XII ELECTRONICS MOST LIKELY QUESTIONS SET PAPER-1

Carefully selected frequently asked questions from HSC Board Exams.

CHAPTER-1: INSTRUMENTS

1. The plates, which are put vertically, deflect the electron beam _____. ***(Ans: horizontally)***
2. The display on CRO screen is in _____ dimensions. ***(Ans: 2 dimensions)***
3. To avoid the retrace line on CRO screen, _____ circuit is used. ***(Ans: blanking circuit)***
4. In normal operation of CRO, the input signal is connected to _____. ***(Ans: y-input)***
5. The _____ input of CRO is used for relative frequency measurement. ***(Ans: x-input)***
6. When a Lissajou's pattern of a circle is obtained on the screen, the phase difference between the two waves will be _____. ***(Ans: 90° or 270°)***
7. The focus knob changes positive bias on _____ anode inside the CRT. ***(Ans: focusing anode)***
8. The deflection sensitivity of CRO is measured in _____ unit. ***(Ans: mm/volt)***
9. The _____ basically measures DC voltage. ***(Ans: DMM)***
10. The _____ circuit is used in function generator to convert square wave into proportional triangular wave. ***(Ans: integrator)***
11. The AC voltage connected to the filament of CRT is _____ Volts. ***(Ans: 6.3V)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. How intensity and focus controls work in CRO circuit? Explain.
2. How CRO can be used to measure AC current? Explain with neat diagram and any one example.
3. What type of Lissajou's pattern will be obtained on the CRT screen, if the phase difference between two waves connected to two inputs of CRO is 45°?
4. Why retrace is not produced when electron beam comes back from right to left of the screen? Explain in brief.
5. Explain any one process of measurement in terms of DMM.
6. How the r.m.s. value of unknown AC voltage is known with the help of CRO? Explain in brief.
7. How magnetic deflection system works? Explain with diagram.
8. Explain the function in brief: volt/div control, time/div control and astigmatism.
9. Define: fluorescence and phosphorescence with respect to CRT properties.
10. What type of waveforms can be generated with the help of function generator circuit? Explain with simple diagram.
11. What is the need of using delay line in CRO circuit? Explain with proper reasoning.
12. Distinguish between electrostatic and magnetic deflection systems with any three points.

DESCRIPTIVE QUESTIONS (4 MARKS)

1. Explain with block diagram the working of CRO.
2. Why time base is required in CRO? Thus explain the process of displaying waves on the screen of CRO.
3. Draw neat diagram of CRT and explain the function of each block in it.
4. Explain the detailed functioning of intensity, focus and y-pos, x-pos controls on the front panel of CRO.
5. What are the types of deflection systems used in CRO? Explain with neat diagram.
6. Explain the working of function generator with its neat block diagram. Also explain the process of converting square wave into triangular wave.
7. What are the applications of deflection systems? Give any two applications of each deflection system.
8. How a DMM works? Explain any three types of measurements using with the help of DMM.
9. Explain the working of UJT oscillator circuit to generate the sawtooth waves for deflecting the electron beam horizontally.
10. How unknown frequency and phase are measured with the help of CRO? Explain with one example each.
11. During what part of sawtooth wave the electron beam draws the wave on CRO screen? Thus explain the use of sawtooth wave in the drawing process of wave on the CRT screen.
12. Define all the properties of CRT screen. Explain the use of aquadag coating applied on the CRT screen.

CHAPTER-2: DC POWER SUPPLIES

1. The output equation of a series pass transistor regulator is given by _____. ***(Ans: Vo=Vin – Vce)***
2. The ripple frequency of BR is _____. ***(Ans: 2.Fin)***
3. If one diode in bridge rectifier is damaged /opened, then circuit can works as a _____. ***(Ans: HWR)***
4. The ripple factors of three rectifier circuits are _____, _____ and _____. ***(Ans: 1.21, 0.48, 0.48)***
5. The IC LM 320 stops its working when its temperature exceeds _____. ***(Ans: 175℃)***
6. In full wave rectifier circuit, the PIV of each diode must greater than _____. ***(Ans: Vp)***
7. Rsc is a resistor used in regulator circuit for _____ protection. ***(Ans: short circuit protection)***
8. A transformer works on the principle of _____. ***(Ans: EM Induction)***
9. The turns ratio of a transformer is 230:3000, then such transformer is called as _____ transformer. ***(Ans: Step up transformer)***
10. In the circuit of SMPS, the _____ in reverse biased condition is used to absorb the back e.m.f. produced in the series inductor. ***(Ans: diode)***
11. If peak AC voltage in HWR is 20V, its average DC output voltage will be _____ Volts. ***(Ans: 9V)***
12. A _____ diode is always operated in breakdown region. ***(Ans: Zener)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. State two advantages and one disadvantage of a bridge rectifier over a full wave rectifier.
2. In half wave rectifier, the secondary voltage is 25V, calculate the DC load voltage and load current for a load of 20Ω.
3. What is regulator? Explain the need of regulator in power supply.
4. Why filter circuits are used in power supply?
5. Draw the block diagram of IC (3-pin type) regulator.
6. Draw basic circuit of SMPS and state various blocks/components in it.
7. Define the terms: load voltage, increase in load resistance, increase in load voltage
8. What do you mean by line regulation, load regulation with respect to a general purpose power supply?
9. Compare HWR, FWR and BR with any three points.
10. Draw the circuit of an LC filter and explain its working in short.
11. How the value of short circuit resistor Rsc, in a transistorized short circuit proof voltage regulator is calculated? Explain with an example.

