line? How does it differ from a dc load line in any amplifier circuit?

    (c) Draw the circuit diagram of Voltage divider method of biasing.

    (d) What are "Bark hausen criterion for the condition of oscillation"?

    (e) What are the basic differences between a voltage amplifier and a power amplifier?

    (f) What is push-pull operation? Where is it used?

3. Answer *any two* of the following questions: 5×2=10

    (a) Derive an expression for voltage gain of a CE amplifier in the midfrequency range with h-parameter ac equivalent circuit.

    (b) Draw the circuit diagram of a transformer coupled class-A power amplifier. Obtaint the expression for Maximum Conversion Efficiency (%η).   2+3=5

(c) Draw the circuit diagram of a feed back amplifier. Derive an expression for voltage gain of a feedback amplifier.

(d) With the proper circuit diagram of a Hartley Oscillator explain its working principle. Write down the expression for generated frequency of the oscillator. Give one application of it.

4. Answer *any one* of the following questions: 6×1=6

(a) Draw the circuit diagram of a single tuned voltage amplifier. Then obtain its h-parameters ac equivalent circuit. Hence derive the expression for voltage gain for this type of amplifier.

2+2+2=6

(b) With proper circuit diagram obtain an expression for frequency of the generated signal for an R-C phase shift oscillator. What type of frequencies are generated by this oscillator? 2+3+1=6

(c) Draw the circuit diagram of a Zener diode based voltage regulator for dc and explain its operation. How a constant dc voltage is obtained at its output? 2+2+2=6

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B.Sc. 3rd Semester (Honours) Practical Examination, 2019-20
ELECTRONICS

Course ID : 31721 **Course Code : SH/ELC/301/C-5(P)**

Course Title: Electronic Circuits

Time: 2 Hours **Full Marks: 15**

Perform *any one* experiment form the following:

1. Using the given experimental set up, measure the variation of the output d.c. voltage across a suitable resistor with the variation of the input a.c. (r.m.s.) voltage of a half-wave rectifier. Repeat the experiment with a capacitor filter. Represent your observation graphically. Compare the findings with the theoretical predictions.

2. Using the given experimental set up, measure the variation of the output d.c. voltage across a suitable resistor with the variation of the input a.c. (r.m.s.) voltage of a full-wave rectifier. Repeat the experiment with a capacitor filter. Represent your observation graphically. Compare the findings with the theoretical predictions

3. Using the given experimental set up of a half-wave rectifier with capacitor filter, measure the variation of the output d.c. voltage and a.c. ripple voltage with the variation of the load resistor. Hence, graphically plot the ripple factor of the given rectifier as a function of the load resistor. How does the percentage regulation of the given power supply vary with the variation of the load resistor? Answer graphically. Compare the value of the ripple factor with its theoretical value.

4. Using the given experimental set up of a full-wave rectifier with capacitor filter, measure the variation of the output d.c. voltage and a.c. ripple voltage with the variation of the load resistor. Hence, graphically plot the ripple factor of the given rectifier as a function of the load resistor? How does the percentage regulation of the given power supply vary with the variation of the load resistor? Answer graphically. Compare the value of the ripple factor with its theoretical value.

5. Perform an experiment to study the voltage regulation characteristics of a Zener diode based power supply circuit.

6. Using the given experimental set up, measure the voltage gain of a common-emitter transistor amplifier with different a.c. load. Plot the observed voltage gain vs. a.c. load curve.

7. Perform an experiment to draw the frequency response characteristics of a single stage R-C coupled transistor amplifier in CE mode. Report your observation graphically. Also find the mid-frequency gain and bandwidth for the same.

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B.Sc. 3rd Semester (Honours) Examination, 2019-20
ELECTRONICS

Course ID : 31712   **Course Code : SHELC-302C-6(T)**

Course Title: Digital Electronics and Verilog (VHDL)

Time: 1 Hour 15 Minutes   **Full Marks: 25**

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

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any three* of the following questions: 1×3=3

   (a) Using 2's complement method subtract 1010_2 from 1101_2.

   (b) Convert the given hexadecimal number $(23A)_{16}$ to binary number.

