Booklet No.:

EXAMINATION QUESTION BOOKLET

430051

Test Booklet Series: A

Duration: 90 minutes

Roll No.:

Answer Sheet No

Sample

Name of Candidate

Signature of candidate

उम्मीदवारों के लिए निर्देश

Instructions for Candidate

इस प्रश्न-पुस्तिका में 85 बहुविकल्पीय प्रश्न है।प्रत्येक प्रश्न के चार विकल्प दिए गए है (A),(B),(C) और (D)। प्रत्येक प्रश्न का केवल एक सही विकल्प है। सही विकल्प का चुनाव करे और प्रश्न के सामने वाले सही गोले को उत्तर पुस्तिका में काला करें।

This booklet consists of 85 Multiple choice questions. Each question has 4 (four) alternatives (A), (B), (C), and (D). In any case only one alternative will be the correct answer. Choose the right alternative and darken the appropriate circle in the answer sheet in front of the related question.

प्रत्येक सही उत्तर के लिए 1अंक दिया जाएगा, गलत देने पर 0.25 अंक काट लिया जाएगा।

For each correct answer One mark will be given and **for each incorrect answer 0.25 mark will be deducted.**

गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले को एक बार काला करने के बाद इसको मिटाना या बदलना नहीं है। किसी प्रश्न का एक से ज्यादा गोले काले करने पर मशीन द्वारा इसके लिए शून्य अंक दिया जाएगा।

Use Black/Blue ball point Pen to darken the circle..Answer once darkened is not allowed to be erased or altered. Against any question if more than one circle is darkened, machine will allot **zero mark** for that question.

ओएमआर उत्तर पुस्तिका में सभी जानकारी देते हुए सही गोले को काला करे। दिए गए निर्देशों के अनुसार आप सही गोले को काला करने में असफल रहते है तो आपके उत्तर पुस्तिका की जाँच नहीं की जाएगी।

In OMR answer sheet candidate must fill up all required information and for this candidate must darken the appropriate circles. The OMR Answer sheet will not be evaluated if the candidate fails to fill up the required circles correctly as per the given directions.

उत्तर-पुस्तिका में सूचनाओं को भरने से पहले, उत्तर-पुस्तिका में दिए गए निर्देशों को ध्यानपूर्वक पढिए। उत्तर-पुस्तिका को किसी भी तरह से न मोड़े।

Read the instructions printed on Answer sheet carefully before filling the information on the answer Sheet. Do not fold answer sheet in any case.

प्रश्नो का उत्तर देने से पहले यह जाँच कर लें कि उत्तर-पुस्तिका और प्रश्न-पुस्तिका में आपने सारी जानकारी भर दी है।

Before beginning to answer the questions please make sure that all entries on OMR answer-sheet and Test Question booklet have been duly completed.

परीक्षार्थी अपनी उत्तर पुस्तिका पत्र निरीक्षक को सौंपे बिना परीक्षा हाल नहीं छोड़ सकता हैं और उपस्थिती पत्रिका पर हस्ताक्षर करना अनिवार्य हैं। ऐसा नही करने पर अयोग्य घोषित कर दिया जाएगा।

Candidate should not leave the examination hall/room without handing over his Answer sheet to the invigilator and without signing on the attendance sheet. Failing in doing so, will amount to disqualification.

प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात एवं उत्तर देने से पहले उम्मीदवार यह जाँच कर ले कि प्रश्न-पुस्तिका पूर्ण है।

After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question booklet is complete.

नोट : परीक्षा पुस्तिका के हिन्दी संस्करण में यदि कोई विसंगति पाई जाती है, तो अँग्रेजी संस्करण मान्य होगा।
Note : In case of discrepancy in Hindi language, English version will be treated as final.

जब तक आपसे कहा न जाए तब तक प्रश्न-पुस्तिका न खोलें।
DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Directions for Q.1 to Q.72: Choose the most appropriate option.