DESCRIPTIVE QUESTIONS (4 MARKS)

1. Explain the working of FWR with a neat circuit and input output waveforms.
2. Explain the working of simple shunt regulator with necessary circuit diagram.
3. With the help of block diagram, explain the working principle of SMPS. State its two advantages.
4. Explain with the help of circuit diagram, the working of inductor input filter. Show its input, output waveforms if it is connected to a HWR circuit.
5. Draw the block diagram of regulated power supply and explain function of each block.
6. Explain the terms line regulation and load regulation in power supply.
7. Discuss the working of fixed and variable three terminal IC regulator circuits with neat circuit diagrams.
8. Explain the concept of power dissipation and current limiting in series regulator.
9. Draw the block diagram of SMPS. State two advantages of SMPS over conventional power supply.
10. With the help of circuit, explain the working of series pass transistor regulator. State its limitations.
11. Draw circuit of BR and explain its working. Write equation to determine average voltage and ripple frequency.
12. Explain BR circuit with neat circuit diagram and waveforms.
13. Explain with diagram, how transistorized voltage regulator circuit works.
14. Draw and explain the circuit of bridge rectifier such that the DC output voltage of the circuit will be negative. In such case you will have reverse the polarities of the diodes used in the circuit.

CHAPTER-3: TRANSDUCERS

1. A _____ converts one form of energy into another form. ***(Ans: transducer)***
2. The _____ transducer can work without using battery supply. ***(Ans: active)***
3. Capacitive transducer is a _____ transducer. ***(Ans: pressure)***
4. An LVDT has _____ secondary windings. ***(Ans: two)***
5. In an opto coupler device, _____ is used to couple two systems. ***(Ans: light)***
6. In a capacitive transducer, when the distance between the two plates is less, then the capacity of the device is _____. ***(Ans: more)***
7. The _____ works on the principle of electromagnetic induction. ***(Ans: speaker)***
8. For thermister if resistance increases with temperature it is called as _____. ***(Ans: PTC thermister)***
9. Strain gauge is a _____ transducer. ***(Ans: passive)***
10. LDR is composed of _____ material. ***(Ans: CdS)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. Distinguish between passive and active transducer with any two examples.
2. What do you mean by active and passive transducer? State four factors, which decide the selection of transducer in an electronic instrumentation system.
3. Write a short note on thermister.
4. Explain piezo electric transducer with neat diagram.
5. What are three important axes in a crystal? Explain their use.
6. On what principle the loudspeaker is based? Give reason to your answer.
7. Give any three applications of loud speaker.
8. What is a photo conductive cell? Draw its diagram and give its chemical composition in details.
9. What is a gas sensor? In what type of gas sensing it is used? Explain.
10. Explain any two applications of thermister.
11. Enlist the criteria in the selection of a transducer.
12. Define active and passive transducers with any one example of each.
13. On what principle the LVDT is based? Thus explain its working in short.
14. State the name of transducer which can be used in following applications –
15. Weighing machine, Hearing aid, Object counter, Light intensity meter, Sound loudness measurement, Electric water heater control, domestic LPG gas leakage testing.

DESCRIPTIVE QUESTIONS (4 MARKS)

1. How a temperature transducer works? Thus explain the working of thermister.
2. Explain the detailed working of a typical gas sensing instrument. Draw its diagram and explain its applications also.
3. How LVDT works? Draw its neat diagram and explain the output conditions of the circuit in all the three positions of core, used in it.
4. How opto coupler can be used in a electric shock proof ECG system? Explain your ideas about the same.
5. Write a descriptive note on selection of a transducer.
6. Explain piezo electric transducer with neat diagram and explain its any one type of application.
7. Classify different types of active and passive transducers with one example of each.
8. How LDR works? Explain its construction and working with neat diagram.
9. What the applications of LVDT? Explain any one of them.
10. How an LDR can be used in burglar alarm circuit? Give its basic concept with neat diagram.
11. How capacitive transducer works? Explain its detailed working with neat diagram. Explain its all conditions of with and without pressure.
12. What are the two important limitations of LVDT? Explain.

CHAPTER-4: OPERATIONAL AMPLIFIER

1. In RC coupled amplifier the _____ signal cannot be amplified. ***(Ans: DC signal)***
2. The DC amplifier has high gain, but picks up _____ from outside. ***(Ans: noise)***
3. Connecting fraction of output back to input of amplifier is called as _____. ***(Ans: feedback)***
4. Due to two types of amplifier circuits, there are two types of feedbacks; they are _____ feedback and _____ feedback. ***(Ans: positive, negative)***
5. The input and output of _____ amplifier are in-phase. ***(Ans: non-inverting amplifier)***
6. The output of _____ amplifier is 180° out of phase with respect to its input. ***(Ans: inverting)***
7. For an ideal operational amplifier, the input resistance is always _____. ***(Ans: infinite)***
8. If input voltages of an inverting adder are 1V, 2V and –3V; and if its input resistance is equal to feedback resistance, then its output voltage will be _____ volts. ***(Ans: zero Volts)***
9. The output equation of a subtractor is given by _____. ***(Ans: Vo = V2 – V1)***
10. The unit of slew rate of an opamp is _____. ***(Ans: Volt/µsec)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. Derive the output equations of differential amplifier in differential and common mode connections of the circuit.
2. What is differential amplifier? Explain in brief.
3. What do you mean by CMRR?
4. Define the terms: input offset voltage, output offset voltage and slew rate.
5. What is the gain of a differential amplifier in common mode and in differential mode? Give its equation.
6. What do you mean by bandwidth of an opamp?
7. What is the idea of voltage follower?
8. Why feedback is connected in an opamp circuit? Explain in brief.
9. Define the terms: closed loop gain, frequency response with diagram.
10. Enlist the characteristics of an opamp.
11. Draw a block diagram of opamp with three differential amplifier stages at the input section of the opamp and explain the effect of intermediate stage in it.

