HSC Board Exam Pattern Guessing Paper (2025)

Subject: XII Standard Applied Electronics (C2), Paper I

Time: 03 Hrs.   **Marks: 50**

Ques 1: A) Fill in the blanks by choosing the *correct* alternative –   **(4)**

1) The uplink frequency of satellite is always _____ its downlink frequency.

     i) greater than

     ii) Smaller than

     iii) Equal to

     iv) Smaller than or equal to

2) The circuit of _____ can be used to convert sine wave into square wave.

     i) Phase changer

     ii) Amplifier

     iii) Schmitt trigger

     iv) Oscillator

3) The ripple factor of full wave rectifier circuit is _____.

     i) 0.48

     ii) 1.21

     iii) 1

     iv) 1.4

4) The _____ effect is used in LDR.

     i) Photo amplification

     ii) Photo emissive

     iii) Photo voltaic

     iv) Photo conductive

B) Attempt any TWO of the following –   **(6)**

1) Calculate the average DC voltage and load current of a half wave rectifier circuit, if the secondary voltage of transformer is 150V and load resistance is 2.5kΩ.

2) Discuss any three front panel controls of CRO.

3) What are the sidebands in AM? Explain their importance in AM communication system.

Ques 2: A) Attempt any TWO of the following –   **(6)**

1) Define simplex and duplex type of communication systems with an example of each.

2) With the help of neat diagram explain the working of CRT used in CRO.

3) Draw the functional block diagram of 3-terminal voltage regulator IC and explain its working.

B) Attempt any ONE of the following –   **(8)**

1) Explain different factors for the selection of a transducer.

2) Define the following parameters of opamp:

     a. CMRR

     b. Open loop gain

     c. Closed loop gain

     d. Virtual ground

Ques 3: A) Attempt any TWO of the following – **(6)**

1) Explain the working of CRO with its detailed and neat block diagram.
2) Draw the circuit of opamp as subtractor and explain its working with derivation of output equation.
3) In an AM transmission, the frequency of carrier signal is 500kHz and its peak amplitude is 10V. Similarly the bandwidth of transmission is 10kHz with peak amplitude of modulating signal as 6V. Then calculate modulation index, the upper and lower side band frequencies and their peak amplitudes.

B) Attempt any ONE of the following – **(8)**

1) Explain with suitable diagram Electrostatic Deflection System. Define deflection sensitivity of CRO also.
2) Explain the working of Zener Diode voltage regulator circuit with all its four conditions.

Ques 4: A) Attempt any TWO of the following – **(6)**

1) Draw and explain RC filter circuit. Give its disadvantages.
2) State the advantages of DMM over analog multimeter *(any three)*.
3) In an inverting adder circuit using IC 741 as operational amplifier, the input voltages V1 = 100mV, V2 = 200mV and V3 = 500mV. The input resistors R1 = 1kΩ, R2 = 2kΩ and R3 = 5kΩ, with feedback resistor of 20kΩ. Calculate the output voltage of the circuit.

B) Attempt any ONE of the following – **(8)**

1) A CRO has deflection sensitivity of 1.2cm/V. Find the maximum shift of the spot when time base voltage of 4V is applied to horizontal deflection plates. If the time/div knob is kept at 5μs/cm, then calculate the time period for this shift.
2) Compare FM with AM *(any 4 points)*.

Ques 5: A) Attempt any TWO of the following – **(6)**

1) Explain that why modulation is necessary in communication.
2) In a shunt zener regulator circuit, if required output voltage is 50V, maximum input voltage is 60V, load resistor is 100Ω and maximum power rating of zener diode is 5W. Then calculate the value of series resistor. *(Ans: R = 16.67Ω, Iz = 0.1A, IL = 0.5A)*
3) Explain the concept of RADAR system in brief.

B) Attempt any ONE of the following – **(8)**

1) Explain the working of loudspeaker with neat diagram.
2) Derive the output equation of inverting adder with neat circuit diagram.

OR

Ques 5: A) Attempt any TWO of the following – **(6)**

1) Draw the circuit of Bridge Rectifier circuit with inductor filter and explain its working with wave diagram.
2) Calculate the frequency of output of an AMV using IC 555 timer, if the values of resistor R1 = R2 = 10kΩ, with C as 0.01μF. *(Ans: 4.8kHz)*
3) Explain the use of opamp as buffer and sign changer with neat circuit diagrams.