   (c) Find the decimal equivalent of the binary number 1010111 and 001011.

   (d) Represent-14 in 1's complement form.

   (e) What is a demultiplexer?

2. Answer *any three* of the following questions: 2×3=6

   (a) Draw the symbol of an X-NOR gate and give its truth table.

   (b) A Boolean expression is given as $Y = (A + B)(\bar{A} + \bar{B})$. Prove that this logic diagram is equivalent to an EX-OR gate.

   (c) Prove the Boolean identity $AB + \bar{A}\bar{B} = \overline{A\bar{B} + \bar{A}B}$.

   (d) What is a decode counter?

   (e) What are ripple counters?

   (f) Write down the exitation table of S-R and J-K flip-flops.

3. Answer *any two* of the following questions: 5×2=10

   (a) What is a Multiplexor? Explain the function of 8:1 MUX and design the same using different logic gates.

   (b) What is a half-adder? Why is it so called? Design a half-adder by using Universal logic gates.

   (c) Simplify the following Boolean function using Karrnaugh mapping and draw the logical diagram using NAND gates only. $F(A, B, C, D) = \sum_m(0,1,2,4,7,8,9,12,13)$

   (d) Write down the truth-table of half-subtractor. Design the same using NAND gates only.

4. Answer *any one* question: 6×1=6

    (a) Describe the operation of a 4 bit ripple counter using 4JK flip-flops. Draw the proper input output waveforms of the counter.

    (b) What is the need of clocking a flip-flop? Give the truth-table of a clocked SR flip-flop constructed with NAND gates and explain the operation of it.

    (c) Draw the basic circuit diagram of TTL NAND gate and explain its operation.

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B.Sc. 3rd Semester (Honours) Practical Examination, 2019-20
ELECTRONICS

Course ID : 31722 **Course Code : SHELC-302C-6(P)**

Course Title: Digital Electronics and Verilog (VHDL) (Practical)

Time: 2 Hours **Full Marks: 15**

1. Design, AND, OR, NOT and NOR gates using NAND gates only and verify their truth table.

2. Design, AND, OR, NOT and XOR gates using NOR gates only and verify their truth table.

3. Build a Flip-Flop Circuit (RS/Clocked RS/D-type) using gates and verify their truth tables.

4. Design a Half Adder using NAND/NOR gates and verify its truth tables.

5. Design a Full Adder using NAND/NOR gates and verify its truth tables.

6. Design a Half Subtractor using NAND/NOR gates and verify its truth tables.

7. Design a Full Subtractor using NAND/NOR gates and verify its truth tables.

8. Design a 4×1 Multiplexer using gates and verify its truth tables.

9. Design a MOD-10 ripple counter using D/T/JK Flip-Flop and obtain its timing diagram.

10. Design a shift register and study serial and parallel shifting of data.

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SH-III/ELC/303-C-7/19

B.Sc. 3rd Semester (Honours) Examination, 2019-20
ELECTRONICS

Course ID : 31713   **Course Code : SH/ELC/303-C-7**

Course Title: C Programming and Data Structures

Time: 1 Hour 15 Minutes   **Full Marks: 25**

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

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any three* of the following questions: 1×3=3

   (a) What do you mean by 'keywords' in C Programme?

   (b) What is 'Token' in C language?

   (c) How many bytes are required to store float type value?

   (d) What will be the output of the following C. Code

   Printf ("Logical AND is = %d", (5>3&&7>9)).

   (e) If int a = 2, b = 3, x = 0, find the value of x = (+ + a, b + = a).

   (f) What is Unary Operator?

2. Answer *any three* of the following questions: 2×3=6

   (a) How to initialize 1D and 2D arrays?

   (b) Explain with example + + i and i + +.

   (c) What are 'formal' and 'actual' parameters?

   (d) What is Pointer? How is it initialized?

   (e) What do you mean by Operator? Mention two logical operator.

   (f) What do you mean by formatted output in C language?

3. Answer *any two* of the following questions: 5×2=10

   (a) What is the role of 'Switch' statement in C programming Language? Explain with example.

                2+3=5

   (b) Write a C programme to add two matrices of dimension 3 × 3 and store the result in another matrix.