DESCRIPTIVE QUESTIONS (4 MARKS)

1. Explain the working of differential amplifier using the simple circuit and obtain its output equations.
2. Draw the block diagram of operational amplifier and explain the function of each block in it.
3. Derive the output equation of inverting amplifier using opamp. Draw the circuit diagram of inverting amplifier also.
4. With a neat circuit diagram obtain the output equation of non-inverting amplifier circuit using opamp.
5. Describe the working of inverting adder using opamp, derive its output equation and draw its neat circuit diagram.
6. What is the basic idea of buffer? How it is obtained? Explain with its neat circuit diagram.
7. What is the need for dual power supply in differential amplifier circuit? Explain with proper reasoning.
8. Explain the working of differentiator using opamp and derive its output equation with neat circuit diagram.
9. How integrator circuit works? Derive its output equation also.
10. How a differentiator circuit can be converted into passive differentiator? Explain.
11. Write a note on four types of comparator circuits. Compare them with each other.
12. What is a Schmitt trigger circuit? Explain with proper circuit diagram.

CHAPTER-5: MODERN ELECTRONICS COMMUNICATION

1. When amplitude of carrier is changed in accordance with the amplitude of voice signal such modulation process is called as _____. ***(Ans: amplitude modulation)***
2. Geosynchronous satellite is installed at approximate height of _____ from earth. ***(Ans: 36000km)***
3. The standard bandwidth of satellite communication system is _____. ***(Ans: 2GHz)***
4. Maximum bandwidth of an FM station radio station is _____. ***(Ans: 150kHz)***
5. Optical fiber carries signals through it in the form of _____ . ***(Ans: digital pulses)***
6. Fax machine uses _____ modulation type, in its communication system. ***(Ans: PSK or QAM)***
7. The unit of baud rate is _____. ***(Ans: bits/sec)***
8. The EBCDIC code contains _____ characters. ***(Ans: 256)***
9. The main controlling unit in cellular radio system is _____. ***(Ans: MTSO)***
10. The maximum allotted bandwidth for AM radio stations is _____kHz. ***(Ans: 10kHz)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. Define AM, FM and PM with one application of each.
2. What is the concept of bandwidth? Explain with simple example.
3. Compare FAX scanning with TV scanning.
4. Explain the concept of a cell in cellular radio system.
5. What is MODEM? Where it is used?
6. Explain the process of parallel data communication with diagram.
7. What are the three types of networks used in data transfer applications?
8. What is a code? Explain in brief.
9. What is Doppler Effect? Explain with simple example.
10. How RADAR system is used to detect the distance of target from it in nautical miles? Explain with an example.
11. How the mixer circuit in transponder of satellite works? Explain with diagram.
12. Give the frequency values of VHF and UHF with one application of each.

DESCRIPTIVE QUESTIONS (4 MARKS)

1. Describe the working of a communication system with diagram. Also give its one simple application.
2. Draw and explain the process of optical fiber communication systems. How optical fiber is superior over copper cable type of communication?
3. Give at least four advantages of optical fiber over conventional communication system.
4. How satellite as a relay station works? Explain with diagram.
5. What do you mean by serial and parallel data communication? Explain with proper diagram of each.
6. Explain the three types of local area networks topologies. How LAN is effective in sharing data and hardware of computer systems? Explain.
7. Given the meaning of WAN, MAN and LAN with one example of each.
8. Write a note on fax system with diagrams.
9. Explain the working cellular radio system with neat diagrams.
10. Compare FM over AM.
11. How CW RADAR works? Explain its working with neat circuit diagram. Also explain the type of displays used in it.
12. Write a note on Codes.
13. Give at least four applications of optical fiber cable.
14. Derive the equation of AM wave and draw neat diagrams of AM process.
15. Explain the process of FM with its properties.
16. Explain the importance of modulation index in amplitude modulation process. Thus draw and explain the three types of modulations.

CHAPTER-6: STUDY OF INTEGRATED CIRCUITS

1. The pin number _____ of the IC 555 is called as reset pin. ***(Ans: pin-4)***
2. Pin-7 of the IC 555 is _____ when the capacitor is charging. ***(Ans: cut-off)***
3. In the circuit of street light control using IC741, when LDR is lighted, the output of the IC is _____. ***(Ans: negative)***
4. When the voltage at pin-6 is greater than 2/3 of the supply voltage, the output of IC 555 is _____. ***(Ans: LOW)***
5. When pin-5 of IC 555 is connected to a regular triangular wave, it works as _____ modulator circuit. ***(Ans: Pulse Position Modulator)***
6. In frequency shift keying circuit using IC 555, the frequency value of _____ Hz stands for logic-0 state. ***(Ans: 1270Hz)***
7. The power supply voltage of IC 555 ranges from _____ volts. ***(Ans: 3V to 18V)***

