

Roll No.

Question Booklet Number

O. M. R. Serial No.

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| Question Booklet Number |
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M. Sc. (Electronics) (Second Semester) (NEP)

EXAMINATION, 2022-23

DIGITAL SYSTEM AND DESIGN

| Paper Code | | | | | | | |
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| B | 1 | 4 | 0 | 8 | 0 | 4 | T |

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| Questions Booklet Series |
| A |

Time : 1:30 Hours]

[Maximum Marks : 75

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. 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.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। 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।

(Remaining instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. A two digit decimal number requires for representation in the conventional BCD format.
 - (A) 2 bits
 - (B) 4 bits
 - (C) 8 bits
 - (D) 12 bits

2. The expression $Y = (X + Y)(Y + Z)(X + Z)$ shows the operation.
 - (A) AND
 - (B) POS
 - (C) SOP
 - (D) NAND

3. CMOS refers to
 - (A) Centred Metal Oxide Semiconductor
 - (B) Concrete Metal Oxide Semiconductor
 - (C) Continuous Metal Oxide Semiconductor
 - (D) Complementary Metal Oxide Semiconductor

4. Which of the following circuit can be used as parallel to serial converter ?
 - (A) Multiplexer
 - (B) Demultiplexer
 - (C) Decoder
 - (D) Digital counter

5. T flip-flop is used as
 - (A) Transfer data circuit
 - (B) Toggle switch
 - (C) Time delay switch
 - (D) None of the above

6. The characteristics equation of J-K flip-flop is
 - (A) $J + K'Qn$
 - (B) $JQn' + K'Qn$
 - (C) $J' + KQn$
 - (D) $J'K' + KQn$

7. When does a positive level triggered flip-flop in Digital Electronics changes its state ?
 - (A) When the clock is negative
 - (B) When the clock is positive
 - (C) When the inputs are all zero
 - (D) When the inputs are all one

8. How much locations an 4-bit address code can select in memory ?
 - (A) 8 locations
 - (B) 16 locations
 - (C) 256 locations
 - (D) 65, 536 locations

9. Why antifuses are implemented in a PLD ?
- (A) To protect from high voltage
 - (B) To increase the memory
 - (C) To implement the programmes
 - (D) As a switching devices
10. The minimum number of flip-flops that can be used to construct a modulus-7 counter is
- (A) 3
 - (B) 7
 - (C) 8
 - (D) 10
11. The parameter through which 8 distinct values can be represented is known as
- (A) Bit
 - (B) Byte
 - (C) Word
 - (D) Nibble
12. The largest four digit hexadecimal number is
- (A) (FFEE)₁₆
 - (B) (FFDD)₁₆
 - (C) (FFFF)₁₆
 - (D) (EEFF)₁₆
13. The quantity of quad word is
- (A) 64 bits
 - (B) 32 bits
 - (C) 16 bits
 - (D) 8 bits
14. Perform binary addition : 110011 + 101010 = ?
- (A) 011010
 - (B) 1010100
 - (C) 100110
 - (D) 1011101
15. The given hexadecimal number (2F.67)₁₆ is equivalent to
- (A) (57.316)₈
 - (B) (55.246)₈
 - (C) (57.340)₈
 - (D) (55.599)₈
16. The total storage capacity of 2K * 8 ROM is
- (A) 8 bits
 - (B) 16 bits
 - (C) 1024 bits
 - (D) 2048 bits

17. On binary multiplication of (01.01) and (10.10), we get
- (A) 101.0010
 (B) 0010.101
 (C) 011.0010
 (D) 110.0011
18. 2's complement of 10101010 is
- (A) 01010110
 (B) 11010100
 (C) 11100010
 (D) 00110101
19. Perform binary subtraction : $111011 - 101110 = ?$
- (A) 100100
 (B) 010101
 (C) 001101
 (D) 011001
20. Representation of hexadecimal number (F6C)H in decimal :
- (A) $15 * 16^2 + 6 * 16^1 + 12 * 16^0$
 (B) $12 * 16^2 + 6 * 16^1 + 15 * 16^0$
 (C) $14 * 16^2 + 6 * 16^1 + 12 * 16^0$
 (D) $15 * 16^2 + 6 * 16^1 + 14 * 16^0$
21. 1's complement can be easily obtained by using
- (A) Adder
 (B) Comparator
 (C) Inverter
 (D) Subtractor
22. The decimal equivalent of the binary number $(1110.011)_2$ is
- (A) $(11.175)_{10}$
 (B) $(14.375)_{10}$
 (C) $(12.175)_{10}$
 (D) $(14.275)_{10}$
23. There are Minterms for 4 variables (a, b, c, d).
- (A) 4
 (B) 8
 (C) 16
 (D) 32
24. How many two-input AND and OR gates are required to realize $Y = AB + CD + E$?
- (A) 2, 2
 (B) 3, 2
 (C) 3, 3
 (D) 2, 3

