M. Sc. (Electronics) (Second Semester)

EXAMINATION, July, 2022

DIGITAL SYSTEM & DESIGN

Paper Code

ELC	2	0	4	(N)

Questions Booklet Series

A

Time : 1:30 Hours]
[*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

(Remaining instructions on the last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. The parameter through which 16 distinct values can be represented is known as ....

    (A) Bit

    (B) Byte

    (C) Word

    (D) Nibble

2. The decimal equivalent of the binary number $(1011.011)_2$ is ....

    (A) $(11.375)_{10}$

    (B) $(10.123)_{10}$

    (C) $(11.175)_{10}$

    (D) $(9.23)_{10}$

3. The largest two digit hexadecimal number is ....

    (A) $(FE)_{16}$

    (B) $(FD)_{16}$

    (C) $(FF)_{16}$

    (D) $(EF)_{16}$

4. Representation of hexadecimal number (6DE) H in decimal :

    (A) $6 * 16^2 + 13 * 16^1 + 14 * 16^0$

    (B) $6 * 16^2 + 12 * 16^1 + 13 * 16^0$

    (C) $6 * 16^2 + 11 * 16^1 + 14 * 16^0$

    (D) $6 * 16^2 + 14 * 16^1 + 15 * 16^0$

5. The quantity of double word is ....

    (A) 16 bits

    (B) 32 bits

    (C) 4 bits

    (D) 8 bits

6. The given hexadecimal number $(1E.53)_{16}$ is equivalent to ....

    (A) $(35.684)_8$

    (B) $(36.246)_8$

    (C) $(34.340)_8$

    (D) $(35.599)_8$

7. Perform binary addition : $101101 + 011011 = ?$

    (A) 011010

    (B) 1010100

    (C) 101110

    (D) 1001000

8. Perform binary subtraction : $101111 - 010101 = ?$

   (A) 100100

    (B) 010101

    (C) 011010

    (D) 011001

9. On binary multiplication of (10.10) and (01.01), we get ....

   (A) 101.0010

   (B) 0010.101

   (C) 011.0010

   (D) 110.0011

10. 2's complement of 11001011 is ....

    (A) 01010111

    (B) 11010100

    (C) 11100010

    (D) 00110101

11. On subtracting $(010110)_2$ from $(1011001)_2$ using 2's complement, we get ....

    (A) 0111001

    (B) 1100101

    (C) 0110110

    (D) 1000011

12. 1's complement can be easily obtained by using ....

    (A) Comparator

    (B) Inverter

    (C) Adder

    (D) Subtractor

13. A three digit decimal number requires .... for representation in the conventional BCD format.

    (A) 3 bits

    (B) 6 bits

    (C) 12 bits

    (D) 24 bits

14. De Morgan's theorem states that ....

    (A) $(AB)' = A' + B'$

    (B) $(A + B)' = A' * B$

    (C) $A' + B' = A'B'$

    (D) $(AB)' = A' + B$

15. The logical sum of two or more logical product terms is called ....

    (A) SOP

    (B) POS

    (C) OR operation

    (D) NAND operation

16. The expression Y = (A + B) (B + C) (C + A) shows the .... operation.

    (A) AND

    (B) POS

    (C) SOP

    (D) NAND

17. There are .... Minterms for 3 variables (a, b, c).

    (A) 0

    (B) 2

    (C) 8

    (D) 1

18. There are .... cells in a 4-variable K-map.

    (A) 12

    (B) 16

    (C) 18

    (D) 8

19. Product-of-Sums expressions can be implemented using ....

    (A) 2-level OR-AND logic circuits

    (B) 2-level NOR logic circuits

    (C) 2-level XOR logic circuits

    (D) Both 2-level OR-AND and NOR logic circuits

20. The following switching functions are to be implemented using a decoder :

    $f_1 = \Sigma\, m\,(1, 2, 4, 8, 10, 14)$

    $f_2 = \Sigma\, m\,(2, 5, 9, 11)$

    $f_3 = \Sigma\, m\,(2, 4, 5, 6, 7)$

    The minimum configuration of decoder will be ....

    (A) 2 to 4 line

    (B) 3 to 8 line

    (C) 4 to 16 line

    (D) 5 to 32 line

21. How many two-input AND and OR gates are required to realize $Y = CD + EF + G$?

    (A) 2, 2

    (B) 2, 3

    (C) 3, 3

    (D) 3, 2

22. A full adder logic circuit will have ....

    (A) Two inputs and one output

    (B) Three inputs and three outputs

    (C) Two inputs and two outputs

    (D) Three inputs and two outputs

23. Exclusive-OR (XOR) logic gates can be constructed from what other logic gates ?

   (A) OR gates only

   (B) AND gates and NOT gates

   (C) AND gates, OR gates, and NOT gates

   (D) OR gates and NOT gates

24. Which of the following logic families has the shortest propagation delay ?

   (A) S-TTL

   (B) AS-TTL

   (C) HS-TTL

   (D) HCMOS

25. MSI means ....

   (A) Merged Scale Integration

   (B) Main Scale Integration

   (C) Medium Scale Integration

   (D) Main Set Integratio

26. CMOS refers to ....

   (A) Continuous Metal Oxide Semiconductor

   (B) Complementary Metal Oxide Semiconductor

   (C) Centred Metal Oxide Semiconductor

   (D) Concrete Metal Oxide Semiconductor

27. Fan-in and Fan-out are the characteristics of ....

   (A) Registers

   (B) Logic families

   (C) Sequential Circuits

   (D) Combinational Circuits

28. TTL is called transistor-transistor logic because both the logic gating function and the amplifying function are performed by ....

