CODING

Under Graduate Examination, May 2022

Semester **: 4 [CBCS]**

Subject Code **: EL/IV/EC/07**

Subject **: Electronics**

Name of the Paper **: Pulse Switching Circuits**

Date of Examination **:**

No. of Answer Sheet(s) Used : _____

Full Marks : 75 **Time : 3 Hours**

INSTRUCTIONS TO CANDIDATES

Please read the instructions carefully before you start writing your answers.

1. Questions should be attempted as per instructions.
2. Candidate should clearly indicate the Question Nos. and the Page No. for each sheet.
3. Please write your Roll No. and Registration No. clearly and correctly in the space provided.
4. Do not write your name or the name of your college/institution anywhere or anything else, which is not part of your answer.
5. Candidate should make sure that the answer sheets scanned should be legible.
6. The Invigilator on duty should confirm that the correct script is received, compiled and attached to the correct Cover Page.
7. Multiple Choice Answer should indicate the Question No., Sub. No., (if any) and the correct answer. For example—

   1. *Name the state capital of Mizoram.*
   (a) Lunglei
   (b) Champhai
   (c) Aizawl
   (d) Mamit

   Candidate should provide answer as **1 (c) Aizawl**

   [Candidate should avoid writing only (c)]

SECTION–A (OBJECTIVE)	
Total	

SECTION–B (SHORT ANSWER)	
Question Nos.	**Marks**
Total	

SECTION–C (DESCRIPTIVE)	
Question Nos.	**Marks**
Total	
G. Total	

CODING

To be filled in by the Candidate

Date of Examination

Semester **: 4 [CBCS]**

Subject Code

EL/IV/EC/07

Subject

Electronics

Roll No. _____

Regn. No. _____

No. of Additional Sheet(s) :

_____

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*

2022

(CBCS)

(4th Semester)

ELECTRONICS

(Pulse Switching Circuits)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

Use of simple calculator is allowed

(SECTION : A—OBJECTIVE)

(*Marks* : 10)

Choose the correct answer from the options provided : 1×10=10

1. Feedback in amplifiers always helps in

(a) controlling its output

(b) increasing its gain

(c) reducing its input impedance

(d) stabilizes its gain

2. Voltage-series feedback results in

(a) increase in both input and output impedances

(b) decrease in both input and output impedances

(c) increase in input impedance and decrease in output impedance

(d) decrease in input impedance and increase in output impedance

3. For sustaining oscillations in an oscillator

(a) feedback factor should be unity

(b) feedback factor should be negative

(c) phase shift should be 180°

(d) feedback factor should be zero

4. A Colpitts oscillator uses

(a) tapped coil

(b) inductive feedback

(c) tapped capacitance

(d) no tuned LC circuit

5. In RC phase-shift oscillator circuits

(a) there is no need for feedback

(b) feedback factor is less than unity

(c) pure sine wave output is possible

(d) transistor parameters determine oscillation frequency

6. The primary advantage of a crystal oscillator is that

(a) it can oscillate at any frequency

(b) it gives a high output voltage

(c) its frequency of oscillation remains almost constant

(d) its frequency of oscillation does not remain constant

7. The number of energy storing elements in monostable multivibrator is

(a) two *(b)* one

(c) three *(d)* No element

8. _____ multivibrator is a square-wave oscillator.

(a) Monostable *(b)* Astable

(c) Bistable *(d)* Schmitt trigger

9. The binary system uses powers of _____ for positional values.

(a) 2 *(b)* 10

(c) 8 *(d)* 16

10. In Boolean algebra, the plus sign (+) indicates

(a) AND operation *(b)* OR operation

(c) NOT operation *(d)* NOR operation

(SECTION : B—SHORT ANSWER)

(*Marks* : 15)

Answer the following questions : 3×5=15

UNIT—I

1. How does the negative voltage feedback stabilize the gain of an amplifier?

OR

2. The overall gain of a multistage amplifier is 140. When negative voltage feedback is applied, the gain is reduced to 17·5. Find the fraction of the output that is feedback to the input.

UNIT—II

3. Explain Barkhausen criterion for the oscillators.

OR

4. The resonant circuit of a tuned collector oscillator has a frequency of 5 MHz. If the value of capacitance is increased by 50%, calculate the new resonant frequency.