1. The thermionic emission current is given by
   (A) maxwell's equation
   (B) Fermi-Dirac distribution
   (C) Langmuir child law
   (D) Richardson Dushman equation

2. Zener breakdown occurs
   (A) due to rupture of covalent bonds
   (B) due to thermally generated minority carriers
   (C) in lightly doped junctions
   (D) only in germanium diodes

3. Negative feedback in an amplifier
   (A) increase noise   (B) reduce bandwidth
   (C) reduce gain   (D) increase distortion

4. The gain of a bipolar transistor drops at high frequencies because of
   (A) early effect
   (B) parasitic inductive elements
   (C) high current in base
   (D) transistor capacitance

5. The main application of enhancement mode MOSFET is in
   (A) oscillator circuits   (B) amplifier circuits
   (C) clipper circuit   (D) switching circuits

6. Transducer is a device which
   (A) amplifies a given electrical signal
   (B) transfer an electrical signal from one place to another
   (C) translates a physical parameter into suitable electrical quantity
   (D) changes the waveform of an electrical signal

7. The turn ratio of a transformer is 20:1. If a load of 40 ohm is connected across the secondary. What will be the effective resistance seen looking into the primary?
   (A) 800 ohm   (B) 4 k ohm
   (C) 8 k ohm   (D) 16 k ohm

8. n – channel FETs are considered better than p – channel FETs because
   (A) they consume less power
   (B) they have high switching time
   (C) mobility of electrons is greater than that of holes
   (D) they consume less power

9. In a 4-bit weighted resistor D/A converter, resistor value corresponding to LSB is 16 k ohm. The resistor value corresponding to MSB is
   (A) 32 k ohm   (B) 15 k ohm
   (C) 64 k ohm   (D) 2 k ohm

10. In a digital circuit, the clock is a
    (A) Flip-clop
    (B) Inverter
    (C) Monostable multivibrator
    (D) Free running multivibrator

11. In which of the following codes the successive numbers differ in only one bit position?
    (A) ASCII   (B) Gray Code
    (C) Excess –3 Code (D) BCD

12. An instruction used to set the carry flag in a computer can be classified as
    (A) data transfer (B) arithmetic
    (C) logical   (D) program control

Space For Rough Work

13. In FM modulation pre-emphasis is done for
    (A) low frequency components
    (B) high frequency components
    (C) middle frequency components
    (D) all frequency components

14. When modulation index of AM wave is increased from 0.5 to 1, the transmitted power
    (A) increases by 25%
    (B) increases by 33.3 %
    (C) increases by 50%
    (D) remains same

15. The electric flux and field intensity inside a conducting sphere is
    (A) Minimum   (B) Maximum
    (C) Uniform   (D) Zero

16. A waveguide behaves as
    (A) high pass filter   (B) low pass filter
    (C) band pass filter   (D) all pass filter

17. In a lossless RLC circuit the transient current is
    (A) sinusoidal   (B) square wave
    (C) triangular wave (D) non-oscillating

18. In an ac circuit, the maximum and minimum values of power factor can be
    (A) 10 and 1   (B) 1 and -1
    (C) 1 and 0   (D) Any positive value

19. In a circuit containing a complex impedance, maximum power transfer takes place when load is
    (A) pure resistance
    (B) equal to complex impedance
    (C) conjugate complex of the circuit impedance
    (D) inductive

20. The effect of doping intrinsic semi conductor is to
    (A) Move the Fermi level away from the centre of forbidden band
    (B) Move the Fermi level towards the centre of forbidden band
    (C) Change the crystal structure of the semi conductor
    (D) To keep the Fermi level at the middle of the forbidden band

21. Field Effect Transistor has
    (A) Large input impedance
    (B) Large output impedance
    (C) Large power gain
    (D) Small voltage gain

22. The binary addition of 1+1+1 is
    (A) 111   (B) 10
    (C) 110   (D) 11

23. In an RC coupled amplifier, the voltage gain
    (A) Remains almost constant over a range of frequencies
    (B) Always increases with frequency
    (C) Always decreases with frequency
    (D) Is independent of frequency

