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**NIELIT**  
**Previous Year Paper**  
**Scientist B 4 Dec**  
**2016 (Electronics &**  
**Telecommunications)**



**(EC/T)**

पुस्तकांक/Booklet No.:

**204169****परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET****परीक्षा पुस्तिका शृंखला / Test Booklet Series: A**निर्धारित समय : 3 घंटे ( दृष्टिवाचित उम्मीदवारों के लिए : 4 घंटे )  
Time Allowed : 3 Hours (For V.H. Candidates : 4 Hours)गेल नं. \_\_\_\_\_  
Roll No. :अधिकतम अंक : 120  
Maximum Marks : 120उत्तरप्रीति सं. : \_\_\_\_\_  
Answer Sheet No. :

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें, इस पुस्तिका में प्रश्न अंगूजी 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**

- प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका को जाँच करके देख सें कि इसमें पूरे पृष्ठ (1-16) हैं तथा कोई पृष्ठ या उसका भाग कम या दुखाया तो नहीं आ गया है। उम्मीदवारों को यह भी जाँच करनी है कि उनको केवल उस सूची की परीक्षा-पुस्तिका मिली है जिसके लिए उन्होंने अनेक अलैन किया है अथवा कंप्यूटर साइंस / इंजीनियरिंग भाग या सूचना प्रौद्योगिकी भाग या इलेक्ट्रॉनिक्स और कम्युनिकेशन / टेलीकम्युनिकेशन भाग या ऐलेक्ट्रॉनिक्स / एलेक्ट्रॉनिक्स और इलेक्ट्रॉनिक्स भाग। यदि आप इस पुस्तिका में कोई त्रुटी पाएं तो सत्काल इसके बदले दूसरी पुस्तिका ले सें।
- निरीक्षक द्वारा आपको ओ एम् आर उत्तर-शीट अलग से दी जाएगी। ओ एम् आर उत्तर-शीट में विवरण भरने से पहले, आपको ओ एम् आर उत्तर शीट पर चुनित अनुदेशों की सावधानीपूर्वक पढ़ना चाहिए। अपको ओ एम् आर उत्तर-पुस्तिका में दिए गए अनुदेशों के अनुग्रह सावधानी पूर्वक उसमें विवरण और कोड लिखने चाहिए। प्रश्नों के उत्तर सामन्तरिक रूप में लिखना आरंभ करने से पहले आपको ओ एम् आर उत्तर-पुस्तिका में निर्धारित स्थान पर अपने इस्ताशर करने चाहिए। इन अनुदेशों का पूर्ण अनुपालन किया जाना चाहिए, ऐसा न किये जाने पर आपको ओ एम् आर उत्तर-शीट का मूल्यांकन नहीं किया जायेगा। (दूसरीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दुष्टिहीन उम्मीदवारों को ओ एम् आर उत्तर-शीट में निर्धारित स्थान पर अपने चारे साथ के अंगूठे का निशान अंकव्यवस्था दियिए। इसके अतिरिक्त, जो दुष्टिहीन उम्मीदवार अपना इस्ताशर कर सकते हैं, वे अंगूठे के निशान के अलावा अपने इस्ताशर भी करें।)
- इस प्रश्न-पुस्तिका में 120 चुनिकल्पीय प्रश्न हैं, प्रत्येक प्रश्न के 4 विकल्प दिए गए हैं (A), (B), (C) और (D) प्रत्येक प्रश्न का केवल एक विकल्प ही सही उत्तर है। यदि आपको एक से अधिक विकल्प सही लगें तो सबसे अधिक अनेक विकल्प का चुनाव करें और उत्तर पुस्तिका में प्रश्न के गामी वाले उपर्युक्त गोले को काला करें।
- प्रत्येक सही उत्तर के लिए 1 अंक दिया जाएगा, गलत देने पर 0.25 अंक काट दिया जाएगा।
- उम्मीदवार को दोनों भाग अंगीकार्य रूप में हल करने हैं।
- गोले को काला करने के लिए केवल काले/नीले बाल प्लाईट फैन का प्रयोग करें। गोले को एक भाग काला करने के बाद इसको मिटाने या बदलने की अनुमति नहीं है। यदि विनायी प्रश्न के साथने एक से ज्यादा गोले काले किये गए हों तो यहांना द्वारा उत्तर लिए शून्य अंक दिया जाएगा।
- किसी भी स्थिति में उत्तर शीट को न मोड़ें।
- कोई रुक्का कार्य उत्तर-पुस्तिका पर नहीं करना है। रुक्का कार्य के लिए इस पुस्तिका में स्थान दिया गया है।
- परीक्षा हाँस/कमरों में पोकेटल फ्रोन तथा बैतार संचार साधन पूरी तरह निपिछ हैं, उम्मीदवारों को इनके अपने हिस में स्थान दी जाती है कि फोटोल फ्रोन/किरी अन्व बैतार संचार साधन को स्विच ऑफ करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग यानि जायेगा और उनके विरुद्ध कार्यवाही की जाएगी, जिसमें उनकी उम्मीदवारी रद्द करना भी शामिल है।
- परीक्षार्थी को अपनी उत्तर-पुस्तिका शीट निरीक्षक को सौंपे जिनमें उनके उपर्युक्त पत्रिका पर हस्ताशर किये जाना परीक्षा हाँस/कमरा नहीं छोड़ना चाहिए, ऐसा नहीं करने पर अद्योत्य घोषित कर दिया जाएगा।

**जब तक आप से 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 हस्ताशर/Signature of Candidate :

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## SECTION - A

### General Aptitude

Choose the most appropriate option.