B) Attempt any ONE of the following – **(8)**

1) What is a network? Explain tree topology in LAN with necessary block diagram.
2) Explain how CRO can be used to measure frequency and phase of input waveforms.

Ques 1: A) Fill in the blanks by choosing the *correct* alternative –   **(4)**

1) EBCDIC code is _____ bit code.

    i)   8

    ii)   5

    iii)   7

    iv)   3

2) The 2's complement of a binary number is equal to _____.

    i)   the original binary number

    ii)   the 1's complement of original binary number – 1

    iii)   the 1's complete of original binary number + 1

    iv)   the original binary number + 2

3) In JK flip flop when J=K=1, the flip flop _____ when clock pulse arrives.

    i)   SETs

    ii)   RESETs

    iii)   Toggles

    iv)   Races

4) In tri-state logic circuit, the third state is known as _____ state.

    i)   LOW

    ii)   High impedance

    iii)   Low impedance

    iv)   HIGH

B) Attempt any TWO of the following –   **(6)**

1) Convert: $(947)_{16} = (?)_{10}$ $(111)_{10} = (?)_2$ $(11101)_2 = (?)_{10}$
2) Subtract using 2's complement method: $(11100)_2 - (1101)_2$ and $(1100)_2 - (11011)_2$
3) Explain the working of RS FLIP FLOP using NOR gates. Draw the neat diagram also.

Ques 2: A) Attempt any TWO of the following –   **(6)**

1) Compare Inclusive OR gate and Ex-OR gate with any three points.
2) Explain the working of 1:4 line demultiplexer with neat logic diagram and truth table.
3) Draw neat logic diagram of the logic equation: $Y = (A + B).(\overline{A + B})$

B) Attempt any ONE of the following –   **(8)**

1) Explain in brief different semiconductor memories using used in computer.
2) Explain the process of double dabble method with suitable example.

Ques 3: A) Attempt any TWO of the following –   **(6)**

1) Define the characteristics of digital ICs: propagation delay, noise margin, fan-out.
2) With the help of neat logic diagram, explain the working of TTL NAND gate.
3) Construct a combinational logic circuit using 16:1 line Mux by implementing the following expression:

$$f(A, B, C, D) = \Sigma_m(2,4,6,5,7,11,13,15)$$

B) Attempt any ONE of the following – **(8)**

1) Explain the method to convert decimal numbers into hexadecimal number and convert $(125.8)_{10}$ in to hexadecimal number. **Ans: $(7D.CCCCC...)_{16}$**

2) Implement the following multipoint combinational circuit using 4:16 line decoder-demultiplexer with active high outputs.

$$F_1 = \sum_m (0,1,4,8) \qquad F_2 = \sum_m (5,7,9,11,13) \qquad F_3 = \sum_m (8,10,12,15)$$

Ques 4: A) Attempt any TWO of the following – **(6)**

1) Draw the block diagram of computer and explain the function of each block in it.

2) Simplify the following logic equation using Boolean laws and then draw logic diagram using basic gates for the simplified logic equation.

$$Y = A.B.C + \bar{A}.B.C + B.\bar{C}.D$$

3) Explain the working of CMOS NOT gate using MOSFETs. Draw neat circuit diagram also.

B) Attempt any ONE of the following – **(8)**

1) Enlist any four output devices used in computer and explain any one of them in brief.

2) Draw the neat circuit diagram of 4-bit left shift register using D-flip flops and explain its working with wave diagram and truth table.

Ques 5: A) Attempt any TWO of the following – **(6)**

1) Construct an Ex-OR gate using basic gates and explain its working in brief.

2) Fin the output voltage of 5-bit binary ladder circuit for inputs of 11101, 10101 and 11000, if logic-0 = 0V and logic-1 = +12V.

3) Explain the working of 3-bit up-down counter with neat circuit diagram.

B) Attempt any ONE of the following – **(8)**

1) Describe the functions of following pins of decoder IC SN7447.
   Lamp test,   Ripple blanking input,   Blanking input

2) Explain the working of simultaneous ADC with neat circuit diagram.

OR

Ques 5: A) Attempt any TWO of the following – **(6)**

1) Explain the working of master-slave JK flip flops with neat circuit diagram.

2) Explain in brief: MICR, Light pen and x-y plotter used in a computer system.

3) Prove that: $A + \bar{A}B = A + B$

B) Attempt any ONE of the following – **(8)**

1) Draw the circuit of 8:1 line multiplexer and explain its working with truth table.

2) Define ASCII and EBCDIC code with brief details.