25. A 3-bit counter has a maximum modulus of
- (A) 3
(B) 6
(C) 8
(D) 16
26. A flip-flop stores
- (A) 2 bit of information
(B) 4 bit of information
(C) 1 bit of information
(D) 3-bit information
27. Which of the following best describes EEPROMs ?
- (A) EEPROMs can be programmed only once
(B) EEPROMs can be erased by UV
(C) EEPROMs can be erased by shorting all inputs to the ground
(D) EEPROMs can be erased electrically
28. Ripple counters are
- (A) Synchronous counters
(B) Asynchronous counters
(C) True binary counters
(D) Synchronous and true binary counters
29. What will be the output from a D flip-flop if $D = 1$ and the clock is low ?
- (A) 1
(B) 0
(C) No change
(D) Toggle between 0 and 1
30. In a J-K flip-flop, if $J = K$ the resulting flip-flop is referred to as
- (A) T flip-flop
(B) S-K flip-flop
(C) D flip-flop
(D) S-R flip-flop
31. Exclusive-NOR (Ex-NOR) logic gates can be constructed from what other logic gates ?
- (A) OR gates only
(B) OR gates and NOT gates
(C) AND gates and NOT gates
(D) AND gates, OR gates, and NOT gates
32. The logical product of two or more logical sum terms is called
- (A) SOP
(B) POS
(C) OR operation
(D) NAND operation

33. There are cells in a 3-variable K-map.
- (A) 12
(B) 16
(C) 6
(D) 8
34. A full subtractor logic circuit will have
- (A) Three inputs and two outputs
(B) Three inputs and three outputs
(C) Two inputs and two outputs
(D) Two inputs and one output
35. DeMorgan's theorem states that
- (A) $(A + B)' = A' * B'$
(B) $(A + B)' = A' * B$
(C) $A' + B' = A'B'$
(D) $(AB)' = A' + B$
36. AT flip-flop can be constructed from a flip-flop.
- (A) S-R
(B) J-K
(C) D
(D) S-K
37. The terminal count of a typical modulus-12 binary counter is
- (A) 0000
(B) 1010
(C) 1011
(D) 1111
38. Which A/D converter is considered to be simplest, fastest and most expensive ?
- (A) Flash type ADC
(B) Servo converter
(C) Counter type ADC
(D) All of the mentioned
39. PLA contains
- (A) NOR and OR arrays
(B) NOT and OR arrays
(C) NAND and NOT arrays
(D) AND and OR arrays
40. The given hexadecimal number $(E9)_{16}$ is equivalent to Gray Code.
- (A) 10011101
(B) 11001001
(C) 10101010
(D) 11011111
41. RAMs are utilized in the computer as
- (A) Scratch-pad
(B) Main memory
(C) Buffer
(D) All of the Mentioned

42. Drawback of counter type A/D converter :
- (A) Counter reset automatically
 - (B) Low speed
 - (C) High conversion time
 - (D) More complex
43. The full form of EPROM is
- (A) Electrically Programmable ROMs
 - (B) Erasable Programming ROMS
 - (C) Erasable Programmable ROMs
 - (D) Erasable Programmed ROMs
44. The radix of a octal number system is
- (A) 2
 - (B) 8
 - (C) 10
 - (D) 16
45. If A and B are the inputs of a half adder, the carry is given by
- (A) A AND B
 - (B) A OR B
 - (C) A XOR B
 - (D) A EX-NOR B
46. A minimum of parity bits are required for generating Hamming code for 8421 code.
- (A) 2
 - (B) 3
 - (C) 4
 - (D) 5
47. Gray code is a
- (A) Standard
 - (B) Universal
 - (C) Weighted
 - (D) Non-weighted
48. Schottky TTL has propogation delay time than TTL.
- (A) Lower
 - (B) Higher
 - (C) Zero
 - (D) None of the above
49. In a J-K flip flop if $J = K = 1$, its Q output will be when a clock pluse is applied.
- (A) Reset
 - (B) Set
 - (C) Compliment
 - (D) Unchange