UNIT—III

5. Explain the frequency stability of crystal oscillator.

OR

6. What are the advantages and disadvantages of RC phase-shift oscillators?

UNIT—IV

7. What is a multivibrator? What are the uses of monostable multivibrators?

OR

8. Show that the switching time (time period) of an astable multivibrator is 1·38 times the product of R and C.

UNIT—V

9. Multiply $(1111)_2$ by $(0111)_2$ using binary multiplication method.

OR

10. Write the symbol and truth table of XOR gate.

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

UNIT—I

1. *(a)* Discuss the principles of negative feedback in amplifiers. 5

(b) How does negative voltage feedback increase input impedance and decrease output impedance of an amplifier? 5

OR

2. *(a)* The gain of the amplifier without feedback is 50 whereas negative feedback falls to 25. If due to ageing, the amplifier gain falls to 40, find the percentage reduction in stage gain *(i)* without feedback and *(ii)* with negative feedback. 5

(b) When the negative feedback is applied to an amplifier of gain 100, the overall gain falls to 50.

(i) Calculate the fraction of output voltage feedback.

(ii) If this fraction is maintained, calculate the value of the amplifier gain required if the overall stage gain is to be 75. 5

UNIT—II

3. Derive the expressions for the frequency of oscillation and conditions for sustained oscillations for the tuned-collector oscillator. 10

OR

4. *(a)* A Hartley oscillator is designed with $L_1 = 2$ mH, $L_2 = 20$ μH and a variable capacitance. Determine the range of capacitance values, if the frequency of oscillation is varied between 950 kHz and 2050 kHz. 5

(b) A Colpitts oscillator is designed with $C_1 = 100$ pF and $C_2 = 7500$ pF. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 kHz and 2050 kHz. 5

UNIT—III

5. Write short notes on the following : 5+5=10

(a) Phase-shift Oscillator

(b) Wien Bridge Oscillator

OR

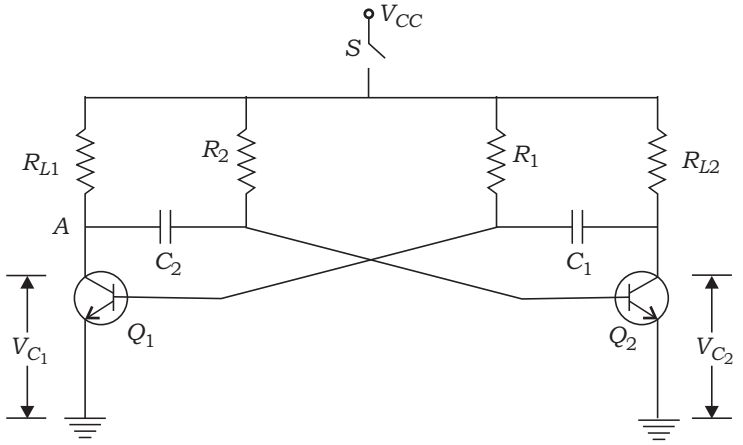
6. *(a)* The a.c. equivalent circuit of a crystal has the values $L = 1$ H, $C = 0 \cdot 01$ pF, $R = 1000\ \Omega$ and $C_m = 20$ pF. Calculate f_s and f_p of the crystal. 5

(b) Determine the oscillation frequency of a Wien Bridge Oscillator of $R_1 = R_2 = 110$ kΩ and $C_1 = C_2 = 1600$ pF. 5

UNIT—IV

7. *(a)* Explain the construction and operation of monostable multivibrator. 6

(b) In the astable multivibrator circuit shown below, $R_1 = R_2 = 10$ kΩ, $C_1 = C_2 = 0 \cdot 01$ μF, $R_{L1} = R_{L2} = 1$ kΩ. Find *(i)* frequency of circuit oscillation and *(ii)* minimum value of transistor β : 2+2=4



OR

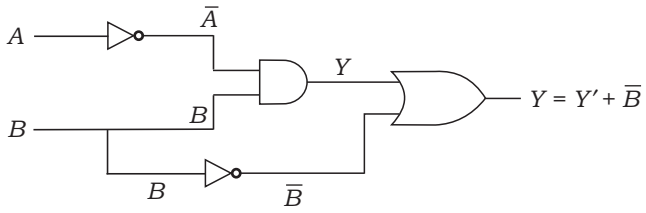
8. *(a)* Explain the construction and operation of bistable multivibrator. 5

(b) Explain the quiescent condition, positive and negative half-cycle of the input voltage of Schmitt trigger. 5

UNIT—V

9. *(a)* With the help of logic circuit diagram, explain the operation of parallel binary adder. 4

(b) Obtain the truth table for the circuit shown below : 3



(c) Using 2's complement method, subtract $(1010)_2$ from $(1101)_2$. 3

OR

10. *(a)* With the help of logic circuit diagram, explain the operation and truth table of a NOR gate. 4

(b) What would be the output signal if two signals $A = (1010110)_2$ and $B = (110101)_2$ are applied to the inputs of *(i)* OR gate and *(ii)* NAND gate? 2+2=4

(c) Divide $(1100010)_2$ by $(111)_2$ using binary division method. 2

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