8. When voltage at pin-2 is less than 1/3 of power supply voltage, then the output of the IC 555 is at _____ state. ***(Ans: HIGH)***
9. When output of the IC 555 is at logic-1 state, the internal RS flip-flop in _____ state. ***(Ans: RESET)***
10. In AMV when external capacitor is charging, internal transistor T1 is _____ biased. ***(Ans: reverse)***
11. In Schmitt trigger circuit, the difference between UTP and LTP is called as _____. ***(Ans: hysteresis)***

DESCRIPTIVE QUESTIONS (3/4 MARKS)

1. Give the functional details of any three pins of IC 555.
2. How IC 555 can be used as a monostable multivibrator circuit. Explain with neat circuit diagram.
3. Explain the working of astable multivibrator using IC 555 and draw its neat circuit diagram.
4. Draw the circuit of pulse position modulator using IC 555 and explain its working.
5. How IC 555 can be used as frequency shift keying circuit? Explain with neat circuit diagram.
6. Explain the concept of PAM with block diagram.
7. Draw the block diagram of IC 555 and explain the function of each block in it.
8. How IC 555 can be used as periodic timer? Explain with neat circuit diagram. Give any two applications of IC 555.

XII ELECTRONICS MOST LIKELY QUESTIONS SET PAPER-2

Carefully selected frequently asked questions from HSC Board Exam.

CHAPTER-1: NUMBER SYSTEMS

1. Converting decimal number into its binary is called as _____ method. ***(Ans: double dabble)***
2. When a given decimal number is converted into its unique equivalent hexadecimal number, this method is called as _____ method. ***(Ans: hex dabble)***
3. The binary number 1110011 is equivalent to its decimal as _____. ***(Ans: 115)***
4. The hexadecimal number 1A2 is equivalent to its binary as _____. ***(Ans: 110100010)***
5. In the rules of addition, when a 1 is added to 11, we get the answer as _____. ***(Ans: 100)***
6. The binary number 1111 is the 1's complement of _____. ***(Ans: 0000)***
7. In 1's complement method of subtraction, when we subtract smaller binary number from larger binary number, the _____ is generated which must be added. ***(Ans: End Around Carry)***
8. The binary number 10000 is the 2's complement of _____. ***(Ans: 10000)***
9. The BCD code 1000 0000 is equivalent to the decimal number as _____. ***(Ans: 80)***
10. The EBCDIC code is an _____ bit code. ***(Ans: 8)***
11. There are 7-bits in _____ code. ***(Ans: ASCII)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. Explain conversion procedure of binary number into its equivalent decimal number with one example.
2. How a larger binary number is subtracted from a smaller binary number using 2's complement method? Explain with an example.
3. What is code? Explain the different types of codes with one example of each.

NUMERICAL PROBLEMS (4 MARKS)

1) Convert binary into decimal value: 110, 10010, 11, 11110101, 1010101, 1111, 10000011
2) Write down all the following binary numbers in a table and then convert them into their equivalent decimal value. Note down the sequence of binary and decimal.
   0000, 0001, 0010, 0011, 0100, 0101, 0110, 0111,
   1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111
3) Convert binary into decimal value: 110.11, 111.01, 100.001, 1111.1111, 1010.1010, 1.1, 110.0001
4) Write down all the following binary numbers in a table and then convert them into their equivalent decimal value *(Observe the sequence of binary and decimal)*.
   0000.0000, 0001.0001, 0010.0010, 0011.0011, 0100.0100, 0101.0101, 0110.0110, 0111.0111,
   1000.1000, 1001.1001, 1010.1010, 1011.1011, 1100.1100, 1101.1101, 1110.1110, 1111.1111
5) Convert decimal into binary values: 23, 95, 67, 71, 137, 83, 10, 17, 511, 2048
6) Convert decimal into binary values: 0.625, 0.11, 3.8125, 72.34, 1.1, 10.7, 6.99, 5.55

7) Convert the hexadecimal numbers into their equivalent binary value.
   9AF.20C, 192.6E0, ABC.CAD, 100.0001, 33.001, 75C.FD4, 240.193, A1B2.C3D9
8) Convert the binary numbers into their equivalent hex values.
   111100011.101011, 101010010100100.101011100100101, 1010101011.1101101
9) Convert the hexadecimal numbers into their equivalent decimal value.
   267, 111, 10, ABC, 1FD, FF, 16, 1020
10) Convert the decimal numbers into their equivalent hexadecimal value.
    16, 100, 2989, 512, 99, 820, 64, 81
11) Add the following binary numbers using binary addition rules.
    a) $(11001)_2$ *and* $(10011)_2$
    b) $(10111)_2$ *and* $(101111)_2$
    c) $(10011110)_2$ *and* $(101110011)_2$
    d) $(110.1011)_2$ *and* $(1011.0111)_2$
    e) $(1111111)_2$ *and* $(1101000)_2$
12) Subtract the following binary numbers using binary subtraction rules
    a) $(11001)_2 - (1011)_2$
    b) $(110111)_2 - (100111)_2$
    c) $(1110111)_2 - (10111)_2$
    d) $(110)_2 - (101)_2$
    e) $(1100)_2 - (111)_2$
13) Solve the following using 1's complement methods –
    a) $(1001)_2 - (1101)_2$
    b) $(0000)_2 - (1111)_2$
    c) $(11011)_2 - (1100)_2$
    d) $(1110)_2 - (111111)_2$
    e) $(11000001)_2 - (1101)_2$
14) Solve the following using 2's complement methods –
    a) $(11011)_2 - (11100)_2$
    b) $(1100)_2 - (1101)_2$
    c) $(11111)_2 - (1110001)_2$
    d) $(110001111)_2 - (1111)_2$
    e) $(1001)_2 - (1101)_2$
    f) $(01111)_2 - (0111)_2$