50. The design of an ALU is based on
- (A) Sequential logic
 - (B) De-Multiplexing
 - (C) Multiplexing
 - (D) Combinational logic
51. The output of a full adder is same as
- (A) Decoder
 - (B) Full subtractor
 - (C) Half subtractor
 - (D) Half adder
52. The following switching functions are to be implemented using a decoder :
- $$f1 = \Sigma m(1, 3, 4, 8, 10) \text{ and}$$
- $$f2 = \Sigma m(2, 4, 5, 9, 11, 14)$$
- 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
53. Fan-in and Fan-out are the characteristics of
- (A) Counters
 - (B) Combinational Circuits
 - (C) Sequential Circuits
 - (D) Logic families
54. All logic operations can be obtained by means of
- (A) NAND and NOR operations
 - (B) AND and OR operations
 - (C) OR and NOT operations
 - (D) AND and NOT operations
55. The number of bits required to represent 25 in BCD is
- (A) 4
 - (B) 8
 - (C) 12
 - (D) 16
56. Master-slave configuration is used in a J-K flip-flop to eliminate
- (A) Race around condition
 - (B) Set condition
 - (C) Reset condition
 - (D) Compliment condition

57. Registers can be designed using
- (A) Counter
 - (B) Decoder
 - (C) Flip-flop
 - (D) Encoder
58. The speed of an asynchronous counter is than that of a synchronous counter.
- (A) Less
 - (B) Greater
 - (C) Equal
 - (D) None of the above
59. A dynamic RAM is fabricated using technology.
- (A) TTL
 - (B) MOS
 - (C) DTL
 - (D) None of the above
60. If A, B and C are the inputs of a full adder then the carry is given by
- (A) $A \text{ AND } B \text{ OR } (A \text{ OR } B) \text{ AND } C$
 - (B) $A \text{ OR } B \text{ OR } (A \text{ AND } B) C$
 - (C) $(A \text{ AND } B) \text{ OR } (A \text{ AND } B)C$
 - (D) $A \text{ XOR } B \text{ XOR } (A \text{ XOR } B) \text{ AND } C$
61. DRAM stores single bit by using
- (A) Transistor
 - (B) Capacitor
 - (C) Both (A) and (B)
 - (D) None of the above
62. The components used in DTL logic are
- (A) Diode, transistor
 - (B) Diode, resistor
 - (C) Diode, transistor, resistor
 - (D) None of the above
63. The group of flip-flops is also known as
- (A) Registers
 - (B) Decoders
 - (C) Encoders
 - (D) None of the above
64. The output of the multiplexer depends on its
- (A) Data outputs
 - (B) Data inputs
 - (C) Selected inputs
 - (D) None of the above

65. The output of the sequential circuit depends on
- (A) Present input
 (B) Present input and present state
 (C) Present state
 (D) None of the above
66. The Field Effect Transistor is device.
- (A) Single terminal device
 (B) Double terminal device
 (C) Three terminal device
 (D) None of the above
67. What is the formula to obtain the number of parity bits ?
- (A) $2^P \geq P + m + 1$
 (B) $2^P \geq P + m - 1$
 (C) $2^P \geq P - m - 1$
 (D) None of the above
68. The counter is used to count the number of
- (A) Digits
 (B) Bits
 (C) Pulses
 (D) None of the above
69. comes under unipolar logic family.
- (A) PMOS
 (B) CMOS
 (C) NMOS
 (D) All of the above
70. In the toggle mode, a JK flip-flop has :
- (A) $J = 0, K = 1$
 (B) $J = 1, K = 1$
 (C) $J = 0, K = 0$
 (D) $J = 1, K = 0$
71. The inputs of a NAND gate are connected together. The resulting circuit is
- (A) AND gate
 (B) OR gate
 (C) NOT gate
 (D) None of the above