24. Which of the following will not decrease as a result of introduction of negative feedback
    (A) Instability   (B) Bandwidth
    (C) Overall gain   (D) Distortion

25. To generate a 1 MHz signal, the most suitable oscillator is
    (A) Colpitt's oscillator
    (B) Phas shift oscillator
    (C) Wcin bridge oscillator
    (D) None of these

Space For Rough Work

TA - A

4

26. The XOR gate produces high output only when two inputs are
   (A) High
   (B) Low
   (C) Different
   (D) Equal

27. In a microprocessor, the address of next instruction to be executed is stored in
   (A) Stack pointer
   (B) Address latch
   (C) Program counter
   (D) Any general purpose register

28. The LED's for their display require
   (A) A voltage of 1.2v and a current of 20 mA
   (B) A voltage of 20v and a current of 1.2 A
   (C) A voltage of 1.2v and current of 100 mA
   (D) A voltage of 10v and current of 120 mA

29. Two equal voltages of same frequency applied to the X and Y plates of a CRD, produces a circle on the screen. The phase difference between the two voltages is
   (A) 30°
   (B) 90°
   (C) 180°
   (D) 0°

30. Kirchoff's laws are applicable to
   (A) d.c. circuits only
   (B) a.c. circuits only
   (C) both a.c. and d.c. circuits
   (D) none of the above

31. The materials having low retentivity are suitable for making
   (A) Temporary magnets
   (B) Permanent magnets
   (C) Weak magnets
   (D) None of these

32. A 50KW, 3-phase, 400V, 60H¶ induction motor runs at 1140 rpm. The % slip will be
   (A) 1%
   (B) 3%
   (C) 5%
   (D) 24%

33. Which of the following device can be used for controlling the speed of a dc motor?
   (A) Thyratron
   (B) Thyristor
   (C) Transistor
   (D) Thermistor

34. The impulse response of an RL circuit is a
   (A) Rising exponential function
   (B) Decaying exponential function
   (C) Step function
   (D) Parabolic function

35. When the speed at which a conductor is moved through a magnetic field is increased, the induced voltage
   (A) Increases
   (B) Decreases
   (C) Remains constant
   (D) Reaches zero

36. Which of the following is the fastest analog to digital converter
   (A) Flash ADC
   (B) Dual slope ADC
   (C) Successive approximation ADC
   (D) Counter type ADC

37. Which of the following μP is a 8 bit processor?
   (A) 80286
   (B) 8085
   (C) 80386
   (D) 8086

38. The load factor is equal to
   (A) Average load/peak load
   (B) Peak load/average load
   (C) Average load / connected load
   (D) Average load / base load

Space For Rough Work

TA - A

39. Open circuit test on transformer is conducted to determine
    (A) Core losses
    (B) Copper Losses
    (C) Eddy Current losses
    (D) Hysteresis Losses

40. Form factor is defined as
    (A) peak value/rms value
    (B) rms value / average value
    (C) rms value / peak value
    (D) average value / rms value

41. Given relations R(w, x) and S(y, z), the result of

    SELECT DISTINCT w, x
    FROM R. S

    is guaranteed to be same as R, if
    (A) R has no duplicates and S is non-empty
    (B) R and S have no duplicates
    (C) S has no duplicates and R is non-empty
    (D) R and S have the same number of tuples

42. Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R, it will
    (A) result in a deadlock situation
    (B) immediately be granted
    (C) immediately be rejected
    (D) be granted as soon as it is released by A

43. If a variable can take only integral values from 0 to n, where n is a constant integer, then the variable can be represented as a bit-field whose width is the integral part of (the log in the answers are to the base 2)
    (A) $\log(n) + 1$ (B) $\log(n - 1) + 1$
    (C) $\log(n + 1) + 1$ (D) none of the above