CHAPTER-2: LOGIC GATES

1. The output of _____ logic gate is equal to '1' when both of its inputs are '0'. ***(Ans: NAND gate)***
2. When any one input of OR gate is at logic-1, its output is at _____. ***(Ans: logic-1 state)***
3. The bubbled AND gate is also called as _____. ***(Ans: NOR gate)***
4. In half adder circuit, when both of its inputs are logic-1, then its output is _____. ***(Ans: 10)***
5. When one input of 2-input Ex-OR gate is connected to logic-1, then the circuit behaves as _____ logic circuit. ***(Ans: NOT gate)***
6. According to De Morgan's theorem, $\overline{A + B + C}$ = _____. ***(Ans: $\bar{A}.\bar{B}.\bar{C}$)***

7. To construct an OR gate using NAND gates, as universal building block, the number of NAND gates required will be _____. ***(Ans: 3)***
8. When both inputs of an Ex-OR gate are at equal logic level, i.e. either at logic-1 or logic-0, then its output will be at _____. ***(Ans: logic-0 state)***
9. If two NOT gates are connected one after another, such that the output of first is connected to the input of second, and if initial input is at logic-0 level, then the final output will be _____. ***(Ans: 0)***
10. Addition process of two binary numbers can be performed using _____ gate. ***(Ans: binary adder)***
11. Bubbled OR gate is equivalent to _____ gate. ***(Ans: NAND gate)***
12. $AB + BC + \overline{AC} + 1 =$ _____. ***(Ans: 1)***

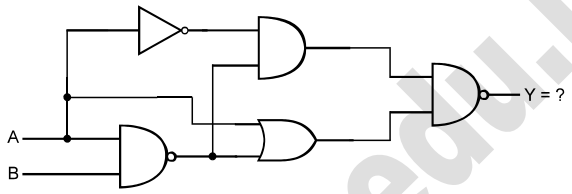
DESCRIPTIVE QUESTIONS (3 MARKS)

1. Simplify the equation $A + AB + ACB =?$ ***(Ans: A)***
2. If $\bar{A} = 0$, then $A =?$ ***(Ans: 1)***
3. Simplify the equation $\bar{A}.B + 1 = ?$ ***(Ans: 1)***
4. Suppose $B = 1$ and $\bar{A}.B = 0$, then $A =?$ ***(Ans: 1)***
5. Simplify the equation $A + AB + CA + BC =?$ ***(Ans: A+BC)***
6. If $\bar{A} + A = 1$, then what is the output of $\overline{AB} + AB =?$ ***(Ans: 1)***
7. $\bar{A}.A = 0$, then calculate the output result of $\overline{AB}.AB =?$ ***(Ans: 0)***
8. Simplify the following equations:
    a) $AC + AB + ABC + ACDB + ABCDEA =?$ ***(Ans: A)***
    b) $C\bar{A} + \bar{A}BC + BC + A =?$ ***(Ans: A + BC + $\bar{A}$.C)***
    c) $\bar{A}.1 + A + 1 =?$ ***(Ans: 1)***
    d) $\bar{A}.A + 1 =?$ ***(Ans: 1)***
    e) $\bar{A}.(B + C + AB) =?$ ***(Ans: $\bar{A}$B + $\bar{A}$C)***
    f) $A.(\bar{A} + A) =?$ ***(Ans: A)***
9. Simplify the equation using De Morgan's theorem: $Y = A + \overline{\bar{A}.B}$ ***(Ans: 1)***
10. If $Y = (\bar{A} + \bar{B}).(\bar{A} + B).(A + \bar{B})$, then calculate the value of Y. ***(Ans: $\bar{A}.\bar{B}$)***
11. $Y = (\overline{AB}) + (\overline{BC}) + (\overline{AC})$, then calculate the value of Y. ***(Ans: $\overline{ABC}$)***
12. Calculate: $Y = (\bar{A} + \bar{B}).(A + B)$. ***(Ans: $\bar{A}$B + A$\bar{B}$)***
13. Prove that both sides of this equation are equal: $\overline{\bar{A} + B} + \overline{\bar{A} + \bar{B}} = A$
14. Prove that both side of this equation are equal:
    $(\bar{A} + B + C).(A + \bar{B} + C).(A + B + \bar{C}) = AB + BC + AC + \bar{A}.\bar{B}.\bar{C}$
15. Simplify the equation and show that its both sides are equal:
    $\overline{AB + BC + AC} = \bar{A}.\bar{B} + \bar{B}.\bar{C} + \bar{A}.\bar{C}$
16. Draw the symbol of NOT gate and explain its working with truth table.
17. Explain why NAND gate is known as universal building block?
18. How Ex-OR gate can be used as NOT gate? Explain.
19. How to convert a NOR gate into a NOT gate? Explain with diagram.
20. Prove that $C + AC + ABC + ABCD = C$
21. Explain the working of half adder using proper logic diagram.

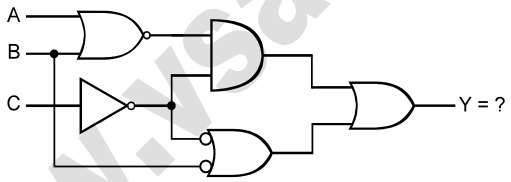
22. What is parity? Explain the working of parity checker.
23. What is the basic difference between inclusive OR gate and exclusive OR gate? Explain with diagrams.

