SEAL

पुस्तिका सं. : **714854**
Booklet No. :

उम्मीदवार इस पुस्तिका के सबसे ऊपरी रील को खोलकर पृष्ठ संख्या 2 और 3 के मध्य स्थापित **OMR** उत्तर शीट को निकाल लें।
Candidates should open the top side of the seal of this Booklet and take out the OMR Answer Sheet placed at page no. 2 and 3.

SCB — परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET

परीक्षा पुस्तिका शृंखला :
Test Booklet Series : **B**

निर्धारित समय : 1 & ½ घंटे
Time Allowed : 1 & ½ Hour

अधिकतम अंक : 85
Maximum Marks : 85

रोल नं.
Roll No. :

उत्तर शीट सं.:
Answer Sheet No. :

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें। इस पुस्तिका में प्रश्न अंग्रेजी में दिए गए हैं।
Read the following instructions carefully before you begin to answer the questions. This booklet contains questions in English.

उम्मीदवारों के लिए अनुदेश

1. प्रश्नों के उत्तर लिखना आरंभ करने से पहले आप इस पुस्तिका की जाँच करके सुनिश्चित कर लें कि इसमें पूरे पृष्ठ (1-24) हैं तथा कोई पृष्ठ या उसका भाग कम या दुबारा तो नहीं आ गया है। उम्मीदवारों को यह भी जाँच करनी है कि उनको केवल उस पद की सही परीक्षा-पुस्तिका मिली है जिसके लिए उन्होंने आवेदन किया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएं, तो *तत्काल* इसके बदले दूसरी पुस्तिका ले लें।

2. ओ एम आर उत्तर-शीट, प्रश्न पुस्तिका में ही उपलब्ध रहेगी। ओ एम आर उत्तर-शीट में विवरण भरने से पहले, आपको ओ.एम.आर. उत्तर-शीट पर मुद्रित अनुदेशों को सावधानीपूर्वक पढ़ना चाहिए। आपको ओ.एम.आर. उत्तर-शीट में दिए गए अनुदेशों के अनुसार सावधानीपूर्वक उसमें विवरण और कोड लिखने चाहिए। प्रश्नों के उत्तर वास्तविक रूप में लिखना आरंभ करने से पहले आपको ओ एम आर उत्तर-शीट में निर्धारित स्थान पर अपने हस्ताक्षर करने चाहिए। इन अनुदेशों का पूर्ण अनुपालन किया जाना चाहिए, ऐसा न किये जाने पर आपकी ओ एम आर उत्तर-शीट का मूल्यांकन नहीं किया जायेगा। (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों को ओ एम आर उत्तर-शीट में निर्धारित स्थान पर अपने बाएं हाथ के अंगूठे का निशान अवश्य लगाना चाहिए। इसके अतिरिक्त, जो दृष्टिहीन उम्मीदवार अपना हस्ताक्षर कर सकते हैं, वे अंगूठे के निशान के अलावा अपने हस्ताक्षर भी करें।)

3. ओ.एम.आर. उत्तर-शीट तीन प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ)। परीक्षा समाप्ति के बाद ओ.एम.आर. की मूल शीट तथा एक कार्बन प्रतिलिपि निरीक्षक को सौंपने के पश्चात् उम्मीदवार अपने साथ एक कार्बन प्रतिलिपि ले जा सकते/सकती हैं। यदि कोई भी उम्मीदवार ऐसा करने में असफल रहता/रहती है तो उसका/उसकी उम्मीदवारी रद्द कर दी जायेगी। यदि कोई उम्मीदवार अपना/अपनी कार्बन प्रतिलिपि में किसी भी प्रकार का फेर-बदल कर उसका दावा करता/करती है तो इस स्थिति में भी उसका/उसकी उम्मीदवारी रद्द की जायेगी।

4. इस प्रश्न-पुस्तिका में 85 बहुविकल्पीय प्रश्न हैं, प्रत्येक प्रश्न के 4 विकल्प दिए गए हैं, (A), (B), (C) और (D)। किसी भी स्थिति में प्रत्येक प्रश्न का केवल एक विकल्प ही सही उत्तर है। यदि आपको एक से अधिक विकल्प सही लगें तो सबसे अधिक उचित एक विकल्प का चुनाव करें और उत्तर शीट में सम्बंधित प्रश्न के सामने वाले उपयुक्त गोले को काला करें।

5. प्रत्येक **सही** उत्तर के लिए 1 अंक दिया जाएगा और प्रत्येक गलत उत्तर के लिए 0.25 अंक काट लिया जाएगा।

6. खंड 'सी' में, अभ्यर्थी के पास **कंप्यूटर साइंस एंड इंफॉर्मेशन टेक्नोलॉजी** पार्ट या **इलेक्ट्रॉनिक्स एंड कम्युनिकेशन इंजीनियरिंग** पार्ट को चुनने का विकल्प है। चुने गए विकल्प को ओ एम आर उत्तर शीट पर सही गोले को काला करके चिह्नित किया जाना चाहिए, ऐसा न होने पर ओ एम आर उत्तर शीट का मूल्यांकन नहीं किया जाएगा।

7. गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले को एक बार काला करने के बाद इसको मिटाने या बदलने की अनुमति नहीं है। यदि किसी प्रश्न के सामने एक से ज्यादा गोले काले किये गए हों तो मशीन द्वारा उसके लिए **शून्य अंक** दिया जाएगा।

8. किसी भी स्थिति में उत्तर शीट को न मोड़ें।

9. उत्तर-शीट पर कोई भी रफ कार्य नहीं करना है। रफ कार्य के लिए इस पुस्तिका में स्थान दिया गया है।

10. परीक्षा हॉल/कमरों में मोबाइल फ़ोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फ़ोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जायेगा और उनके विरुद्ध कार्यवाही की जाएगी, जिसमें उनकी उम्मीदवारी रद्द करना भी शामिल है।

11. परीक्षार्थी को अपनी उत्तर-शीट निरीक्षक को सौंपे बिना और उपस्थिति शीट पर हस्ताक्षर किये बिना परीक्षा हॉल/कमरा नहीं छोड़ना चाहिए, ऐसा नहीं करने पर अयोग्य घोषित कर दिया जाएगा।

Instructions to the Candidates

1. Before you start to answer the questions you must check up this booklet and ensure that it contains all the pages (1-24) and see that no page or portion thereof is missing or repeated. Candidates are also required to check that they have got the right question booklet as for the post applied. If you find any defect in this Booklet, you must get it replaced *immediately*.