#### Direction Q.No. 1 - 2 :

In the following questions choose the word opposite in meaning to the given word.

1. Antagonism :

(A) Cordiality      (B) Animosity  
(C) Hostility      (D) Enmity

2. Hasten :

(A) Dash      (B) Dawdle  
(C) Hurry      (D) Scurry

#### Direction Q.No. 3 - 4 :

In the following questions, out of the four alternatives, choose the one which best expresses the meaning of the given word.

3. Camouflage :

(A) Disguise      (B) Cover  
(C) Demonstrate      (D) Fabric

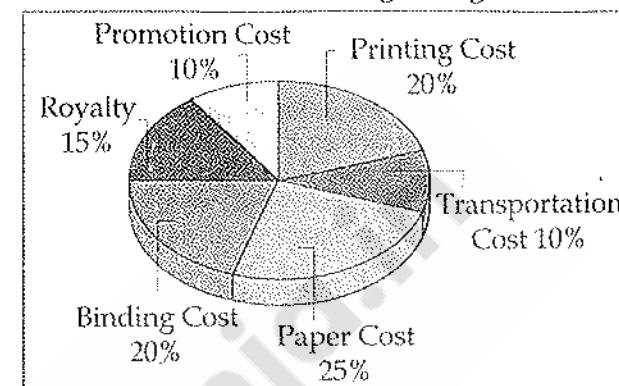
4. Yearn :

(A) Deny      (B) Accept  
(C) Confront      (D) Crave

#### Direction 5 - 8 :

The following pie-chart shows the percentage distribution of the expenditure incurred in publishing a magazine. Study the pie-chart and answer the questions based on it.

Various Expenditures (in percentage)  
Incurred in Publishing a Magazine



5. What is the central angle of the sector corresponding to the expenditure incurred on Royalty ?

(A)  $15^\circ$       (B)  $24^\circ$   
(C)  $54^\circ$       (D)  $48^\circ$

6. The price of the magazine is marked 20% above the C.P. If the marked price of the magazine is ₹ 180, then what is the cost of the paper used in a single copy of the magazine ?

(A) ₹ 36      (B) ₹ 37.50  
(C) ₹ 42      (D) ₹ 44.25

7. If for a certain quantity of magazine, the publisher has to pay ₹ 30,600 as printing cost, then what will be amount of royalty to be paid for these magazines ?

(A) ₹ 19,450      (B) ₹ 21,200  
(C) ₹ 22,950      (D) ₹ 26,150

8. Royalty on the magazine is less than the printing cost by :

(A) 5% (B)  $33\frac{1}{5}\%$   
(C) 20% (D) 25%

**Direction 9 - 11 :**

The table given here shows production of five types of cars by a company in the year 2010 to 2015. Study the table and answer the questions.

**Production of Cars by a Company**

Year/ Type	2010	2011	2012	2013	2014	2015	Total
P	8	20	16	17	21	6	88
Q	16	10	14	12	12	14	78
R	21	17	16	15	13	8	90
S	4	6	10	16	20	31	87
T	25	18	19	30	14	27	133
<b>Total</b>	<b>74</b>	<b>71</b>	<b>75</b>	<b>90</b>	<b>80</b>	<b>86</b>	<b>476</b>

9. In which year the total production of cars of types P and Q together was equal to the total production of cars of types R and S together ?

(A) 2011 (B) 2012  
(C) 2015 (D) None of the above

10. In which year the production of cars of all types taken together was approximately equal to average during the period ?

(A) 2010 (B) 2012  
(C) 2014 (D) 2015

11. The production of which type of cars was 25% of the total production of all types of cars during 2014 ?

(A) S (B) R  
(C) Q (D) P

**Direction Q.No. 12 - 14 :**

Read the following information carefully and answer the questions given below :

(i) P, Q, R, S, T and U six members of a family, each of them engaged in a different profession Doctor, Lawyer, Teacher, Engineer, Nurse and Manager.  
(ii) Each of them remains at home on a different day of the week from Monday to Saturday.  
(iii) The lawyer in the family remain at home on Thursday.  
(iv) R remains at home on Tuesday.  
(v) P, a Doctor, does not remain at home either on Saturday or on Wednesday.  
(vi) S is neither the doctor nor the Teacher and remains at home on Friday.  
(vii) Q is the Engineer and T is the Manager.