DESCRIPTIVE QUESTIONS (4 MARKS)

15. Draw the symbol of OR gate and AND gate. Also write down the Boolean equation and truth table of each circuit.
16. Draw the circuit of NAND gate using basic gates. Write down its Boolean equation also.
17. What will happen if we connect two NOT gates at the two inputs of an AND gate? Draw the diagram, output equation and the truth table also.
18. Repeat the combination given in question-3 by replacing AND gate with OR gate and explain the working of the circuit.
19. Define and prove De Morgan's both theorems with neat diagram, truth table.
20. What is the output equation of following circuit? ***(Ans: Y = 0)***

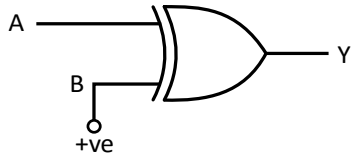


21. Draw the circuit in your notebook and derive the final Boolean equation of Y. ***(Ans: $Y = \overline{B} + C$)***



22. Explain the working of Ex-OR gate and Ex-NOR gate. Draw neat diagrams using basic gates and find the final Boolean equation of each circuit.
23. Explain the terms line regulation and load regulation in power supply.
24. Discuss the working of fixed and variable three terminal IC regulator circuits with neat circuit diagrams.
25. Explain the concept of power dissipation and current limiting in series regulator.
26. Draw the block diagram of SMPS. State two advantages of SMPS over conventional power supply.
27. With the help of circuit, explain the working of series pass transistor regulator. State its limitations.
28. Draw circuit of BR and explain its working. Write equation to determine average voltage and ripple frequency.
29. Explain BR circuit with neat circuit diagram and waveforms.
30. Explain with diagram, how transistorized voltage regulator circuit works.
31. Draw and explain the circuit of bridge rectifier such that the DC output voltage of the circuit will be negative. In such case you will have reverse the polarities of the diodes used in the circuit.

32. Construct one Ex-OR gate using 10 NOR gates. Draw the diagram and derive the Boolean equation of the circuit.
33. Draw the circuit of Ex-NOR gate using 11 NOR gates. Derive the Boolean equation of the circuit.
34. Take a two input Ex-OR gate, as shown below. Let the two inputs be A & B with output Y. Suppose input B, is permanently connected to +ve terminal of battery i.e. $B = 1$. Now we have only one input remaining i.e. input A. Then find $Y =$? when $A = 0$ and $A = 1$. Which type of gate this circuit is working now?



35. Draw the circuit of Ex-OR gate using 5 NOR gates and derive its Boolean equation.
36. Draw the circuit of 4-bit binary adder and find the result of addition for following numbers. Write down the actual carries generated in the diagram at respective places.
    a) $A_3A_2A_1A_0 = (1100)_2$ and $B_3B_2B_1B_0 = (1011)_2$
    b) $A_3A_2A_1A_0 = (1111)_2$ and $B_3B_2B_1B_0 = (1000)_2$
    c) $A_3A_2A_1A_0 = (1010)_2$ and $B_3B_2B_1B_0 = (0111)_2$
37. Explain the working of NAND gate as universal building block by drawing different circuits as NOT, OR and AND gates.
38. How 4-bit binary adder circuit works? Explain with diagram and one example.
39. What is controlled inverter? How Exclusive OR gate can be used as controlled inverter? Explain with diagram.
40. Draw the circuit of 4-bit adder/subtractor circuit using full adders and the circuit of controlled inverter.
41. Define and prove De Morgan's both theorems with diagrams and truth tables.
42. Give any four logic equations to prove the Boolean algebra.
43. How full adder circuit works? Explain with diagram.
44. Explain the working of Ex-OR gate using basic gates. Draw the necessary diagram and explain the working of circuit with derivation of output equation.
45. How to use NAND gates to produce one exclusive OR gate? Explain with diagram and derivation of output equation.
46. Prove that NOR can gate be used as universal building block with diagram and derivations of each circuit.
47. Draw the logic circuit of 4-input Ex-OR gate and explain its working such that its output equation will be $Y = A \oplus B \oplus C \oplus D$.
48. Define and explain the three basic gates. Write their truth tables also.
49. Solve the following identities and prove that LHS = RHS.
50. Prove that $\overline{AB + BC + CA} = \bar{A}.\bar{B} + \bar{B}.\bar{C} + \bar{C}.\bar{A}$
51. Prove that $AB + CAB + DBCA + DBACE = A$
52. Prove that $A.(\bar{A} + B) = AB$

CHAPTER-3: LOGIC FAMILIES

1. The integrated circuits in which the electric current is carried by both holes and electrons is called as _____. ***(Ans: bipolar logic circuits)***
2. _____ is the logic family in which current is carried by either holes or electrons. ***(Ans: TTL family)***
3. The logic circuits which contain PMOS and NMOS are called as _____. ***(Ans: CMOS)***
4. Schottkey TTL belongs to _____ logic family. ***(Ans: TTL family)***
5. The time required to change the state of a logic circuit is known as _____. ***(Ans: propagation delay)***
6. The number of inputs of any gate is known as _____. ***(Ans: fan-in)***
7. The product of propagation delay and power dissipation is called as _____. ***(Ans: figure of merit)***
8. In a logic circuit if the speed is increased then the total amount of power dissipated in it _____. ***(Ans: increases)***
9. In CMOS NAND gate, the NMOS transistors are connected in _____ and the PMOS transistors are connected in _____. ***(Ans: series, parallel)***
10. In tri-state logic circuit, third state of the output is known as _____. ***(Ans: high impedance state)***
11. The IC 74LXX is classified in _____ family. ***(Ans: low power TTL family)***
12. The Shottkey TTL family has _____ IC series. ***(Ans: 74SXX)***