2. OMR Answer-Sheet will be within the Question booklet. Read the instructions printed on OMR Answer sheet carefully before filling the information on the OMR Answer sheet. You must complete and code the details as per the instructions given in the OMR answer sheet carefully. You must also put your signature on the OMR Answer-Sheet at the prescribed place before you actually start answering the questions. These instructions must be fully complied with, failing which, your OMR Answer-Sheet will not be evaluated. (For V.H. candidates these details will be filled in by the scribe. However, all V.H. candidates must put their left-hand thumb impression at the space provided in the OMR Answer-Sheet. In addition, those V.H. candidates who can sign should also put their signatures in addition to thumb impression.)

3. The OMR answer sheet will be in triplicate (Original and two carbon copies). Candidates has to take one carbon copy (marked as 'candidate copy') with him/her after examination and handover the original OMR along with one carbon copy to invigilator. If candidate fails to handover the original OMR along with one carbon copy to invigilator, his/her candidature will be cancelled. Further, if the candidate tampers with candidate OMR carbon copy and claims for same, in that case also his/her candidature will be cancelled.

4. 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. In case if you find more than one correct answer, then choose the most appropriate single option and darken the appropriate circle in the answer sheet in front of the related question.

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

6. **In Section 'C'** Candidates has choice to attempt either **Computer Science & Information Technology** Part OR **Electronics & Communication Engineering** Part. The choice attempted should be marked by darkening the correct circle on OMR answer sheet, failing which OMR answer sheet will not be evaluated.

7. 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.

8. Do not fold answer sheet in any case.

9. No rough work is to be done on the Answer Sheet. Space for rough work has been provided in this booklet.

10. Mobile phones and wireless communication devices are completely banned in the examination hall/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature.

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

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.

उम्मीदवार का नाम/Name of Candidate : _____   उम्मीदवार के हस्ताक्षर/Signature of Candidate : _____

SEAL

SECTION - A

GENERAL APTITUDE

Choose the most appropriate option.

(Q.No. 01 to 13)

1. Which word does NOT belong with the others ?
   - (A) wing
   - (B) fin
   - (C) beak
   - (D) rudder

2. Suppose a fraud shopkeeper sells rice to the customer at the cost price, but he uses a false weight of 900 gm for a kg then his percentage gain is _____.
   - (A) 5.75%
   - (B) 5.56%
   - (C) 5.20%
   - (D) 5.00%

3. Let us consider the length of the side of a square represented by $2y + 3$. The length of the side of an equilateral triangle is $4y$. If the square and the equilateral triangle have equal perimeter, then what is the value of y ?
   - (A) 3
   - (B) 4
   - (C) 6
   - (D) 8

4. A software engineer has the capability of thinking 200 lines of code in five minutes and can type 200 lines of code in 10 minutes. He takes a break for five minutes after every ten minutes. How many lines of code will he complete typing after an hour ?
   - (A) 200
   - (B) 300
   - (C) 400
   - (D) 500

5. Look at this sequence SCD TEF UGH _____ WKL and find the missing sequence.
   - (A) CMN
   - (B) UJI
   - (C) VIJ
   - (D) IJT

6. Here are some words translated from any Language.

   dionot means oak tree

   blyonot means oak leaf

   blycrin means maple leaf

   Which word could mean "maple syrup" ?
   - (A) blymuth
   - (B) hupponot
   - (C) patricrin
   - (D) crinweel

7. If finch related to bird i.e. FINCH : BIRD. Then, find the pair that has a similar relationship.
   - (A) frog : toad
   - (B) elephant : reptile
   - (C) dalmatian : dog
   - (D) collie : marsupial

8. Candid is to indirect as honest is to :
   - (A) frank
   - (B) wicked
   - (C) truthful
   - (D) untruthful

SPACE FOR ROUGH WORK

9. Divide 88 into four parts such as first part known as a, second part b, third part c, and fourth part is d, when 5 is added to the first part, 5 is subtracted from the second part, 3 is multiplied by the third part and the fourth part is divided by 5, then all results are equal. Find the value of a, b, c and d respectively.

(A) 7, 17, 4, 60   (B) 8, 25, 5, 50
(C) 10, 30, 3, 45   (D) 17, 7, 4, 60

10. Look at this series : 25, 25, 37, 37, __, 51, . . .What number should fill the blank ?

(A) 51   (B) 39
(C) 23   (D) 25

11. Look at this series : 5000, 1001, 201, 41, . . . What number should come next ?

(A) 9   (B) 10
(C) 11   (D) 42

12. A construction company ready to finish a construction work in 180 days, hired 80 workers each working 8 hours daily. After 90 days, only 2/7 of the work was completed. How many workers are to be increased to complete the work on time ? Note : If additionally acquired workers do agree to work for 10 hours daily.

(A) 90 workers   (B) 80 workers
(C) 65 workers   (D) 85 workers

13. A Professor passed one sixth of his life in childhood, one twelfth in youth, and one seventh more as a bachelor; five years after his marriage a son was born who died four years before his father at half his final age, then what is the age of Professor ?

(A) 84 years   (B) 74 years
(C) 64 years   (D) 54 years

SECTION - B
ENGINEERING MATHEMATICS

Choose the most appropriate option.

(Q.No. 14 to 30)

14. While solving the differential equation $\dfrac{d^2y}{dx^2} + 4y = \tan 2x$ by the method of variation of parameters, then value of Wronskion (W) is :

(A) 1   (B) 2
(C) 3   (D) 4

15. If y^a is an integrating factor of the differential equation $2xy\,dx - (3x^2 - y^2)dy = 0$, then the value of a is :

(A) -4 (B) 4
(C) -1 (D) 1

16. The value of $\int_1^2 \int_0^{x^2} x\,dy\,dx$ is :

(A) $\dfrac{15}{4}$ (B) $\dfrac{5}{4}$

(C) $\dfrac{3}{4}$ (D) $\dfrac{2}{3}$

17. If $u = f(y - z, \quad z - x, \quad x - y)$, then $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z}$ is equal to :

(A) $x + y + z$ (B) $1 + x + y + z$
(C) 1   (D) 0

18. If $f(x) = k \exp\{-(9x^2 - 12x + 13)\}$, is a p.d.f. of a normal distribution (k, being a constant), the mean and standard deviation of the distribution :

(A) $\mu = \dfrac{2}{3}$, $\sigma = \dfrac{1}{3\sqrt{2}}$

(B) $\mu = 2$, $\sigma = \dfrac{1}{\sqrt{2}}$

(C) $\mu = \dfrac{1}{3}$, $\sigma = \dfrac{1}{3\sqrt{2}}$

(D) $\mu = \dfrac{2}{3}$, $\sigma = \dfrac{1}{\sqrt{3}}$

19. For the function $(z) = \dfrac{1}{z^2(e^z - 1)}$, $z = 0$ is a pole of order :

(A) 1

(B) 2

(C) 3

(D) None of these

20. The value of p such that the vector $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ is an eigen vector of the matrix $\begin{bmatrix} 4 & 1 & 2 \\ p & 2 & 1 \\ 14 & -4 & 10 \end{bmatrix}$ is :