12. Which of the following combinations is correct ?

(A) Lawyer - Tuesday  
(B) Nurse - Friday  
(C) Manager - Friday  
(D) Engineer - Thursday

13. Which of the following combinations is not correct ?

(A) R - Teacher (B) Q - Engineer  
(C) T - Manager (D) S - Lawyer

14. Who is the Nurse ?  
 (A) S (B) R  
 (C) U (D) Data inadequate

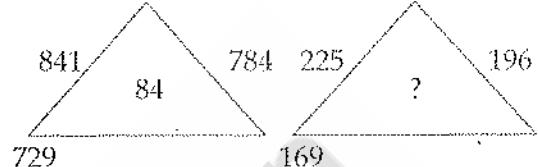
15. Which word does NOT belong to the others ?  
 (A) Tape (B) Twine  
 (C) Cord (D) Yarn

16. Who faces B ?  
 (A) C (B) A  
 (C) E (D) F

17. Who of the following are sitting in the same row ?  
 (A) AEB (B) EFB  
 (C) DEF (D) AEF

18. Which of the following pairs are facing each other ?  
 (A) CA (B) BA  
 (C) DA (D) DE

19. Find the missing number in the following question.


  
 (A) 32 (B) 42  
 (C) 62 (D) 82

20. If  $\div$  means  $+$ ,  $-$  means  $\div$ ,  $\times$  means  $-$  and  $+$  means  $\times$ , then

$$\frac{(3 \times 4) - 8 \times 4}{4 + 8 \times 2 + 16 \div 1} = ?$$
  
 (A) 1 (B) -1  
 (C) 2 (D) 0

**Direction Q.No. 16 - 18 :**

Study the following information's carefully and answer the questions given below :

- (i) Six persons A, B, C, D, E and F are taking their breakfast in two groups facing one another.
- (ii) D and A are not in the same row.
- (iii) E is to the left of F and faces C.
- (iv) B is in the middle of a group.
- (v) D is to the left of B.

16. Who faces B ?

(A) C (B) A  
 (C) E (D) F

17. Who of the following are sitting in the same row ?

(A) AEB (B) EFB  
 (C) DEF (D) AEF

**Direction Q.No. 21 - 22 :**

In each of the following letter series, some of the letters are missing which are given in that order as one of the alternatives below it. Choose the correct alternative.

21. aaa\_bb\_aab\_baaa\_bb  
 (A) abab (B) bbaa  
 (C) babb (D) baab

22. abca\_bcaab\_aa\_caa\_c  
 (A) bbac (B) bbaa  
 (C) acbb (D) acac

Direction Q.No. 23 - 24 :

In each of the following questions, one term in the number series is wrong. Find out the wrong term.

Direction O, No. 25 - 27:

In each of the following questions, a series is given with one term missing. Choose the correct alternative that will continue the same pattern and fill in the blank space.

27. 50, 49, 46, 41, 34, \_\_\_\_\_.

(A) 32 (B) 35  
(C) 21 (D) 18

Direction Q.No. 28 - 29 :

In each of the following questions, find out the correct answer from the given alternatives.

28. If in a certain language MECHANICS is coded as HCEMASCIN, how is POSTER coded in that code ?

(A) OPTSRE      (B) SOPRET  
(C) RETSOP      (D) TERPOS

29. If TABLE is coded as GZYOV, how is JUICE coded ?

(A) OZLFJ      (B) QFRXV  
(C) HOFAD      (D) QZHMT

Direction Q.No. 30 - 32 :

In each of the following questions, there is a certain relation between two given words on one side of :: and one word is given on another side of :: while another word is to be found from the given alternatives, having the same relation with this word as the words of the given pair bear. Choose the best alternative.

32. Virology : Virus :: Semantics : ?  
(A) Amoeba      (B) Language  
(C) Nature      (D) Society

**Direction Q.No. 33 - 35 :**

The following questions consist of two words each that have a certain relationship to each other, followed by four lettered pairs of words. Select the lettered pair that has the same relationship as the original pair of words.

33. Symphony : Music

- (A) Mural : Painting
- (B) Ode : Prose
- (C) Preface : Book
- (D) Editorial : Journal

34. Medicine : Capsule

- (A) Pearl : Shell
- (B) Passenger : Bus
- (C) Heart : Lungs
- (D) Car : Vehicle

35. Identity : Anonymity

- (A) Flow : Perfection
- (B) Careless : Mistake
- (C) Truth : Lie
- (D) Fear : Joy

**Direction Q.No. 36 - 37 :**

Each of the following questions the first two words have definite relationship. Choose one word out of the given four alternatives which will fill in the blank space and show the same relationship with the third word as between the first two.

36. Cobra is related to Snake in the same way as Leopard is related to \_\_\_\_\_.

- (A) Tiger
- (B) Lion
- (C) Cat
- (D) Zebra

37. Memorise is to Amnesia as Movement is to \_\_\_\_\_

- (A) Lubrication
- (B) Lethargy
- (C) Paralysis
- (D) Hermit

**Direction Q.No. 38 - 41 :**

In each of the following questions, three out of four alternatives contain alphabet placed in a particular form. Find the one that does not belong to the group.