DESCRIPTIVE QUESTIONS (3 MARKS)

1. Calculate the figure of merit of a digital logic circuit, if its propagation delay is 5ns and power dissipation is 15mW. ***(Ans: 75pJ i.e. 75 pico Joules)***
2. For a TTL family, if $I_{iH} = 100\mu A$ and $I_{oH} = 1mA$, then calculate its fan-out. ***(Ans: 10)***
3. A TTL family digital IC has a power consumption of 500mW. Then calculate its actual current requirement. ***(Ans: 100mA)***
4. If a CMOS family digital IC has propagation delay of 10ms and its power consumption is 15mW, then calculate the figure of merit of the IC. ***(Ans: 150pJ)***
5. A CMOS digital IC consumes 0.6nA current at an operating voltage of 15V. Then calculate its power dissipation. ***(Ans: 9nW)***

DESCRIPTIVE QUESTIONS (4 MARKS)

1. Classify the different types of logic families with one example of each.
2. Explain the terms of digital ICs: Noise margin, power dissipation, propagation delay, fan out.
3. Draw the circuit of CMOS NAND gate and explain the function of the circuit. Also draw the truth table and explain which transistor conducts and which doesn't in every state of the output.
4. With neat circuit diagram, explain the working of TTL NOR gate.
5. State and explain any four characteristics of digital ICs.
6. Draw the circuit of CMOS NOT gate and explain its working with truth table.

7. Explain the basic concept of tri-state logic circuit. Draw its circuit diagram and explain its working also.
8. Compare TTL and CMOS logic families with any four points.
9. Draw the circuit of TTL NOT gate and TTL NAND gate. Compare them and explain the difference. Thus, give your reasoning to explain the idea of universal building block using NAND gate.

CHAPTER-4: COMBINATIONAL LOGIC CIRCUITS

1. The logic circuit which has many outputs but only one input, such circuit is called as _____. ***(Ans: demux)***
2. The logic circuit which has many inputs but only one output, such circuit is called as _____. ***(Ans: mux)***
3. The 8:1 line multiplexer has _____ select input terminals. ***(Ans: 3)***
4. In demultiplexer circuit, if there are 32 outputs, then the select inputs will be _____. ***(Ans: 5)***
5. The logic circuit which is used to convert the _____ input into its equivalent binary is called as encoder. ***(Ans: decimal)***
6. The decoder IC 7448 uses _____ 7-segment LED display. ***(Ans: common cathode)***
7. In _____ the output at any instant of time depends upon the input at that instant of time. Thus it does not have any memory. ***(Ans: CLC)***
8. The IC 74153 is known as _____ IC. ***(Ans: Dual 4:1 Mux)*** †
9. The IC _____ is used in encoder circuits. ***(Ans: 74147)*** †
10. A 16:1 multiplexer logic circuit can be constructed using two _____ line multiplexer circuits. ***(Ans: 8:1 line Mux)***

LONG ANSWER QUESTIONS (4 MARKS)

1. Explain the procedure of combination of logic design using multiplexer and demultiplexer logic circuits.
2. How an encoder circuit works? Draw its neat logic diagram and explain its working.
3. Draw the circuit of decoder using decoder/driver IC and explain its working with truth table.
4. How will you construct 4:1 line mux? Draw the circuit and explain its working with truth table and output equation.
5. Draw the circuit of 1:4 line demux and explain its working with truth table and also write down its output equations.
6. What are the applications of mux and demux? Give at least two applications of each.
7. What are the IC numbers of multiplexer and demultiplexer ICs? Give at least two code numbers of each logic circuit.
8. Compare Mux and demux with any three points*.

** Recently asked questions in board exam. † Asked in practical examination.*

CHAPTER-5: FLIP-FLOPS, REGISTERS & COUNTERS

1. The forbidden state is avoided in _____ flip-flop. ***(Ans: D flip flop)***
2. At the output of single T-flip-flop the clock input frequency connected to the flip-flop is reduced to _____. ***(Ans: half)***
3. When a binary word is to be stored then the _____ memory circuit is used. ***(Ans: register)***
4. The 1-bit memory cell has _____ stable states. ***(Ans: two)***
5. In left shift register circuit, data shifts from _____ to _____ in sequence. ***(Ans: LSB to MSB)***
6. In _____ system, the data shift from one system to another bit-by-bit and then it shifts all at time. ***(Ans: SIPO)***
7. The propagation delay in asynchronous counter is _____. ***(Ans: large)***
8. In decade counter, the circuit can count from _____ to _____. ***(Ans: 0000 to 1001)***
9. The _____ input of JK flip flop directly stores a '1' into its memory. ***(Ans: preset)***
10. In 5-bit ripple counter, the number of states through which the counter can progress is given as _____. ***(Ans: $2^5 = 32$)***

LONG ANSWER QUESTIONS (4 MARKS)