44. Consider the function
        find (int x, int y)
        {return ((x < y) ? 0 : (x − y)) ; }
    Let a, b be two non-negative integers. The call find {a, find (a, b)} can be used to find the
    (A) maximum of a, b
    (B) positive difference of a, b
    (C) sum of a, b
    (D) minimum of a, b

45. Concurrent processes are processes that
    (A) do not overlap in time
    (B) overlap in time
    (C) are executed by a processor at the same time
    (D) none of the above

46. In a multi-user operating system, 20 requests are made to use a particular resource per hour, on an average. The probability that no requests are made in 45 minutes is
    (A) e^{-15} (B) e^{-5}
    (C) $1 - e^{-5}$ (D) $1 - e^{-10}$

47. An FSM can be considered a TM
    (A) of finite tape length, rewinding capability and unidirectional tape movement
    (B) of finite tape length, without rewinding capability and unidirectional tape movement
    (C) of finite tape length, without rewinding capability and bidirectional tape movement
    (D) of finite tape length, rewinding capability and bidirectional tape movement

Space For Rough Work

48. The major difference between a Moore and a Mealy machine is that
   (A) the output of the former depends on the present state and the current input
   (B) the output of the former depends only on the present state
   (C) the output of the former depends only on the current input
   (D) none of the above

49. Which of the following is not primitive recursive but computable?
   (A) Carnot function
   (B) Riemann function
   (C) Bounded function
   (D) Ackermann function

50. Which of the following weights makes the complement operation easier in BCD form?
   (A) 8-4-2-1   (B) Excess-3
   (C) 2-4-2-1   (D) 3-2-1-0

51. Which of the following logic families is well suited for high-speed operation?
   (A) TTL   (B) ECL
   (C) MOS   (D) CMOS

52. The total number of possible Boolean functions involving 'n' Boolean variables is
   (A) infinitely many   (B) n^n
   (C) n^2 (D) none of the above

53. Let $a_n a_{n-1} \ldots a_1 a_0$ be the binary representation of an integer b. The integer b is divisible by 3 if
   (A) the number of one's is divisible by 3
   (B) the number of one's is divisible by 3, but not by 9
   (C) the number of zeroes is divisible by 3
   (D) the difference of alternate sum, i.e., $(a_0 + a_2 + \ldots) - (a_1 + a_2 + \ldots)$ is divisible by 3

54. Which of the following is not a standard RS-232C sigal?
   (A) RTS   (B) CTS
   (C) DSR   (D) VDR

55. Start and stop bits are used in serial communication for
   (A) error detection
   (B) error correction
   (C) synchronization
   (D) slowing down the communication

56. The coefficient of x^2 in the expansion of
$$\left(\frac{x}{2} - \frac{3}{x^2} \right)^{10}$$ is
   (A) $-405/16$
   (B) $405/16$
   (C) $405/128$
   (D) None of the above

57. $\begin{vmatrix} 1+x & 1-x & 1-x \\ 1-x & 1+x & 1-x \\ 1-x & 1-x & 1+x \end{vmatrix} = 0$ for
   (A) $x \in \{1,1\}$ (B) $x \in \{0,-1\}$
   (C) $x \in \{1,-1\}$ (D) $x \in \{0,3\}$

Space For Rough Work

58. Evaluate $\begin{vmatrix} \alpha^2+1 & \alpha\beta & \alpha\gamma \\ \alpha\beta & \beta^2+1 & \beta\gamma \\ \alpha\gamma & \beta\gamma & \gamma^2+1 \end{vmatrix}$?