38. (A) BCDEI (B) PQRSW  
(C) LMNOS (D) HIKLO

39. (A) LNMO (B) CRDT  
(C) EUFV (D) GWHX

40. (A) CBAZ (B) AZYX  
(C) AZBY (D) PONM

41. (A) JMP (B) RUX  
(C) UYB (D) EHK

42. A train started from Mumbai at 6.00 A.M. On the next (second) station  $\frac{1}{3}$  passengers got down and 96 got in. On the next (third) station,  $\frac{1}{2}$  of the total passengers present in the train, got down and 12 came in. Now there were 248 passengers in the train, when the train started from Mumbai, the number of passengers was :

- (A) 435
- (B) 564
- (C) 654
- (D) 736



52. The average of the husband and his wife was 23 years at the time of their marriage. After five years they have a one year old child. The average age of the family now is :

(A) 29.3 years (B) 28.5 years  
(C) 23 years (D) 19 years

53.  $\frac{1}{4}$ th of 60% of a number is equal to  $\frac{2}{5}$ th of 20% of another number. What is the respective ratio of the first number to that of second number ?

(A) 8 : 15 (B) 5 : 9  
(C) 8 : 13 (D) 4 : 7

54. A&B together have ₹ 1210. If  $\frac{4}{15}$  of A's amount is equal to  $\frac{2}{5}$  of B's amount, how much amount does B have?

(A) ₹ 664 (B) ₹ 550  
(C) ₹ 484 (D) ₹ 460

55. How many one rupee coins, 50 paise coins and 25 paise coins of which the numbers are proportional to 4, 5 and 6 are together worth ₹ 32 ?

(A) 16, 20, 24 (B) 12, 16, 20  
(C) 20, 24, 28 (D) 24, 28, 32

56. Two dice are thrown simultaneously. The probability of obtaining a total score of 5 is :

(A)  $1/18$  (B)  $1/12$   
(C)  $1/9$  (D) None of these

57. A tradesman marks his goods at such a price that after allowing a discount of 15%, he earns a profit of 20%. Find the marked price of an article which costs him ₹ 850.

(A) ₹ 1200 (B) ₹ 1300  
(C) ₹ 1250 (D) ₹ 1350

58. In a camp, there are meals for 120 men or 200 children. If 150 children have taken their meals, how many men will be catered to with the remaining meal ?

(A) 50 (B) 40  
(C) 30 (D) 20

59. 56 men can complete a piece of work in 24 days. In how many days can 42 men complete the same piece of work ?

(A) 48 (B) 32  
(C) 20 (D) 16

60. A boat travels upstream from P to Q and downstream from Q to P in 4 hours. If the speed of the boat in still water is 12 km/hr and the speed of the current is 4 km/hr, then what is the distance from P to Q ?

(A)  $31\frac{1}{3}$  km (B)  $41\frac{1}{3}$  km  
(C)  $21\frac{1}{3}$  km (D)  $11\frac{1}{3}$  km

**SECTION - B**  
**ELECTRONICS**  
**& COMMUNICATION/**  
**TELECOMMUNICATION**

Choose the most appropriate option

61. Which one of the following is a D/A conversion techniques ?  
 (A) Successive approximation  
 (B) Weighted resistor technique  
 (C) Dual slop technique  
 (D) Single slope technique

62. The input-output relationship of a causal stable LTI system is given as  
 $y[n] = \alpha y[n-1] + \beta x[n]$ .  
 If the impulse response  $h[n]$  of this system satisfies the condition

$$\sum_{n=0}^{\infty} h[n] = 2,$$

The relationship between  $\alpha$  and  $\beta$  is :  
 (A)  $\alpha = 1 - \beta/2$       (B)  $\alpha = 1 + \beta/2$   
 (C)  $\alpha = 2\beta$       (D)  $\alpha = -2\beta$

63. The unit impulse response of a system is  $h(t) = e^{-t}$ ,  $t \geq 0$ . For this system, the steady-state value of the output for unit step input is equal to :  
 (A)  $-1$       (B)  $0$   
 (C)  $1$       (D)  $\infty$

64. A transistor connected in common base configuration has :  
 (A) a high input resistance and low output resistance  
 (B) a low input resistance and high output resistance  
 (C) a low input resistance and low output resistance  
 (D) a high input resistance and a high output resistance

65. The determinant of matrix A is 5 and that of matrix B is 40. The determinant of matrix AB will be :  
 (A) 8      (B) 40  
 (C) 5      (D) 200

66. A unity-feedback control system has the open-loop transfer function  $(s) = 4(1 + 2s) / [s^2(s + 2)]$  if the input to the system is a unity ramp, the steady-state error will be :  
 (A) 0      (B) 0.5  
 (C) 2      (D) Infinity

67. In 8085, whenever a signal is received at TRAP terminal, its program execution is transferred to a subroutine on address :  
 (A) 0000 H      (B) 002C H  
 (C) 0024 H      (D) 0004 H

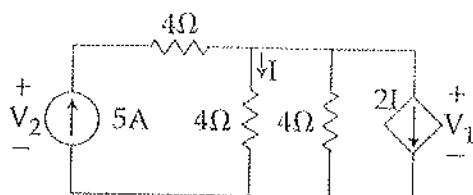
68. Which one of the following conditions will not guarantee a distortionless Transmission Line ?  
 (A)  $R = 0, G = 0$   
 (B)  $LG = RC$   
 (C)  $R \gg \omega L, G \gg \omega C$   
 (D)  $R \ll \omega L, G \ll \omega C$