(A) 15   (B) 16

(C) 17   (D) 18

21. If C is a non-singular matrix and $B = C \begin{bmatrix} 0 & x & y \\ 0 & 0 & z \\ 0 & 0 & 0 \end{bmatrix} C^{-1}$ then :

(A) $B^2 = I$

(B) $B^2 = $ Null Matrix

(C) $B^3 = I$

(D) $B^3 = $ Null Matrix

22. The following vectors (1, 9, 9, 8), (2, 0, 0, 8), (2, 0, 0, 3) are :

(A) Linearly dependent

(B) Linearly independent

(C) Constant

(D) None of these

23. The general solution of the partial differential equation $(D^2 - D'^2 - 2D + 2D')Z = 0$ where $D = \dfrac{\partial}{\partial x}$ and $D' = \dfrac{\partial}{\partial y}$:

(A) $f(y + x) + e^{2x} g(y - x)$

(B) $e^{2x} f(y + x) + g(y - x)$

(C) $e^{-2x} f(y + x) + g(y - x)$

(D) $f(y + x) + e^{-2x} g(y - x)$

24. The value of $\int_c \dfrac{2z^2 - 5}{(z+2)^2 (z^2+4)z^2}\,dz$,

(where c is the square with vertices $1+i$, $2+i$, $2+2i$, $i+2i$) is :

(A) 0

(B) πi

(C) $2\pi i$

(D) $4\pi i$

25. If $w = f(z) = u(x, y) + i\,v(x, y)$ is an analytic function, then $\dfrac{dw}{dz}$ is :

(A) $\dfrac{\partial u}{\partial x} - i\dfrac{\partial u}{\partial y}$

(B) $\dfrac{\partial u}{\partial x} + i\dfrac{\partial v}{\partial y}$

(C) $\dfrac{\partial u}{\partial x} - i\dfrac{\partial v}{\partial x}$

(D) $\dfrac{\partial u}{\partial x} + i\dfrac{\partial u}{\partial y}$

26. If $P(A \cap B) = \dfrac{1}{2}$, $P(\overline{A} \cap \overline{B}) = \dfrac{1}{2}$ and $2P(A) = P(B) = p$, then the value of p is given by :

(A) $\dfrac{1}{4}$

(B) $\dfrac{1}{2}$

(C) $\dfrac{1}{3}$

(D) $\dfrac{2}{3}$

27. Using Green's theorem in plane, evaluate $\int_c (2x - y)dx + (x + y)dy$, where c is the circle $x^2 + y^2 = 4$ in the plane :

(A) 2π

(B) 4π

(C) -4π

(D) 8π

28. A continuous random variable x is distributed over the interval [0, 2] with probability density function $f(x) = ax^2 + bx$, where a and b are constants. If the mean of the distribution is $\dfrac{1}{2}$. Find the values of the constants a and b.

(A) $a = 2, b = -\dfrac{13}{6}$

(B) $a = -\dfrac{15}{8}, b = 3$

(C) $a = -\dfrac{29}{6}, b = 2$

(D) $a = 3, b = -\dfrac{7}{2}$

29. If $2a + 3b + c = 0$, then at least one root of the equation $ax^2 + bx + c = 0$, lies in the interval :

(A) (0, 1)

(B) (1, 2)

(C) (2, 3)

(D) (1, 3)

30. The general solution of the differential equation

$\dfrac{dy}{dx} = (1 + y^2)\left(e^{-x^2} - 2x \tan^{-1} y\right)$ is :

(A) $e^{x^2} \tan^{-1} y = x + c$

(B) $e^{-x^2} \tan y = x + c$

(C) $e^x \tan y = x^2 + c$

(D) $e^{-x} \tan^{-1} y = x^3 + c$

SPACE FOR ROUGH WORK

SECTION - C

COMPUTER SCIENCE & INFORMATION TECHNOLOGY

Choose the most appropriate option.

(Q.No. 31 to 85)

31. Minimum _____ full adders and _____ half adders are required by the BCD adder to add two decimal digits.

    (A) 3, 2
    (B) 9, 4
    (C) 6, 5
    (D) 5, 2

32. Given message M = 1010001101. The CRC for this given message using the divisor polynomial $x^5 + x^4 + x^2 + 1$ is _____.

    (A) 01011
    (B) 10101
    (C) 01110
    (D) 10110

33. Dijkstra's algorithm is based on :

    (A) Greedy Approach
    (B) Dynamic programming
    (C) Backtracking paradigm
    (D) Divide and conquer paradigm

34. Which of the following languages over the alphabet {0,1} is described by the given regular expression : (0+1)*1(0+1)*1 ?

    (A) The set of all strings containing the substring 11.
    (B) The set of all strings containing at most two 1's.
    (C) The set of all strings containing at least two 1's.
    (D) The set of all strings that begins and ends with only 0.

35. For a given hash table T with 10 slots that stores 1000 elements, the load factor α for T is _____.

    (A) 100
    (B) 0.01
    (C) 200
    (D) 1.05

36. Identify the true statement from the given statements.

    (1) HTTP may use different TCP connection for different objects of a webpage if non-persistent connections are used.

    (2) FTP uses two TCP connections, one for data and another control.

    (3) TELNET and FTP can only use TWO connection at a time.

    (A) (1)
    (B) (1) and (2)
    (C) (2) and (3)
    (D) (1), (2) and (3)

37. Identify the total number of tokens in the given statement **printf("A%B = ",&i);**

    (A) 7
    (B) 8
    (C) 9
    (D) 13

38. _____ number of queues are needed to implement a stack.

    (A) 1
    (B) 2
    (C) 3
    (D) 4

39. For the given nodes :

89, 19, 50, 17, 12, 15, 2, 5, 7, 11, 6, 9, 100

Minimum _____ number of interchanges are needed to convert it into a max-heap.

(A) 3
(B) 4
(C) 5
(D) 6

40. The smallest element that can be found in time _____ in a binary max heap.

(A) O(nlogn)
(B) O(logn)
(C) O(n)
(D) O(n^2)

41. _____ is the worst-case time complexity for all operations (i.e. search, update and delete) in a general Binary Search Tree.

(A) O(n)

(B) O(nLogn)

(C) O(Logn) for search and insert, and O(n) for delete

(D) None of these

42. Which of the following code replacements is an example of operator strength reduction ?

(A) Replace P^2 by P*P

(B) Replace P*16 by P << 4

(C) Replace pow(P, 3) by P*P*P

(D) Replace (P <<5) − P by P*3

43. _____ IP address can be used in WAN.

