(EC/T)

परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET

परीक्षा पुस्तिका श्रृंखला / Test Booklet Series : **A**

निर्धारित समय : 3 घंटे (दृष्टिबाधित उम्मीदवारों के लिए : 4 घंटे)
Time Allowed : 3 Hours (For V.H. Candidates : 4 Hours)

अधिकतम अंक : 120
Maximum Marks : 120

रोल नं.
Roll No. :

उत्तरशीट 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 / Instructions to the Candidates

1. प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-16) 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 स्ट्रीम की परीक्षा-पुस्तिका मिली है जिसके लिए उन्होंने आवेदन किया है अर्थात कंप्यूटर साईंस / इंजीनियरिंग भाग या सूचना प्रौद्योगिकी भाग या इलेक्ट्रॉनिक्स और कम्युनिकेशन / टेलीकम्युनिकेशन भाग या भौतिकी / इलेक्ट्रॉनिक्स / एप्लायड इलेक्ट्रॉनिक्स भाग। यदि आप इस पुस्तिका में कोई त्रुटि पायें, तो *तत्काल* इसके बदले दूसरी पुस्तिका ले लें।

2. निरीक्षक द्वारा आपको ओ एम आर उत्तर-शीट अलग से दी जाएगी। 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-पुस्तिका में दिए गए अनुदेशों के अनुसार सावधानी पूर्वक उसमें विवरण और कोड लिखने चाहिए। प्रश्नों के उत्तर वास्तविक रूप में लिखना आरंभ करने से पहले आपको ओ एम आर उत्तर-पुस्तिका 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 आयेंगे। 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, ये अंगूठे के निशान के अलावा अपने हस्ताक्षर भी करें।)

3. इस प्रश्न-पुस्तिका में 120 बहुविकल्पीय 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 उचित विकल्प का चुनाव करें और उत्तर पुस्तिका में प्रश्न के सामने वाले उपयुक्त गोले को काला करें।

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

5. उम्मीदवार की दोनों भाग अनिवार्य रूप में हल करने हैं।

6. गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले की 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।

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

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

9. परीक्षा हॉल/कमरों में मोबाइल फोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं, उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फोन/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।

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

1. Before you start to answer the questions you must check up this booklet and ensure that it contains all the pages (1-16) 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 book strictly from the stream candidate has applied for i.e. Computer Science / Engineering Part OR Information Technology Part OR Electronics and Communication / Telecommunication Part OR Physics / Electronics / Applied Electronics Part. If you find any defect in this Booklet, you must get it replaced *immediately*.

2. You will be supplied the OMR Answer-Sheet separately by the Invigilator. Read the instructions printed on OMR Answersheet 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 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. This booklet consists of 120 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.

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

5. Candidate has to attempt both parts compulsorily.

6. 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.

7. Do not fold answer sheet in any case.

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

9. 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.

10. 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 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 हस्ताक्षर/Signature of Candidate : _____

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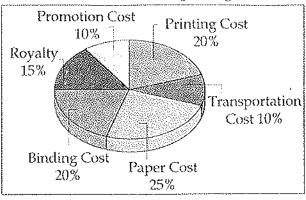
In the following questions, out of the four alternatives, choose the one which best expresses the meaning of the given word.

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°   (B)   24°

    (C)   54°   (D)   48°

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
Total	74	71	75	90	80	86	476

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

Direction Q.No. 15 :

Three of the words will be in the same classification, the remaining one will not be. Your answer will be the one word that does NOT belong in the same classification as the others.
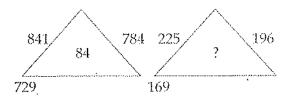
15. Which word does NOT belong to the others ?

    (A) Tape   (B) Twine

    (C) Cord   (D) Yarn

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

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.

841 / 84 \ 784   225 / ? \ 196

729   169

    (A) 32   (B) 42

    (C) 62   (D) 82

20. If ÷ means +, − means ÷, × means − and + means ×, 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. 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

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

23. 125, 126, 124, 127, 123, 129

    (A) 123   (B) 124

    (C) 126   (D) 129

24. 52, 51, 48, 43, 34, 27, 16

    (A) 51   (B) 48

    (C) 34   (D) 43

Direction Q.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.

25. 6, 25, _____, 123, 214, 341.

    (A) 65   (B) 70

    (C) 72   (D) 62

26. 71, 76, 69, 74, 67, 72, _____.

    (A) 65   (B) 76

    (C) 77   (D) 80

27. 50, 49, 46, 41, 34, _____.

    (A) 32   (B) 25

    (C) 21   (D) 19

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.