69. n-channel JFET has  $I_{dss} = 2\text{mA}$ ,  $V_p = -4\text{V}$ . Its transconductance  $g_m$  (in millimho) for an applied gate-to-source  $V_{GS}$  of  $-2\text{V}$  is :  
 (A) 0.5      (B) 0.25  
 (C) 0.75      (D) 1.0

70. The logic function implemented by the circuit given below is :  
 (ground implies a logic '0')

(A)  $F = \text{AND}(P, Q)$   
 (B)  $F = \text{OR}(P, Q)$   
 (C)  $F = \text{Ex-NOR}(P, Q)$   
 (D)  $F = \text{Ex-OR}(P, Q)$

71. In the given circuit, the values of  $V_1$  and  $V_2$  respectively are :

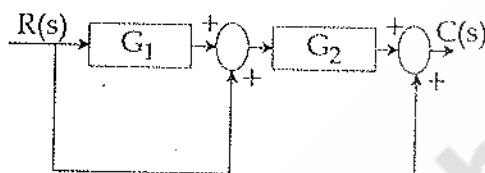


(A) 5 V, 25 V (B) 10 V, 30 V  
 (C) 15 V, 35 V (D) 0 V, 20 V

72. The  $z$ -transform of the function given below is  $\sum_{k=0}^{\infty} \delta(n-k)$ :

(A)  $(z-1)/z$  (B)  $z/(z-1)$   
 (C)  $z/(z-1)^2$  (D)  $(z-1)^2/z$

73. The transfer function  $C(s)/R(s)$  in the block diagram shown below is :



(A)  $\frac{G_1 G_2}{1 + G_1 G_2}$   
 (B)  $G_1 G_2 + G_1 + 1$   
 (C)  $G_1 G_2 + G_2 + 1$   
 (D)  $\frac{G_1}{1 + G_1 G_2}$

74. Let  $x[n]$ ,  $-5 \leq n \leq 3$  and  $h[n]$ ,  $2 \leq n \leq 6$  be two finite duration signals. The range of their convolution is :

(A)  $-7 \leq n \leq 9$  (B)  $-3 \leq n \leq 9$   
 (C)  $2 \leq n \leq 3$  (D)  $-5 \leq n \leq 6$

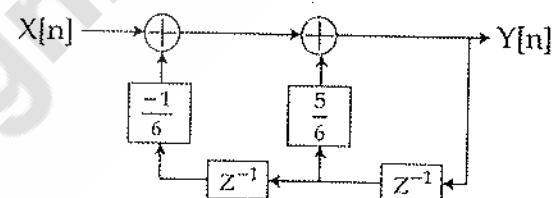
75. A signal  $x(t)$  has a Fourier transform  $X(\omega)$ . If  $x(t)$  is a real and odd function of  $t$ , then  $X(\omega)$  is :

(A) A real and even function of  $\omega$   
 (B) An imaginary and odd function of  $\omega$   
 (C) An imaginary and even function of  $\omega$   
 (D) A real and odd function of  $\omega$

76. The 4-point Discrete Fourier Transform (DFT) of a discrete time sequence  $\{1, 0, 2, 3\}$  is :

(A)  $[0, -2+2j; 2, -2-2j]$   
 (B)  $[2, 2+2j; 6, 2-2j]$   
 (C)  $[6, 1-3j; 2, 1+3j]$   
 (D)  $[6, -1+3j; 0, -1-3j]$

77. For the discrete-time system shown in the figure below, the poles of the system transfer function are located at :



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

78. The first six points of the 8-point DFT of a real valued sequence are 5,  $1-j3$ , 0,  $3-4j$ , 0 and  $3+j4$ . The last two points of the DFT are respectively :

(A)  $0, 1-j3$  (B)  $0, 1+j3$   
 (C)  $1+j3, 5$  (D)  $1-j3, 5$

79. A signal  $(t) = 2\cos(\pi \cdot 10^4 t)$  volts is applied to an FM modulator with the sensitivity constant of 10 kHz/volt. Then the modulation index of the FM wave is :

(A) 4 (B) 2  
 (C)  $4/\pi$  (D)  $2/\pi$



80. The image channel selectivity of superheterodyne receiver depends upon :

- IF amplifiers only
- RF and IF amplifiers only
- Pre selector, RF and IF amplifiers
- Pre selector and RF amplifiers

81. A wave is incident normally on a good conductor. If the frequency of a plane electromagnetic wave increases four times, the skin depth, will :

- Increase by a factor of 2
- Decrease by a factor of 4
- Remain the same
- Decrease by a factor of 2

82. The List-I (lists the attributes) and the List-II (lists of the modulation systems). Match the attribute to the modulation system that best meets it.