(A) 256.0.0.1

(B) 172.16.0.10

(C) 15.1.5.6

(D) 127.256.0.1

44. The following table has two attributes X and Y where X is the primary key and Y is the foreign key referencing X with on-delete cascade.

X	Y
2	4
3	4
4	3
5	2
7	2
9	5
6	4

The set of all tuples that must be additionally deleted to preserve referential integrity when the tuple (3, 4) is deleted is :

(A) (4, 3) and (6, 4)

(B) (2, 4) and (7, 2)

(C) (3, 2) and (9, 5)

(D) (3, 4), (4, 3) and (6, 4)

45. _____ transport layer protocol is used to support electronic mail.

(A) SNMP
(B) IP
(C) SMTP
(D) TCP

46. _____ sorting algorithms has the lowest worst-case complexity.

   (A)   Selection Sort

   (B)   Bubble Sort

   (C)   Merge Sort

   (D)   Quick Sort

47. Baud rate measures the number of _____ transmitted per second.

   (A)   Symbols

   (B)   Bits

   (C)   Byte

   (D)   None of these

48. Evaluation of the given postfix expression 10 10 + 60 6/* 8 − is :

   (A)   192   (B)   190

   (C)   110   (D)   92

49. Identify the subnet mask for the given direct broadcast address of subnet is 201.15.16.31.

   (A)   255.255.192.192

   (B)   255.255.255.198

   (C)   255.255.255.240

   (D)   255.255.257.240

50. Decreasing the RAM causes _____.

   (A)   Fewer page faults

   (B)   More page faults

   (C)   Virtual memory get increases

   (D)   Virtual memory get decreases

51. $(A+C')(B'+C')$ simplifies to _____.

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

   (C) $BC' + A$ (D) $AB' + C'$

52. _____ is used to convert from recursive to iterative implementation of an algorithm.

   (A)   Array   (B)   Tree

   (C)   Stack   (D)   Queue

53. Identify the true statement from the given statements.

   (1)   Lossless, dependency-preserving Decomposition into 3 NF is always possible.

   (2)   Any relation with two attributes is in BCNF.

   (A)   (1)

   (B)   (2)

   (C)   (1) and (2)

   (D)   None of these

54. _____ pairs of traversals is not sufficient to build a binary tree.

   (A)   Preorder and Inorder

   (B)   Postorder and Inorder

   (C)   Postorder and Preorder

   (D)   None of these

55. Find the effective access time for the memory for the given data.

Page fault service time = 8 ms

Average memory access time = 20 ns

One page fault is generated for every memory access = 10^6

(A) 29 ns   (B) 33 ns

(C) 28 ns   (D) 30 ns

56. For the given recurrence equation

T(n)=2T(n-1), if n>0

= 1, otherwise

(A) O(nlogn)   (B) $O(n^2)$

(C) $O(2^n)$ (D) O(n)

57. _____ symbol is used to denote derived attributes in ER Model.

(A) Dashed ellipse

(B) Squared ellipse

(C) Ellipse with attribute name underlined

(D) Rectangular Box

58. _____ is NOT a part of the ACID properties.

(A) Inconsistency

(B) Consistency

(C) Atomicity

(D) Isolation

59. Among all given option, _____ must reside in the main memory.

(A) Assembler   (B) Compiler

(C) Linker   (D) Loader

60. Time to Live (TTL) field in the IP datagram is used _____.

(A) to optimize throughput

(B) to prevent packet looping

(C) to reduce delays

(D) to prioritize packets

61. Maximum number of superkeys for the relation schema R(X, Y, Z, W) with X as the key is :

(A) 6   (B) 8

(C) 9   (D) 12

62. If the period of a signal is 100 ms. Then its frequency in Hertz is _____.

(A) 10   (B) 100

(C) 1000   (D) 10000

63. In a system, counting semaphore was initialized to 10. Then 6 P (wait) operations and 4 V (signal) operations were completed on this semaphore. So _____ is the final value of the semaphore.

(A) 7   (B) 8

(C) 13   (D) 12

SPACE FOR ROUGH WORK

64. Identify the correct nodes and edges in the given intermediate code :

    (1)   i = 1

    (2)   t1 = 5*i

    (3)   t2 = 4*t1

    (4)   t3 = t2

    (5)   a[t3] = 0

    (6)   i = i + 1

    (7)   if i < 15 goto(2)

    (A) 33   (B) 44

    (C) 43   (D) 34

65. _____ number of gates are required to implement the Boolean function $(AB + C)$ with using only 2-input NOR gates.

    (A) 2   (B) 3

    (C) 4   (D) 5

66. A RAM chip has a capacity of 1024 words of 8 bits each $(1K \times 8)$. The number of 2×4 decoders with enable line needed to construct a $32K \times 8$ RAM from $1K \times 8$ RAM is :

    (A) 4   (B) 5

    (C) 6   (D) 7

67. _____ number of undirected graphs can be constructed using $V = (v1, v2, \ldots vn)$.

    (A) n^3 (B) $2^{n(n-1)/2}$

    (C) $n - 1/2$ (D) $2^{(n-1)/2}$

68. The language $\{W^a\ X^b\ Y^{a+b} \mid a, b \geq 1\}$ is :

    (A) Regular

    (B) Context-free but not regular

    (C) Context sensitive but not context free

    (D) Type-0 but not context sensitive

69. _____ to evaluate an expression without any embedded function calls.

    (A) Two stacks are required

    (B) One stack is needed

    (C) Three stacks are required

    (D) More than three stacks are required

70. _____ number of leaf nodes in a rooted tree of n nodes, where each node is having 0 or 3 children.

    (A) $\dfrac{n}{2}$ (B) $\dfrac{(2n + 1)}{3}$

    (C) $\dfrac{(n - 1)}{n}$ (D) $(n-1)$

71. In the Given language L = {ab, aa, baa}, _____ number of strings are in L*.

    (1)   baaaba

    (2)   aabaaaa

    (3)   baaabaaaabaa

    (4)   baaabaaa

    (A) (1)   (B) (2)

    (C) (3)   (D) (4)

72. Identify the true statement from the given statements. Program relocation at run time :
   (1) requires transfer complete block to some memory locations.
   (2) requires both base address and relative address.
   (3) requires only absolute address.
   (A) (1)
   (B) (1) and (2)
   (C) (1), (2) and (3)
   (D) (1) and (3)

73. _____ is holding an entry for each terminal symbol and is acting as permanent database.
   (A) Variable Table
   (B) Terminal Table
   (C) Keyword Table
   (D) Identifier Table

74. In the given truth table, $f(x, y)$ represent the Boolean function.

x	y	$f(x, y)$
0	0	1
0	1	0
1	0	0
1	1	1

   (A) $x \leftrightarrow y$
   (B) $x \wedge y$
   (C) $x \vee y$
   (D) $x \rightarrow y$