1. What is RS flip-flop? How does it work? Draw its circuit and explain its working.
2. Draw the circuit of D flip-flop and explain its working with truth table.
3. How JK flip-flop works? Explain its working with circuit diagram and truth table.
4. What is register? Explain the working of left shift register with diagram and waves.
5. Draw a neat circuit of 3-bit ripple counter and explain its working with waveforms and truth table.
6. How we can reduce the propagation delay in asynchronous counter by using 3-bit synchronous counter circuit? Explain its working with diagram and truth table.
7. Compare between asynchronous and synchronous counter circuits with any four points.
8. How MS flip-flop works? What is the basic idea behind it? Explain its working with circuit diagram, truth tables and waveforms.
9. Draw the circuit of ring counter and explain its working with truth table.
10. What is clock? Explain its basic concept.
11. What is flip flop? Explain.
12. Draw the circuit of RS flip flop using NOR gates and explain its working with truth table.
13. How clocked RS flip flop works? Draw its circuit and explain its working in brief.
14. How D flip flop works? Explain with neat diagram and truth table.
15. Explain the working of JK flip flop with neat diagram and truth table.
16. What is T flip flop? How frequency can be divided using T flip flop? Explain with neat circuit and output waveform.

17. In a digital communication system, a signal of 4GHz is received from satellite. It is to be connected to a small TV which works on 500MHz video signal. Then how to convert the
18. What is Master-Slave flip flop? Explain with neat circuit diagram.
19. What is modulus of a counter? Explain in brief.
20. Given modulus of following counter circuit containing –
    5 flip flops, 3 flip flops, 8 flip flops, 2 flip flops
21. Draw the circuit of MOD-10 counter and explain its working.
22. How to design MOD-12 counter? Explain its procedure and then draw the circuit also.
23. If a 4-bit counter receives 66^{th} clock pulse, what will be its output at that particular clock pulse? Calculate with step-by-step procedure and explain. ***(Ans: 0010)***
24. A 3-bit counter circuit is counting clock pulses normal condition. If it receives, 92^{nd} clock pulse, the calculate its output state. ***(Ans: 0100)***

CHAPTER-6: ADC & DAC

1) In _____ circuit, at every conversion, the circuit counts from 0. ***(Ans: counter type ADC)***
2) _____ circuit consists of resistive network. ***(Ans: DAC)***
3) For 4-bit simultaneous ADC circuit the number of comparators used will be _____. ***(Ans: 16)***
4) In binary ladder circuit there are only two types of resistors, the _____ and the _____. ***(Ans: R & 2R)***
5) For an n-bit weighted resistor DAC, number of resistors required is given by _____. ***(Ans: 2^{n-1})***
6) If 6-bit weighted resistors DAC circuit uses R = 10kΩ, then the value of resistor at MSB will be equal to _____. ***(Ans: 320kΩ)***
7) SAR output voltage is always _____. ***(Ans: digital)***
8) The staircase voltage is obtained in _____ ADC circuit. ***(Ans: counter type)***
9) In SAR ADC circuit, the count always advances by setting each _____. ***(Ans: MSB)***
10) The 4-bit resistive divider DAC uses 80kΩ resistor at LSB. Then the value of resistor used at MSB position will be _____. ***(Ans: 10kΩ)***

LONG ANSWER QUESTIONS (4 MARKS)

1. Explain the working principle of weighted resistors DAC circuit with neat circuit diagram and formula.
2. What are the basic drawbacks of weighted resistors DAC circuit? Explain.
3. Draw a neat circuit of simultaneous ADC circuit and explain its working.
4. How SAR is faster than counter type ADC circuit? Explain with an example.
5. Compare between weighted resistors DAC and binary ladder DAC circuit.
6. Explain the working of counter type ADC circuit with proper diagram.
7. How SAR works? Explain its working with neat circuit diagram and represent its conversion process graphically.
8. What do you mean by full scale output voltage of a DAC circuit? Explain with respect to both types of DAC circuits.

CHAPTER-7: COMPUTER FUNDAMENTALS

1. The address bus is _____ and the data bus is _____. ***(Ans: unidirectional, bidirectional)***
2. When UV radiations are used to delete the memory contents, such memory is called as _____ memory. ***(Ans: EPROM)***
3. _____ is a sequential access storage device. ***(Ans: magnetic tape)***
4. When supply computer is switched off, information stored in _____ is completely lost. ***(Ans: RAM)***
5. The memory which can be written once is called as _____ memory. ***(Ans: PROM)***
6. _____ is an input device. ***(Ans: Keyboard)***
7. _____ is an output device. ***(Ans: Printer)***
8. Floppy can work both as _____ device as well as _____ device. ***(Ans: input, output)***
9. The storage capacity of CD is _____ MBytes. ***(Ans: 700MByte)***
10. The floppy device can storage a maximum data size of _____ MB. ***(Ans: 1.44MByte)***

LONG ANSWER QUESTIONS (4 MARKS)

1. Draw the block diagram of basic computer and explain the function of each block.
2. Write a note on floppy disk and explain its working.
3. What is a hard disk? Explain its working with neat diagram.
4. Explain the terms modem and multimedia in brief.
5. What are the two types of buses used in computer? Explain their use.
6. State any six specifications of a personal computer.
7. Compare between primary and secondary memories.
8. Explain the working of magnetic tape with neat diagram.
9. What are the types of semiconductor memories? Enlist names and explain any two of them in details.
10. Give at least four applications of a computer.
11. What are the types of printers? Enlist their names and one application of each.
12. Explain any two input and output devices.