**List-I**

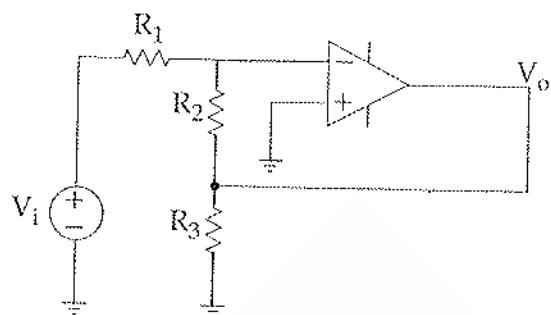
- Power efficient transmission of signals
- Most bandwidth efficient transmission of voice signals
- Simplest receiver structure
- Bandwidth efficient transmission of signals with significant dc component

**List-II**

- Conventional AM
- FM
- VSB
- SSB-SC
  - (a)
  - (b)
  - (c)
  - (d)

- (iv) (ii) (i) (iii)
- (ii) (iv) (i) (iii)
- (iii) (ii) (i) (iv)
- (ii) (iv) (iii) (i)

83. Assuming the op-amp to be ideal, the voltage gain of the amplifier shown below is :

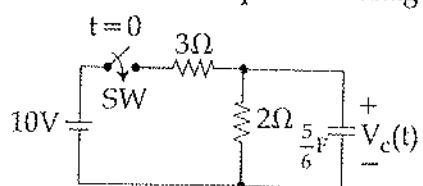


- $-\frac{R_2}{R_1}$
- $-\frac{R_3}{R_1}$
- $-\left(\frac{R_2||R_3}{R_1}\right)$
- $-\left(\frac{R_2 + R_3}{R_1}\right)$

84. The open-loop DC gain of a unity negative feedback system with closed-loop transfer Function  $(S+4)/(S^2 + 7S + 13)$  is :

- 4/13
- 4/9
- 4
- 13

85. In the circuit shown below, switch SW is closed at  $t=0$ . Assuming zero initial conditions, the capacitor voltage  $V_c(t)$  is :



- $4 - 4e^{-t}$
- $4e^{-t}$
- $10/3 - 4e^{-t}$
- $4 - 4e^{-t/2}$

86. The Nyquist sampling interval, for the signal  $\sin(700t) + \text{sinc}(500t)$  is :

- 1/350 sec
- $\pi/350$  sec
- 1/700 sec
- $\pi/175$  sec

87. In commercial TV transmission in India, picture and speech signals are modulated respectively :

(A) VSB and VSB      (B) VSB and SSB  
 (C) VSB and FM      (D) FM and VSB

88. In a traveling electromagnetic wave, E and H vector fields are :

(A) Perpendicular in space  
 (B) Parallel in space  
 (C) E is in the direction of wave travel  
 (D) H is in the direction of wave travel

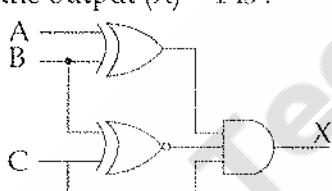
89. Which of the following demodulator(s) can be used for demodulating the signal  $x(t) = 5(1 + 2\cos 200\pi t)20000\pi t$  ?

(A) Envelope demodulator  
 (B) Square-law demodulator  
 (C) Synchronous demodulator  
 (D) None of the above

90. A system with an input  $x(t)$  and output  $y(t)$  is described by the relation :  $y(t) = tx(t)$ . This system is :

(A) Linear and time-invariant  
 (B) Linear and time-varying  
 (C) Non-linear & time-invariant  
 (D) Non-linear and time-varying

91. For the logic circuit shown below, the required input condition (A, B, C) to make the output ( $X$ ) = 1 is :



(A) 1, 0, 1      (B) 0, 0, 1  
 (C) 1, 1, 1      (D) 0, 1, 1

92. An AM signal is detected using an envelope detector. The carrier frequency and modulation signal frequency are 1 MHz and 2 kHz respectively. An appropriate value for the time constant of the envelope detector is :

(A) 500  $\mu$ sec      (B) 20  $\mu$ sec  
 (C) 0.2  $\mu$ sec      (D) 1  $\mu$ sec

93. In a full wave rectifier, if the input frequency is 50 Hz, then output frequency will be :

(A) 50 Hz      (B) 75 Hz  
 (C) 100 Hz      (D) 200 Hz

94. The maximum value of the function  $f(x) = \ln(1+x) - x$  (where  $x > -1$ ) occurs at  $x =$

(A) 1      (B) 0  
 (C) -0.5      (D) 2

95. The cascode amplifier is a multistage configuration of :

(A) CC - CB      (B) CE - CB  
 (C) CB - CC      (D) CE - CC

96. The impulse response  $h[n]$  of a linear time-invariant system is given by :  

$$h[n] = u[n+3] + u[n-2] - 2u[n-7]$$
 Where  $u[n]$  is the unit step sequence.  
 The above system is :  

(A) Stable but not causal  
 (B) Stable and causal  
 (C) Causal but unstable  
 (D) Unstable and not causal

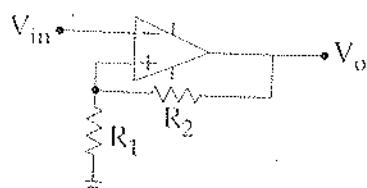
97. The  $z$  - transform  $F(z)$  of the function  $f(nT) = a^{nT}$  is :