75. The context free grammar $S \rightarrow aSb \mid bSa \mid \varepsilon$ generates :
   (A) Equal number of a's and b's
   (B) Unequal number of a's and b's
   (C) Any number of a's followed by any number of b's
   (D) Any number of b's followed by any number of a's

76. In the disk, swap space is used to _____.
   (A) Save XML files
   (B) Save process data
   (C) Save drivers
   (D) Save HTML files

77. Consider the following Finite State Automaton. The language accepted by this automaton is given by the regular.
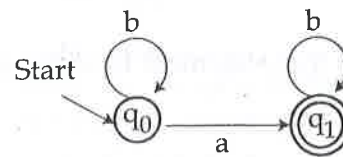
   (A) ab*b*
   (B) a*b*
   (C) b*b
   (D) b*ab*

78. Identify the true statement from the given statements :
   (1) A recursive formal language is a recursive subset in the set of all possible words over the alphabet of the language.
   (2) The complement of a recursive language is recursive.
   (3) The complement of a context-free language is context-free.
   (A) Only (1)
   (B) (1) and (2)
   (C) (1), (2) and (3)
   (D) (2) and (3)

79. Identify the true statement from the given statements.

   (1)   FIFO is non-preemptive.

   (2)   Round robin is non-preemptive.

   (3)   Multilevel Queue Scheduling is non-preemptive.

   (A)   (1)   (B)   (1) and (2)

   (C)   (1), (2) and (3)   (D)   (2)

80. Identify the true statement from the given statements.

   (1)   Number of child pointers in a B/B+tree node is always equal to number of keys in it plus one.

   (2)   B/B+tree is defined by a term minimum degree. And minimum degree depends on harddisk block size, key and address sizes.

   (A)   (1)

   (B)   (1) and (2)

   (C)   (2)

   (D)   None of these

81. The ALU uses _____ to store intermediate result.

   (A)   Cache   (B)   Registers

   (C)   Accumulators   (D)   Stack

82. Consider the following functional dependencies in a database :

   $A \rightarrow B$
   $B \rightarrow C$
   $D \rightarrow E$
   $E \rightarrow D$
   $F \rightarrow G$
   $F \rightarrow H$
   $(E, F) \rightarrow I$

   The relation (E, D, A, B) is :

   (A)   2 NF

   (B)   3 NF

   (C)   BCNF

   (D)   None of the above

83. The hexadecimal representation of $(632)_8$ is :

   (A)   19A   (B)   198

   (C)   29A   (D)   291

84. The process executes the following code and after execution _____ number of child process get created.

   fork();
   fork();
   fork();
   fork();

   (A)   4   (B)   1

   (C)   15   (D)   16

85. _____ merges the bodies of two loops.

   (A)   loop rolling

   (B)   loop folding

   (C)   loop merge

   (D)   loop jamming

SEAL

Choose the most appropriate option.

(Q.No. 31 to 85)

31. The voltage e_0 is indicated in the figure has been measured by an ideal voltmeter. Which of the following can be calculated ?
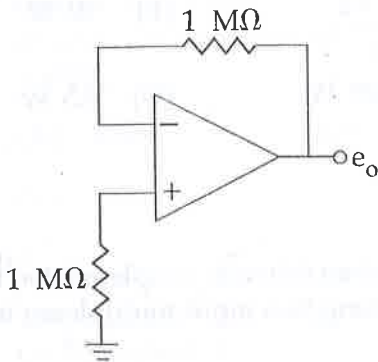
(A) Bias current of the inverting input only

(B) Bias current of the inverting and non-inverting inputs only

(C) Input offset current only

(D) Both the bias currents and the input offset current

32. The concentration of minority carriers in an extrinsic semiconductor under equilibrium is :

(A) Directly proportional to doping concentration

(B) Inversely proportional to the doping concentration

(C) Directly proportional to the intrinsic concentration

(D) Inversely proportional to the intrinsic concentration

33. For an npn transistor connected as shown in figure $V_{BE} = 0.7$ volts. Given that reverse saturation current of the junction at room temperature 300 K is 10^{-13}A, the emitter current is :
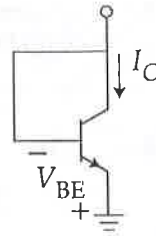
(A) 30 mA   (B) 39 mA

(C) 49 mA   (D) 20 mA

34. Generally, the gain of a transistor amplifier falls at high frequencies due to the :

(A) internal capacitances of the device

(B) coupling capacitor at the input t

(C) skin effect

(D) coupling capacitor at the output

35. Many circles are drawn in a Smith Chart used for transmission line calculations. The circles shown in the figure represent :
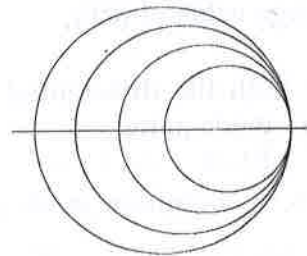
(A) Unit circles

(B) Constant resistance circles

(C) Constant reactance circles

(D) Constant reflection coefficient circles

36. Consider the Bode magnitude plot shown in the fig. The transfer function H(s) is :

20 log H(jω)

−20 dB/sec
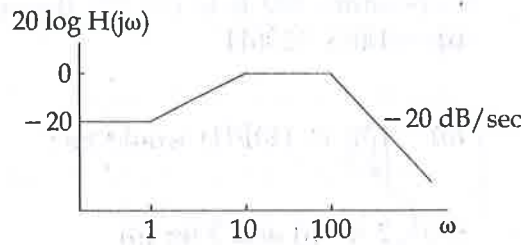
(A) $\dfrac{(s+10)}{(s+1)(s+100)}$

(B) $\dfrac{10(s+1)}{(s+10)(s+100)}$

(C) $\dfrac{10^2(s+1)}{(s+10)(s+100)}$

(D) $\dfrac{10^3(s+100)}{(s+1)(s+10)}$

37. In an ideal differential amplifier shown in the figure, a large value of (RE).

(A) increase both the differential and common - mode gains

(B) increases the common mode gain only

(C) decreases the differential mode gain only

(D) decreases the common mode gain only

38. The maximum power that can be transferred to the load resistor RL from the voltage source in the figure is :

100 Ω

10 V

R_L
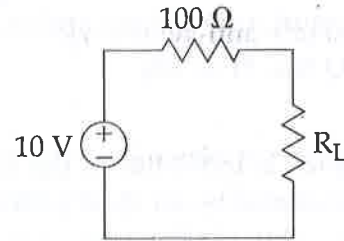
(A) .1 W   (B) 10 W

(C) 0.25 W   (D) 0.5 W

39. The Boolean function f implemented in the figure using two input multiplexes is :

O—0
A—1   MUX —f

C—0
$\overline{C}$—1   MUX

B
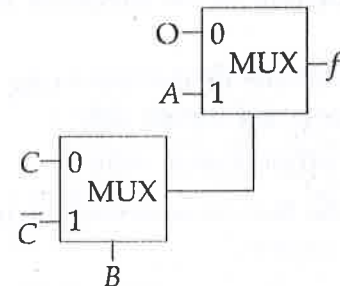
(A) $A\overline{B}C + AB\overline{C}$

(B) $ABC + A\overline{B}\overline{C}$

(C) $\overline{A}BC + \overline{A}B\overline{C}$

(D) $AB\overline{C} + \overline{A}BC$

SPACE FOR ROUGH WORK

40. The Fourier transform of a conjugate symmetric function is :

(A) imaginary

(B) conjugate anti-symmetric

(C) real

(D) conjugate symmetric

41. Which of the following analog modulation scheme requires the minimum transmitted power and minimum channel band width ?