   (c) What is data type? Explain any four data types used in C language.   2+3=5

   (d) Write a C programme to read character from keyboard and display message whether character is alphabet, digit or special symbol.

4. Answer *any one* of the following questions: 6×1=6

   (a) Write a C program to accept a number from the user and check whether given number is present in the array or not using binary search algorithm.

   (b) What do you mean by sorting? Write a C program to sort the n positive integers using Insertion sort algorithm.

   (c) Write a C program to create a database of 50 students to store personal details such as Roll Nos, Names, and Marks. Print all the details of student whose name is entered by user.

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B.Sc. 3rd Semester (Honours) Practical Examination, 2019-20
ELECTRONICS

Course ID : 31723   **Course Code : SH/ELC/303/C-7(Pr)**

Course Title: C Programming and Data Structures

Time: 2 Hours   **Full Marks: 15**

Answer *any one* of the following:

1. Write a C program to generate the Fibonacci series up to the given limit N and also print the number of elements in the series.

2. Write a C program to find minimum and maximum of N numbers.

3. Write a C program to find the GCD of two integer numbers.

4. Write a C program to calculate factorial of a given number.

5. Write a C program to find all the roots of a quadratic equation $Ax^2 + Bx + C = 0$ for non – zero co-efficients A, B and C. Else report error.

6. Write a C program to calculate the value of sin(x) and cos(x) using the series. Also print sin (x) and cos (x) value using library function.

7. Write a C program to generate and print prime numbers up to an integer N.

8. Write a C program to sort given N numbers in ascending/descending order using Insertion sort/Bubble sort/Selection sort algorithm.

9. Write a C program to find the sum & difference of two matrices.

10. Write a C program to find the product of two matrices.

11. Write a C program to find the transpose of given MXN matrix.

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SH-III/ELC/305-SEC-1/19

B.Sc. 3rd Semester (Honours) Examination, 2019-20

ELECTRONICS

Course ID : 31715   **Course Code : SH-ELC-305-SEC-1**

Course Title: Programming with MATLAB

Time: 2 Hours   **Full Marks: 40**

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

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any five* of the following questions: 2×5=10

    (a) What is the difference between 'clc' and 'clear' commands?

    (b) What will be the output from the following MATLAB Commands?

$$\gg a = 7;$$
$$\gg B = 5;$$
$$\gg c = a + B;$$
$$\gg d = [1, a + B; a, c]$$

    (c) What is the difference between 'Who' and ' Whos' Commands?

    (d) Explain 'input' command in MATLAB.

    (e) What will be the output of the following MATLAB Command?

$$\gg A = [1\ 2\ 3\ ; 4\ 5\ 6\ ]$$
$$\gg S = Size\ (A)$$

    (f) What will be the output of the following Commands?

      (i) Zeros (3, 2)

      (ii) Ones (2, 3)

    (g) Write MATLAB Command to find the roots of the polynomial $y = x^3 - 3x^2 + 2x$.

    (h) Write MATLAB expressions for the following:

      (i) $|xe^x - Cos(bx)|$

      (ii) $x = \log_e \sqrt{\frac{a}{bc}}$.

2. Answer *any four* of the following questions: 5×4=20

    (a) What is Variable? How is it defined in MATLAB? Give rules regarding variable names.

                                                              1+1+3=5

    (b) Explain 'Relational' and 'logical' operators in MATLAB with example.   2½+2½=5

(c) Write a MATLAB function to calculate the hyperbolic Sine and Cosine function.   5

(d) Write a function file for polar to rectangular conversion.   5

(e) Write a MATLAB script file to check whether the given number is even or odd.   5

(f) Write a MATLAB script file to plot the curve for a function described by the equation $Y = x^3 + 2x^2 - 5$ where x varies from –10 to 10. Label x and y–axes and provide a suitable title to the plot.   5

3. Answer *any one* of the following questions: 10×1=10

(a) What is script file and function file in MATLAB? Write a script and a function file to find out the distance between two points (x_1, y_1) and (x_2, y_2) specified by the user on Cartesian Coordinate System.   5+5=10

(b) Explain 'break' and 'continue' Commands in MATLAB with suitable example.   5+5=10

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