(A)  $\frac{z}{z - a^T}$       (B)  $\frac{z}{z + a^T}$   
 (C)  $\frac{z}{z - a^{-T}}$       (D)  $\frac{z}{z + a^{-T}}$

98. Consider sinusoidal modulation in an AM systems. Assuming no over modulation, the modulation index ( $\mu$ ) when the maximum and minimum values of the envelope, respectively are 3V and 1V is :

(A) 0.5      (B) 2  
 (C) 3      (D) 0.25

99. The circuit shown in the figure given below is:



- (A) a non-inverting Amplifiers
- (B) an inverting Amplifiers
- (C) an oscillator
- (D) a Schmitt Trigger

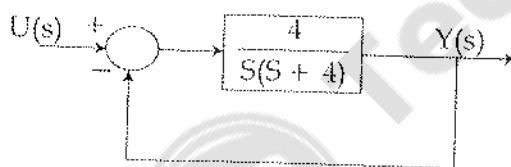
100. The input and output of a continuous time system are respectively denoted by  $x(t)$  and  $y(t)$ . Which of the following descriptions correspond to a causal system ?

(A)  $y(t) = x(t-2) + x(t+4)$   
 (B)  $y(t) = (t-4)x(t+1)$   
 (C)  $y(t) = (t+4)x(t-1)$   
 (D)  $y(t) = (t+5)x(t+5)$

101. A 10 MHz carrier is frequency modulated by a sinusoidal signal of 500 Hz, the maximum frequency deviation being 50 kHz. The bandwidth required given by the Carson's rule is :

- (A) 101 kHz
- (B) 50.5 kHz
- (C) 49.5 kHz
- (D) None of the above

102. For the closed-loop system shown below, the natural frequency (in rad/s) is :



103. A system is defined by its impulse response  $h(n) = 2^n u(n - 2)$ . The system is :

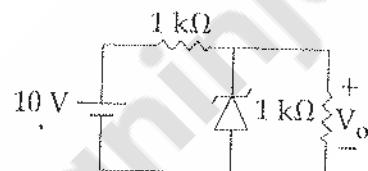
(A) Stable and causal  
 (B) Causal but not stable  
 (C) Stable but not causal  
 (D) Unstable and non-causal

104. A message signal  $m(t) = \cos 2000\pi t + 4\cos 4000\pi t$  modulates the carriers  $c(t) = \cos 2\pi f_c t$  where  $f_c = 1\text{MHz}$  to produce an AM signal. For demodulating the generated AM signal using an envelope detector, the time constant  $RC$  of the detector circuit should satisfy :

(A)  $0.5 \text{ ms} < RC < 1 \text{ ms}$   
 (B)  $1 \mu\text{s} \ll RC < 0.5 \text{ ms}$   
 (C)  $RC \ll 1 \mu\text{s}$   
 (D)  $RC >> 0.5 \text{ ms}$

105. In the circuit shown below, the Zener diode is ideal and the Zener voltage is 6 V.

The output Voltage  $V_o$  (in volts) is :



(A) 5 (B) 6  
 (C) 5.5 (D) 0

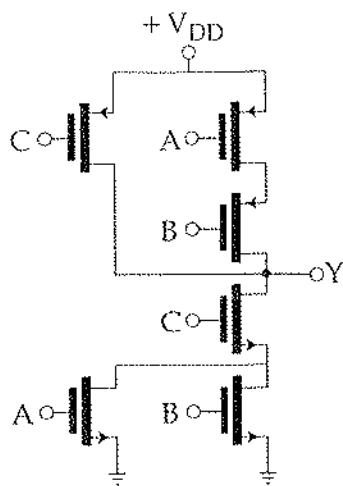
106. The EM field and current is concentrated close to the surface of the conductor. The phenomenon is called :

- (A) Faraday's effect
- (B) Skin effect
- (C) EM Concentration effect
- (D) Ohm's effect

107. Two discrete time systems with impulse responses  $h1[n] = \delta[n - 1]$  and  $h2[n] = \delta[n - 2]$  are connected in cascade. The overall impulse response of the cascaded system is :

(A)  $[n-1] + [n-2]$     (B)  $[n-4]$      
 (C)  $[n-3]$     (D)  $[n-1][n-2]$

108. Consider the CMOS circuit shown below. The output  $Y$  is :



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

109. Consider the following processes in the fabrication of IC's :

(1) Substrate  
 (2) Oxide layer  
 (3) Etching  
 (4) Photo resist and photolithography

The correct sequence of these processes is :

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

110. Consider the  $z$  - transform  $(z) = 5z^2 + 4z^{-1} + 3; 0 < |z| < \infty$ . The inverse  $z$  - transform  $[n]$  is :

(A)  $5[n+2] + 3\delta[n] + 4\delta[n-1]$   
 (B)  $5[n-2] + 3\delta[n] + 4\delta[n+1]$   
 (C)  $5[n+2] + 3u[n] + 4u[n-1]$   
 (D)  $5[n-2] + 3u[n] + 4u[n+1]$