72. Storage of 1 KB means the following number of bytes :
- (A) 1064
 - (B) 1024
 - (C) 1000
 - (D) 924
73. The time required for a gate to change its output is called as :
- (A) decay time
 - (B) run time
 - (C) propagation time
 - (D) start time
74. How many input and output required for demultiplexer ?
- (A) one input and many output
 - (B) one input and one output
 - (C) number of selection inputs and one output
 - (D) None of the answers
75. The parity is used to
- (A) Increase the switching operation
 - (B) Reduce switching operation
 - (C) Detect errors
 - (D) None of the above
76. Which of the following is an invalid state in an 8421 binary coded decimal ?
- (A) 1001
 - (B) 1101
 - (C) 1000
 - (D) 0100
77. A three input NOR gate gives high output when
- (A) One input is high
 - (B) One input is low
 - (C) All inputs are low
 - (D) All inputs are high
78. A decade counter requires
- (A) 4 flip-flop
 - (B) 10 flip-flop
 - (C) 2 flip-flop
 - (D) 3 flip-flop

79. The binary equivalent of decimal number 56 is
- (A) 101101
 (B) 110110
 (C) 101010
 (D) 111000
80. Group of 4-bits forms
- (A) Nibble
 (B) Byte
 (C) Gigabyte
 (D) Terabyte
81. What is the octal equivalent of the binary number 10111101 ?
- (A) 675
 (B) 275
 (C) 572
 (D) 465
82. An OR gate has 6 inputs. The number of input words in its truth table are
- (A) 6
 (B) 32
 (C) 64
 (D) 128
83. Excess-3 code is known as
- (A) Weighted code
 (B) Cyclic redundancy code
 (C) Self-complementing code
 (D) Algebraic code
84. The NOR gate is OR gate followed by
- (A) NOT gate
 (B) NAND gate
 (C) AND gate
 (D) None of the above
85. How many NAND gates are used to form an AND gate ?
- (A) 1
 (B) 2
 (C) 3
 (D) 4
86. As the number of inputs increases, the NAND gate delay :
- (A) increases
 (B) decreases
 (C) does not vary
 (D) None of the above

87. Which gate is called as inequality detector ?
- (A) 2 input NAND gate
 (B) 2 input AND gate
 (C) 2 input XOR gate
 (D) 2 input XNOR gate
88. What is the minimum number of 2 input NAND gate required to make a 2 input XOR gate ?
- (A) 5
 (B) 4
 (C) 3
 (D) 2
89. An inverter gates can be developed using
- (A) Two diodes
 (B) Resistance and capacitance
 (C) Transistor
 (D) Inductance and capacitance
90. The octal equivalent of the decimal number $(4174)_{10}$ is
- (A) $(641)_8$
 (B) $(619)_8$
 (C) $(640)_8$
 (D) $(598)_8$
91. On addition of +38 and -20 using 2's compliment we get :
- (A) 11001100
 (B) 10101010
 (C) 00111011
 (D) 00010010
92. $(A + B)(A' \cdot B') = ?$
- (A) 1
 (B) 0
 (C) AB
 (D) AB'
93. expressions can be implemented using 2-level NAND logic circuits.
- (A) POS
 (B) Literals
 (C) SOP
 (D) None of the above
94. One that is not the outcome of Magnitude Comparator :
- (A) $a > b$
 (B) $a - b$
 (C) $a < b$
 (D) $a = b$

95. A combinational circuit that select one from many inputs are
- (A) Encoder
 - (B) Decoder
 - (C) De-multiplexer
 - (D) Multiplexer
96. How many outputs will a decimal to BCD encoder have ?
- (A) 4
 - (B) 8
 - (C) 12
 - (D) 16
97. What is the difference between a shift-right register and a shift-left register ?
- (A) There is no difference
 - (B) The direction of the shift
 - (C) Propagation delay
 - (D) The clock input
98. Which one of the following is volatile in nature ?
- (A) ROM
 - (B) EPROM
 - (C) PROM
 - (D) RAM
99. A shift register in which the output of the last flip-flop is connected to the Input of the first flip-flop ?
- (A) Ring counter
 - (B) BCD counter
 - (C) Parallel counter
 - (D) Ripple counter
100. Which of the following is not a decoder ?
- (A) 4 to 2
 - (B) 3 to 8
 - (C) 4 to 16
 - (D) 5 to 32

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct 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 any 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 सही उत्तर छँटना 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।