(A) VSB   (B) DSB-SC

(C) SSB   (D) AM

42. The cascade amplifier is a multistage configuration of :

(A) $CC - CB$

(B) $CE - CB$

(C) $CB - CC$

(D) $CE - CC$

43. As x increased from -3 to 3, the function

$$f(x) = \frac{e^x}{1+e^x}$$

(A) monotonically increases

(B) monotonically decreases

(C) increases to a maximum value and then decreases

(D) decreases to a minimum value and then increases

44. The number of memory cycles required to execute the following 8085 instructions

(i) LDA 3000H

(ii) LXI D, FOF1H would be :

(A) 2 for (i) and 2 for (ii)

(B) 4 for (i) and 3 for (ii)

(C) 3 for (i) and 3 for (ii)

(D) 3 for (i) and 4 for (ii)

45. The function $x(t)$ is shown in the figure. Even and odd parts of a unit step function $u(t)$ are respectively,
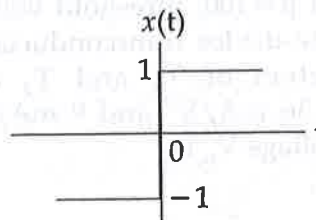
(A) $1/2$, $1/2\ x(t)$

(B) $-1/2$, $1/2\ x(t)$

(C) $\frac{1}{2}$, $-1/2\ x(t)$

(D) $-1/2$, $-1/2$

46. The value of C required for sinusoidal oscillation of frequency 1 kHz in the circuit of fig. is :
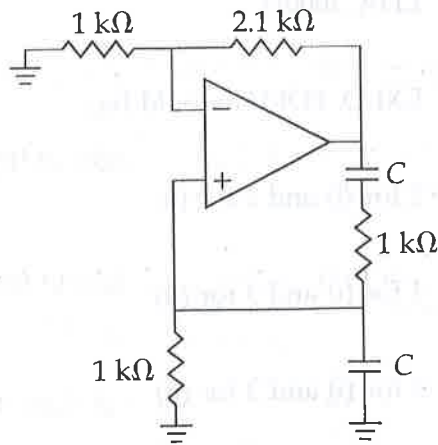
(A) $\dfrac{1}{2\pi}\,\mu F$

(B) $2\pi\,\mu F$

(C) $\dfrac{1}{2\pi\sqrt{6}}\,\mu F$

(D) $2\pi\sqrt{6}\,\mu F$

47. Both transistors T_1 and T_2 shown in the figure, have a $\beta = 100$, threshold voltage of 1 Volt. The device transconductance (kn) parameters of T_1 and T_2 are, respectively, 36 mA/V^2 and 9 mA/V^2. The output voltage V_o is :
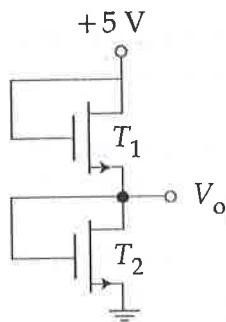
(A) 1 V

(B) 2 V

(C) 3 V

(D) 4 V

48. The forward-path transfer of a Ufb control system is :

$$G(s) = \frac{1000}{(1+0.1s)(1+10s)}$$

The step, ramp, and parabolic error constants are :

(A) 0,1000,0

(B) 1000,0,0

(C) 0,0,0

(D) 0,0,1000

49. The first and the last critical frequencies (singularities) of a driving point impedance function of a passive network having two kinds of elements, are a pole and a zero respectively. The above property will be satisfied by :

(A) RL network only

(B) RC network only

(C) LC network only

(D) RC as well as RL networks

50. Consider the following statements S1 and S2 :

S1 : The β of a bipolar transistor reduces if the base width is increased.

S2 : The β of a bipolar transistor increases if the doping concentration in the base is increased.

Which remarks of the following is **correct** ?

(A) S1 is FALSE and S2 is TRUE

(B) Both S1 and S2 are TRUE

(C) Both S1 and S2 are FALSE

(D) S1 is TRUE and S2 is FALSE

SPACE FOR ROUGH WORK

51. The Boolean expression for the truth table shown is for D.

A	B	C	D
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

(A) $B(A+C)(\overline{A}+\overline{C})$

(B) $B(A+\overline{C})(\overline{A}+C)$

(C) $\overline{B}(A+\overline{C})(\overline{A}+C)$

(D) $\overline{B}(A+C)(\overline{A}+\overline{C})$

52. For the circuit shown in the figure, Thevenin's voltage and Thevenin's equivalent resistance at terminals a - b is
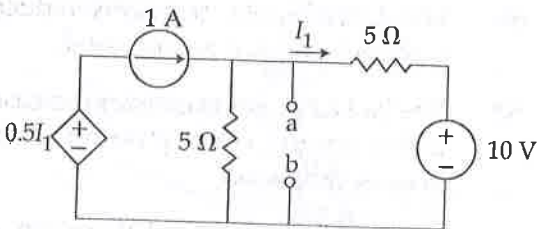
(A) 5 V and 2 ohm

(B) 7.5 V and 2.5 ohm

(C) 4 V and 2 ohm

(D) 3 V and 2.5 ohm

53. The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the TE_{10} mode is :

(A) equal to its group velocity

(B) less than the velocity of light in free space

(C) equal to the velocity of light in free space

(D) greater than the velocity of light in free space

54. For the Silicon Transistor in circuit shown in fig., $\beta=200$. Determine the value of I_C & V_{CE} for value of $V_B=0$ in question.
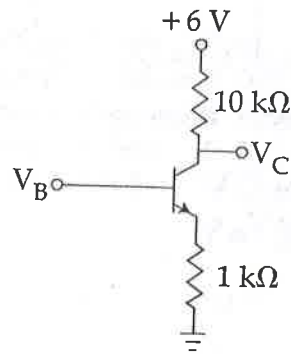
(A) 6.43 mA, 2.4 V