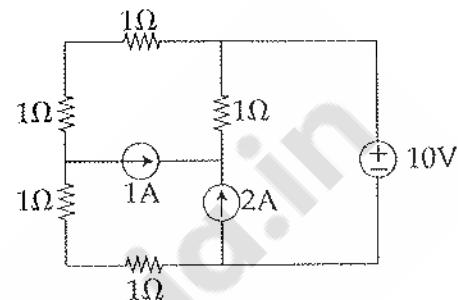
111. A sequence  $x(n)$  with the  $z$  - transform  $= z^4 + z^2 - 2z + 2 - 3z^{-4}$  is applied as an input to a linear time - variant system with the impulse response  $h(n) = 2\delta(n-3)$ . The output at  $n=4$  is :

(A) - 6      (B) zero  
 (C) 2      (D) - 4

112. The dominant mode in a rectangular waveguide is  $TE_{10}$ , because of :

(A) No attenuation  
 (B) No cut-off  
 (C) No magnetic field component  
 (D) The highest cut-off wavelength

113. In the circuit shown below, the power supplied by the voltage source is :

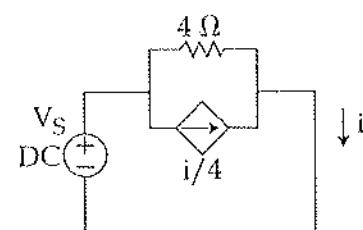


(A) 0 W      (B) 5 W  
 (C) 10 W      (D) 100 W

114. A linear discrete-time system has the characteristics equation:  $z^3 - 0.81z = 0$ . The system :

(A) is stable  
 (B) is marginally stable  
 (C) is unstable  
 (D) Stability cannot be assessed from the given information

115. In the circuit given below, the effective resistance (in  $\Omega$ ) faced by the voltage source :



(A) 3      (B) 4  
 (C) 7      (D) -4

116. The region of convergence of the z - transform of a unit step function is :

- $|z|>1$
- $|z|<1$
- (Real part of  $z$ )  $> 0$
- (Real part of  $z$ )  $< 0$

117. Group I lists a set of four transfer functions. Group II gives a list of possible step responses  $y(t)$ . Match the step responses with the corresponding transfer functions.

## Group I

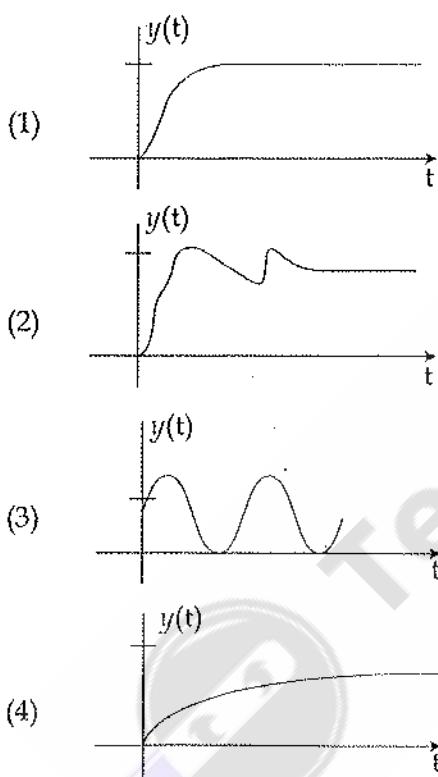
$$P = 25 / (s^2 + 25)$$

$$Q = 36 / (s^2 + 20s + 36)$$

$$R = 36/(s^2 + 12s + 36)$$

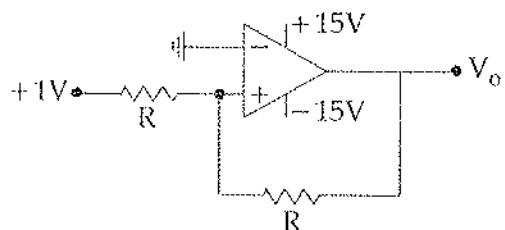
$$S = 36 / (s^2 + 7s + 49)$$

## Group II



(A)  $P = \{3\}$ ,  $Q = \{1\}$ ,  $R = \{4\}$ ,  $S = \{2\}$   
 (B)  $P = \{3\}$ ,  $Q = \{2\}$ ,  $R = \{4\}$ ,  $S = \{1\}$   
 (C)  $P = \{2\}$ ,  $Q = \{1\}$ ,  $R = \{4\}$ ,  $S = \{3\}$   
 (D)  $P = \{3\}$ ,  $Q = \{4\}$ ,  $R = \{1\}$ ,  $S = \{2\}$

118. In the circuit shown in figure below,  $V_o$  will be :



(A) -1V (B) 2V  
 (C) +1V (D) +15V

119. Which of the following components are used for bias compensation in transistor circuit?

- (A) Resistors
- (B) Rectifier diodes
- (C) Thermistors
- (D) both (B) and (C)

120. A 10 bit D/A converter gives a maximum output of 10.23V. The resolution is :

(A) 10 mV (B) 20 mV  
(C) 15 mV (D) 25 mV

- 0 0 0 -