(A) $\alpha^2 + \beta^2 + \gamma^2$

(B) $\alpha^2\beta^2\gamma^2 + 1$

(C) $(\alpha + \beta + \gamma + 1)^2$

(D) $\alpha^2 + \beta^2 + \gamma^2 + 1$

59. Given $y = \ln(\ln^n mx)$, $\dfrac{dy}{dx} = ?$

(A) $\dfrac{nm}{x\ln mx}$

(B) $\dfrac{n}{mx\ln mx}$

(C) $\dfrac{n}{x\ln mx}$

(D) $\dfrac{m}{nx\ln mx}$

60. Given $2^x + 2^y = 2^{x+y}$, $\dfrac{dy}{dx} = ?$

(A) -2^{y-x}

(B) $\dfrac{2^x(2^y+1)}{2^y(2^x-1)}$

(C) $\dfrac{2^x(2^y-2)}{2^y(2^x-1)}$

(D) $\dfrac{2^x(2^y-1)}{2^y(2^x-1)}$

61. The line $y = mx + c$ will be tangent to the ellipse $\dfrac{x^2}{9} + \dfrac{y^2}{4} = 1$, if c is equal to

(A) $\dfrac{3}{m}$

(B) $\sqrt{9m^2+4}$

(C) $\sqrt{1+m^2}$

(D) $\sqrt{4m^2+9}$

62. The circle $x^2 + y^2 + 2ax + 1 = 0$ (where $a > 0$) is _____.

(A) tangent to the y-axis.

(B) does not meet the y-axis.

(C) intersects the y-axis.

(D) intersects both x-axis and y-axis.

63. $\displaystyle\int_0^{\frac{\pi}{3}} \dfrac{\cos\theta}{4+3\sin\theta}\, d\theta$ equals to

(1) $\dfrac{1}{3}\log(1+\dfrac{\sqrt{3}}{8})$

(B) $\dfrac{1}{3}\log(1-\dfrac{3\sqrt{3}}{8})$

(C) $\dfrac{1}{3}\log(1-\dfrac{\sqrt{3}}{8})$

(D) $\dfrac{1}{3}\log(1+\dfrac{3\sqrt{3}}{8})$

64. $\displaystyle\int_e^{+\infty} \dfrac{dx}{x\ln^3 x}$ is equal to

(A) 1

(B) 1 / 2

(C) -1

(D) 2

65. $\displaystyle\lim_{x\to\infty} \left(\dfrac{x+3}{x-2}\right)^{2x+1} = ?$

(A) e^{10}

(B) e^{-10}

(C) e^2

(D) $e^{1/2}$

Space For Rough Work

TA - A

8

66. $\lim_{x \to 0} \left(\dfrac{1 - \cos 4x}{2\sin^2 x + x\tan 7x} \right) = ?$

    (A) 8/9   (B) -8/9

    (C) -9/8   (D) 9/8

67. AB is a vertical pole. The end A is on the level ground, C is the middle point of AB and P is a point on the level ground. The portion CB subtends an angle β at P. If AP = nAB, then

    (A) $\tan\beta = \dfrac{n+1}{2n^2+1}$ (B) $\tan\beta = \dfrac{n}{2n^2+1}$

    (C) $\tan\beta = \dfrac{n-1}{2n^2+1}$ (D) $\tan\beta = \dfrac{n}{n^2+1}$

68. There exist positive integers A, B, and C, with no common factor greater than 1, such that, $A\log_{200}(5) + B\log_{200}(2) = C$ then what is the value of $A + B + C$?

    (A) 6   (B) 7

    (C) 8   (D) 9

69. Let $\vec{a}$ and $\vec{b}$ are unit vectors inclined at an angle α to each other. Then, $\left| \vec{a} + \vec{b} \right| < 1$ if

    (A) $\dfrac{2\pi}{3} < \alpha < \pi$ (B) $\alpha = \dfrac{5\pi}{12}$

    (C) $\alpha = \dfrac{5\pi}{3}$ (D) $\alpha = \dfrac{4\pi}{3}$

70. $\lim_{x \to 1} \sin(x-1)\tan\left(\dfrac{\pi x}{2}\right) = ?$

    (A) $-\dfrac{\pi}{2}$ (B) $\dfrac{2}{\pi}$

    (C) $\dfrac{\pi}{2}$ (D) $-\dfrac{2}{\pi}$

71. The solution of the differential equation $\dfrac{dy}{dx} + \dfrac{y}{x} = x^2$ with y = 1 when x = 1 is

    (A) $x\,y = x^4 + 2$ (B) $2x\,y = x^4 + 4$

    (C) $3x\,y = x^4 + 4$ (D) $4x\,y = x^4 + 3$

72. The perpendicular from the origin to the line $y = mx + c$ meets it at the point (- 1, 2). Then, the values of m and c are