(B) 2.18 mA, 3.4 V

(C) 0 A, 6 V

(D) 1 A, 5.5 V

SPACE FOR ROUGH WORK

55. A master-slave flip-flop has the characteristic that :

(A) change in the output immediately reflected in the output

(B) change in the output occurs when the state of the master is affected

(C) change in the output occurs when the state of the slave is affected

(D) both the master and the slave states are affected at the same time

56. The circuit shown in fig. has been kept opened for a long time before closing at $t < 0$. The initial condition is $v(0) = 2$ V. The $v(t)$ for $t >$ is :
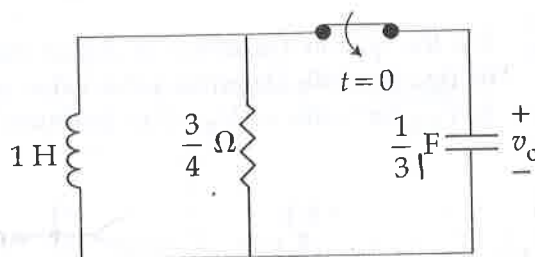
(A) $5e^{-t} - 7e^{-3t}$ V

(B) $7e^{-t} - 5e^{-3t}$ V

(C) $-e^{-t} + 3e^{-3t}$ V

(D) $3e^{-t} - e^{-3t}$ V

57. A 1 kHz sinusoidal signal is ideally sampled at 1500 samples/sec and the sampled signal is passed through an ideal low-pass filter with cut-off frequency 800 Hz. The output signal has the frequency.

(A)   zero Hz   (B)   0.75 kHz

(C)   0.5 kHz   (D)   0.25 kHz

58. Consider the sequence of 8085 instructions given below :

LXI H, 9258

MOV A, M CMA MOV M, A; Which one of the following is performed by this sequence ?

(A) Contents of location 9258 are moved to the accumulator

(B) Contents of location 9258 are compared with the contents of the accumulator

(C) Contents of location 8529 are complemented and stored in location

(D) Contents of location 5892 are complemented and stored in location 5892

59. The distribution function $F_x(x)$ of a random variable x is shown in the figure.

The probability that $x = 1$ is :
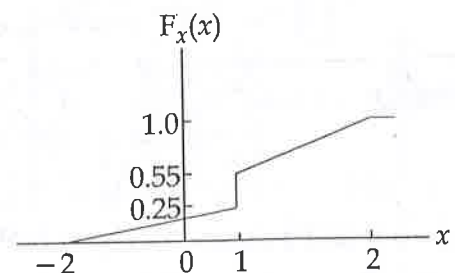
(A)   0   (B)   0.25

(C)   0.55   (D)   0.30

60. Under low level injection assumption, the injected minority carrier current for an extrinsic semiconductor is essentially the :

    (A) Diffusion current

    (B) Drift current

    (C) Recombination current

    (D) Induced current

61. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor :

    (A) 8/16

    (B) 12

    (C) 16

    (D) 8

62. The circuit using a BJT with $\beta = 50$ and $V_{BE} = 0.7$ V is shown in the figure. The base current I_B and collector voltage by V_C are respectively :
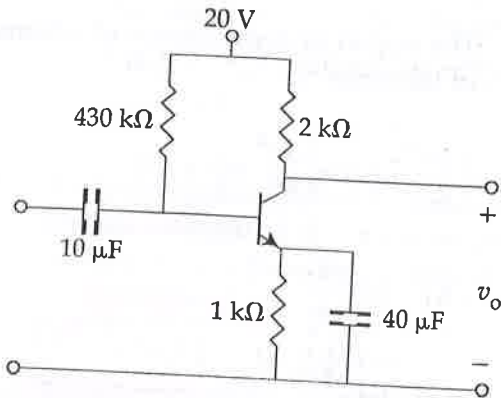
    (A) 43 mA and 11.4 Volts

    (B) 40 mA and 16 Volts

    (C) 45 mA and 11 Volts

    (D) 50 mA and 10 Volts

63. A digital system is required to amplify a binary-encoded audio signal. The user should be able to control the gain of the amplifier from minimum to a maximum in 100 increments. The minimum number of bits required to encode, in straight binary, is :
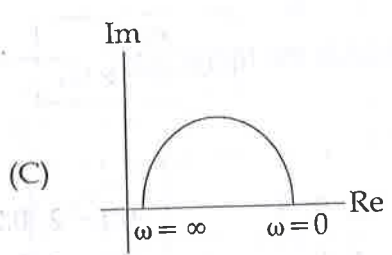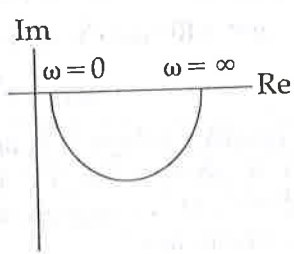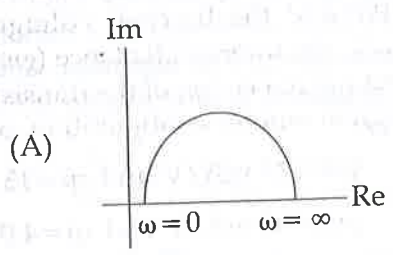
    (A) 8

    (B) 6

    (C) 5

    (D) 7

64. The circuit in the figure is a :
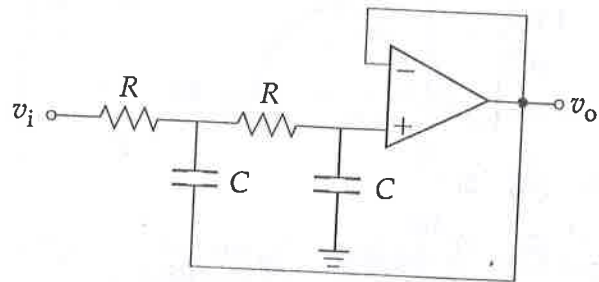
    (A) low-pass filter

    (B) high-pass filter

    (C) band-pass filter

    (D) band-reject filter

SPACE FOR ROUGH WORK

65. Which one of the following polar diagrams corresponds to a lag network ?

(A)

Im, ω=0, ω=∞, Re

(B)

Im, ω=0, ω=∞, Re

(C)

Im, ω=∞, ω=0, Re

(D)

Im, ω=∞, ω=0, Re
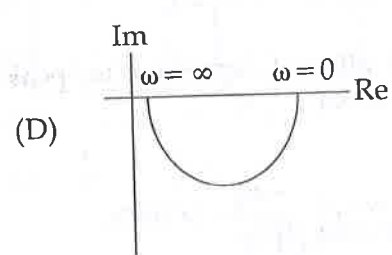
66. A system has poles at 0.1 Hz, 1 Hz and 80 Hz; zeros at 5 Hz, 100 Hz and 200 Hz. The approximate phase of the system response at 20 Hz is :