   (A) Resistors

   (B) Bipolar junction transistors

   (C) One transistor

   (D) Resistors and transistors respectively

29. In DTL amplifying function is performed by ....

   (A) Transistor

   (B) Diode

   (C) Inductor

   (D) Capacitor

30. The DTL propagation delay is relatively ....

   (A) Large

   (B) Small

   (C) Moderate

   (D) Negligible

31. Which logic is the fastest of all the logic families ?

   (A) TTL

   (B) ECL

   (C) HTL

   (D) DTL

32. What are the types of MOSFET devices available ?

   (A) P-type enhancement type MOSFET

   (B) N-type enhancement type MOSFET

   (C) Depletion type MOSFET

   (D) All of the mentioned

33. CMOS technology is used in ....

   (A) Inverter

   (B) Microprocessor

   (C) Digital logic

   (D) Both microprocessor and digital logic

34. In a combinational circuit, the output at any time depends only on the .... at that time.

   (A) Voltage

   (B) Intermediate values

   (C) Input values

   (D) Clock pulses

35. All logic operations can be obtained by means of ....

   (A) AND and NAND operations

   (B) OR and NOR operations

   (C) OR and NOT operations

   (D) NAND and NOR operations

36. The design of an ALU is based on ....

   (A) Sequential logic

   (B) Combinational logic

   (C) Multiplexing

   (D) De-Multiplexing

37. If A and B are the inputs of a half-adder, the sum is given by ....

   (A) A AND B

   (B) A OR B

   (C) A XOR B

   (D) A EX-NOR B

38. If A, B and C are the inputs of a full-adder, then the carry is given by ....

   (A) A AND B OR (A OR B) AND C

   (B) A OR B OR (A AND B) C

   (C) (A AND B) OR (A AND B)C

   (D) A XOR B XOR (A XOR B) AND C

39. Let A and B is the input of a subtractor then the borrow will be ....

    (A) A AND B'

    (B) A' AND B

    (C) A OR B

    (D) A AND B

40. The output of a full subtractor is same as ....

    (A) Half-adder

    (B) Full-adder

    (C) Half subtractor

    (D) Decoder

41. Carry lookahead logic uses the concepts of ....

    (A) Inverting the inputs

    (B) Complementing the outputs

    (C) Generating and propagating carries

    (D) Ripple factor

42. In a serial addition, the addition is carried out ....

    (A) 3 bit per second

    (B) Byte by byte

    (C) Bit by bit

    (D) All bits at the same time

43. A serial subtractor can be obtained by converting the serial adder by using the ....

    (A) 1's complement system

    (B) 2's complement system

    (C) 10's complement

    (D) 9's complement

44. Decimal digit in BCD can be represented by ....

    (A) 1 input line

    (B) 2 input lines

    (C) 3 input lines

    (D) 4 input lines

45. The device shown here is most likely a ....
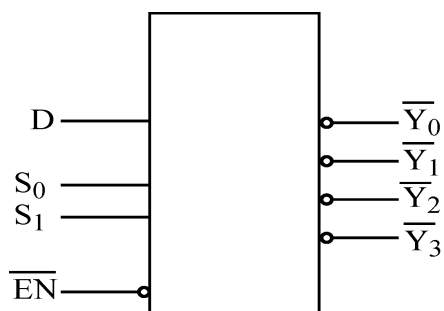
    (A) Comparator

    (B) Multiplexer

    (C) Inverter

    (D) Demultiplexer

46. What is a multiplexer ?

(A) It is a type of decoder which decodes several inputs and gives one output

(B) A multiplexer is a device which converts many signals into one

(C) It takes one input and results into many output

(D) It is a type of encoder which decodes several inputs and gives one output

47. What is the function of an enable input on a multiplexer chip ?

(A) To apply V_{CC}

(B) To connect ground

(C) To active the entire chip

(D) To active one half of the chip

48. What of the following circuit can be used as parallel to serial converter ?

(A) Multiplexer

(B) Demultiplexer

(C) Decoder

(D) Digital counter

49. In 1-to-4 demultiplexer, how many select lines are required ?

(A) 2

(B) 3

(C) 4

(D) 5

50. How many types of parity bits are found ?

(A) 2

(B) 3

(C) 4

(D) 1

51. The BCD number 101011 has .... priority.

(A) Odd

(B) Even

(C) Both even and odd

(D) Undefined

52. Reflected binary code is also known as ....

(A) BCD code

(B) Binary code

(C) ASCII code

(D) Gray code

53. A circuit that compares two numbers and determines their magnitude is called ....

(A) Height comparator

(B) Size comparator

(C) Comparator

(D) Magnitude comparator

54. A magnitude comparator is defined as a digital comparator which has ....

(A) Only one output terminal

(B) Two output terminals

(C) Three output terminals

(D) No output terminal

55. Whose operations are more faster among the following ?

(A) Combinational circuits

(B) Sequential circuits

(C) Latches

(D) Flip-Flops

56. How many types of sequential circuits are ?

(A) 2

(B) 3

(C) 4

(D) 5

57. What is a trigger pulse ?

(A) A pulse that starts a cycle of operation

(B) A pulse that reverses the cycle of operation

(C) A pulse that prevents a cycle of operation

(D) A pulse that enhances a cycle of operation

58. How is a J-K flip-flop made to toggle ?

(A) $J = 0, K = 0$

(B) $J = 1, K = 0$

(C) $J = 0, K = 1$

(D) $J = 1, K = 1$

59. A D flip-flop can be constructed from an .... flip-flop.

(A) S-R

(B) J-K

(C) T

(D) S-K

60. In a J-K flip-flop, if $J = K$ the resulting flip-flop is referred to as ....

(A) D flip-flop

(B) S-R flip-flop

(C) T flip-flop

(D) S-K flip-flop

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is ny discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।