    (A) $m = \dfrac{3}{2}, c = \dfrac{5}{2}$

    (B) $m = -\dfrac{1}{2}, c = \dfrac{5}{2}$

    (C) $m = \dfrac{1}{2}, c = -\dfrac{5}{2}$

    (D) $m = \dfrac{1}{2}, c = \dfrac{5}{2}$

Directions for Q.73 to Q.75: Find the odd-man out:

प्रश्न संख्या 73–75 के लिए निर्देशः असंगत विकल्प को चुनें

73. (A) DGJ   (B) LOR

    (C) TWZ   (D) PRU

Space For Rough Work

74. (A) belt   (B) bow
     (C) socks   (D) tie
     (A) कमरबंद   (B) गलही
     (C) जुराब   (D) टाई

75. (A) axe   (B) spade
     (C) club   (D) heart
     (A) कुल्हाड़ी   (B) कुदाल
     (C) छड़ी   (D) दिल

Directions for Q.76 to Q.79: Complete the series by choosing the appropriate missing term from the options given.

प्रश्न संख्या 76–79 के लिए निर्देशः दिये गये विकल्पों में से सर्वाधिक उपयुक्त अनुपस्थित भाब्द (term)का चयन कर दी गई श्रेणी को पूरा करें

76. 80, 10, 70, 15, 60, ?
     (A) 20   (B) 25
     (C) 30   (D) 50

77. 664, 332, 340, 170, ?, 89
     (A) 85   (B) 97
     (C) 109   (D) 178

78. QPO NML KJI ? EDC
     (A) HGF   (B) CAB
     (C) JKL   (D) GHI

79. U32, V29, ? , X23, Y20.
     (A) W26   (B) W17
     (C) Z17   (D) Z26

Directions for Q.80 to Q.82: Select the related letter/ word/number/figure from the given alternatives.

निर्देश : प्रश्न (81–82) प्रदत्त विकल्पों में से संबंधित अक्षर / शब्द / संख्या / चित्र, चुनें ।

80. Book : Publisher :: Film : ?
     (A) Writer   (B) Editor
     (C) Director   (D) Producer
     पुस्तक : प्रकाशक : : फिल्म : ?
     (A) लेखक   (B) संपादक
     (C) निर्देशक   (D) उत्पादक

81. Menu : Food :: Catalogue : ?
     (A) Books   (B) Library
     (C) Newspaper   (D) Rack
     मेन्यु : भोजन : : सूची : ?
     (A) पुस्तक   (B) पुस्तकालय
     (C) अखबार   (D) रैक

82. Film : ADGH :: Milk : ?
     (A) ADGF   (B) HDGE
     (C) HDGF   (D) HEGF

Directions for Q.83 to Q.85: Choose the most appropriate option.

83. One-sixth of a certain number is four more than one-twelfth the number. Find the number.
     यदि एक संख्या का छठवां हिस्सा उसके बारहवें हिस्से से 4 ज्यादा है तो वह संख्या होगी।
     (A) 6   (B) 18
     (C) 36   (D) 48

Space For Rough Work

TA - A

10

84. Six less than (1 / 9)th of 45 is -

45 के नौवें हिस्से से 6 कम होगा –

(A) -1   (B) -2

(C) 1   (D) 3

85. Twelve times one-half of a number is thirty six. What is the number?

यदि एक संख्या के आधे का बारह गुना 36 है तो वह संख्या होगी –

(A) 3   (B) 6

(C) 8   (D) 18

Space For Rough Work

TA - A