(A) $-90°$

(B) $0°$

(C) $90°$

(D) $-180°$

67. Consider the following loop

LXI H, 000AH

LOOP: DCX B

MOV A, B

ORA C

JNZ LOOP

This loop will be executed :

(A) 1 time

(B) 10 times

(C) 11 times

(D) Infinite times

68. The open-loop function of a unity-gain feedback control system is given by :

$$G(s)= -\frac{k}{(s+1)(s+2)}$$
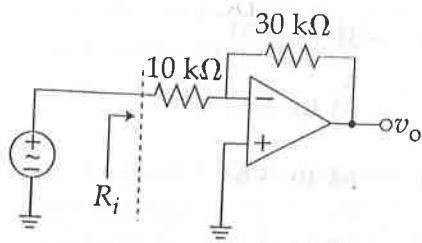
The gain margin of the system in dB is given by :

(A) 0

(B) 1

(C) 2

(D) Infinite

69. The region of convergence of z-transform of the sequence :

$$\left(\frac{5}{6}\right)^n u(n)-\left(\frac{6}{5}\right)^n u(-n-1)$$

(A) $|z|<\frac{5}{6}$

(B) $|z|>\frac{5}{6}$

(C) $\frac{5}{6}<|z|<\frac{6}{5}$

(D) $\frac{5}{6}<|z|<\infty$

SPACE FOR ROUGH WORK

SCB

70. The input resistance R_i of the amplifier shown in the figure is :

(A) 30/4 kΩ

(B) 10 kΩ

(C) 40 kΩ

(D) Infinite

71. If the differential voltage gain and the common mode voltage gain of differential amplifier are 48 dB and 2 dB respectively, then common mode rejection ratio is :

(A) 23 dB

(B) 25 dB

(C) 46 dB

(D) 50 dB

72. A PD controller is used to compensate a system. Compared to the uncompensated system, the compensated system has :

(A) a higher type number

(B) reduced damping

(C) higher noise amplification

(D) larger transient overshoot

73. A bipolar transistor is operating in the active region with a collector current of 1 mA. Assuming that the β of the transistor is 100 and the thermal voltage (VT) is 25 mV, the transconductance (gm) and the input resistance (rp) of the transistor in the common emitter configuration, are :

(A) $gm = 25$ mA/V and $rp = 15.625$ kW

(B) $gm = 40$ mA/V and $rp = 4.0$ kW

(C) $gm = 25$ mA/V and $rp = 2.5$ kW

(D) $gm = 40$ mA/V and $rp = 2.5$ kW

74. The positive values of K and a so that the system shown in the figures below oscillates at a frequency of 2 rad/sec respectively are :
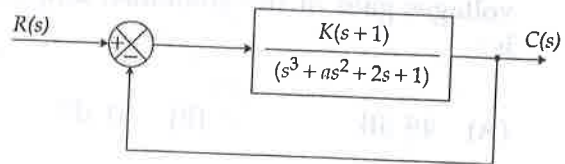
(A) 1, 0.75

(B) 2, 0.75

(C) 1, 1

(D) 2, 2

75. Derivation of expression for peak percent overshoot :

$$M_p = \exp\left(\frac{-\pi\xi}{\sqrt{1-\xi^2}}\right) \times 100\%$$

(A) System is linear and time invariant.

(B) The system transfer function has a pair of complex conjugate poles and no zeroes.

(C) There is no transportation delay in the system.

(D) The system has zero initial conditions.

SPACE FOR ROUGH WORK

SCB

76. The present output Qn of an edge triggered JK flip-flop is logic 0. If $J=1$, then $Qn+1$:

(A) Cannot be determined

(B) will be logic 0

(C) will be logic 1

(D) will wave around

77. Three identical amplifiers with each one having a voltage gain of 50, input t resistance of 1 kW and output resistance of 250 W are cascaded. The opened circuit voltages gain of the combined amplifier is :

(A) 49 dB   (B) 51 dB

(C) 98 dB   (D) 102 dB

78. In a negative feedback amplifier using voltage-series (i.e. voltage-sampling, series mixing) feedback.

(A) R_i decreases and R_0 decreases

(B) R_i decreases and R_0 increases

(C) R_i increases and R_0 decreases

(D) R_i increases and R_0 increases

(R_i and R_0 denote the input t and output resistance respectively)

79. The range of signed decimal numbers that can be represented by 6-bits 1 is complement number is :
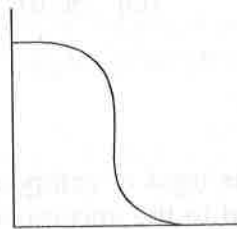
(A) -31 to $+31$

(B) -63 to $+63$

(C) -64 to $+63$

(D) -32 to $+31$

80. The power in the signal $s(t) = 8\cos\left(20\pi - \dfrac{\pi}{2}\right) + 4\sin(15\pi t)$ is :

(A) 40   (B) 41

(C) 42   (D) 82

81. Given figure is the voltage transfer characteristics of :

(A) an NOMS inverter with enhancement mode transistor as load

(B) an NMOS inverter with depletion mode transistor as load

(C) a CMOS inverter

(D) a BJT inverter

82. Consider the following statements S1 and S2 :

S1 : At the resonant frequency the impedance of a series RLC circuit is zero.

S2 : In a parallel GLC circuit, increasing the conductance G results in increase in its Q factor.

Which one of the following is **correct** ?

(A) S1 is FALSE and S2 is TRUE

(B) Both S1 and S2 are TRUE

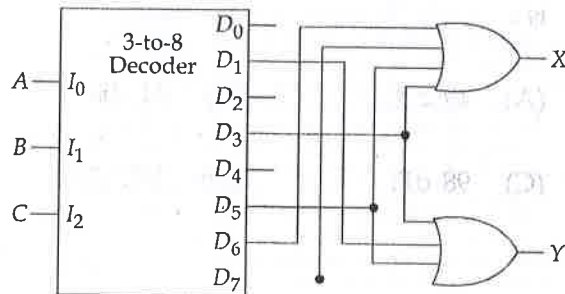(C) S1 is TRUE and S2 is FALSE

(D) Both S1 and S2 are FALSE

83. Despite the presence of negative feedback, control systems still have problems of instability because the :

(A) Components used have non-linearities.

(B) Dynamic equations of the subsystem are not known exactly.

(C) Mathematical analysis involves approximations.

(D) System has large negative phase angle at high frequencies.

84. The impurity commonly used for realizing the base region of a silicon *n-p-n* transistor is :

(A) Gallium

(B) Indium

(C) Boron

(D) Phosphorus

85. The building block shown in fig. is an active high output decoder. The output X is :

(A) $AB + BC + CA$

(B) ABC

(C) $A + B + C$

(D) 1

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