30. Engineer : Map : : Bricklayer : ?

    (A) Design   (B) Templet

    (C) Mould   (D) Cement

31. Major : Battalion : : Colonel : ?

    (A) Company   (B) Regiment

    (C) Army   (D) Soldiers

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 1/3 passengers got down and 96 got in. On the next (third) station, ½ 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

43. The LCM of two numbers is 45 times their HCF. If the sum of the LCM and the HCF of these two numbers is 1150 and one of the numbers is 125, then the other number is :

(A) 256   (B) 225

(C) 250   (D) 255

Direction Q.No. 44 - 45 :

Find out the wrong term from the following series and select the number from the alternatives which will replace the wrong term in the series.

44. 299, 178, 97, 48, 24, 14, 13 :

(A) 175   (B) 295

(C) 23   (D) 10

45. 2, 9, 28, 65, 126, 216, 344 :

(A) 38   (B) 217

(C) 356   (D) 66

46. The ratio between Sumit's and Prakash's age at present is 2 : 3. Sumit is 6 years younger than Prakash. The ratio of Sumit's age to Prakash's age after six years will be :

(A) 1 : 2   (B) 2 : 3

(C) 3 : 4   (D) 3 : 8

47. If the difference between a number and $1/5^{th}$ of it is 84, what is the number ?

(A) 115   (B) 95

(C) 105   (D) 125

48. The ratio of ages of the father and his son at present is 12 : 5, the difference of their age is 28 years. What will be the ratio of their Ages after eight years ?

(A) 2 : 2   (B) 3 : 1

(C) 2 : 1   (D) 3 : 2

49. Two pipes A and B can fill a water tank in 20 and 24 minutes respectively and third pipe C can empty at the rate of 3 gallons per minute. If A, B and C opened together filled the tank in 15 minutes, the capacity (in gallons) of the tank is :

(A) 60   (B) 120

(C) 150   (D) 180

50. A can run 200 m in 35 seconds and B in 38 seconds. By what distance A beats B ?

(A) 15 m   (B) $15\frac{2}{3}$ m

(C) $15\frac{15}{19}$ m   (D) $15\frac{4}{19}$ m

51. A train starts at 7 a.m. from A towards B with a speed of 50 km/hr. Another train from B starts at 8 a.m. with a speed of 60 km/hr towards A. Both of them meet at 10 a.m. at C. The ratio of the distances AC to BC is :

(A) 4 : 5   (B) 5 : 4

(C) 5 : 6   (D) 6 : 5

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. $1/4^{th}$ of 60% of a number is equal to $2/5^{th}$ 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 4/15 of A's amount is equal to 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 α and β 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) ∞
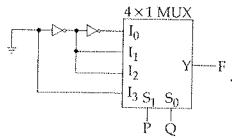
64. A transistor connected in common base configuration has :
    - (A) a high input resistance and low output resistance
    - (B) a low input resistance and high output resistance
    - (C) a low input resistance and low output resistance
    - (D) a high input resistance and a high output resistance

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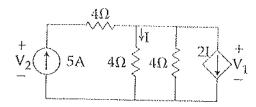
67. In 8085, whenever a signal is received at TRAP terminal, its program execution is transferred to a subroutine on address :
    - (A) 0000 H
    - (B) 002C H
    - (C) 0024 H
    - (D) 0004 H

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 $I_{dss} = 2mA, V_p = -4 V$. Its transconductance g_m (in millimho) for an applied gate-to-source V_{GS} of $-2 V$ 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')
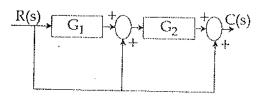
    - (A) $F = AND (P, Q)$
    - (B) $F = OR (P, Q)$
    - (C) $F = Ex\text{-}NOR (P, Q)$
    - (D) $F = Ex\text{-}OR (P, Q)$

71. In the given circuit, the values of V_1 and V_2 respectively are :
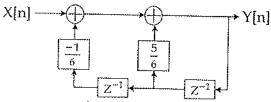
(A) 5 V, 25 V   (B) 10 V, 30 V

(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) $\dfrac{G_1 G_2}{1 + G_1 G_2}$

(B) $G_1 G_2 + G_1 + 1$

(C) $G_1 G_2 + G_2 + 1$

(D) $\dfrac{G_1}{1 + G_1 G_2}$

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

(A) $-7 \le n \le 9$ (B) $-3 \le n \le 9$

(C) $2 \le n \le 3$ (D) $-5 \le n \le 6$

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 ω

(B) An imaginary and odd function of ω

(C) An imaginary and even function of ω

(D) A real and odd function of ω

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 $(t) = 2\cos(\pi . 10^4 t)$ 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) $2/\pi$

SPACE FOR ROUGH WORK

80. The image channel selectivity of superheterodyne receiver depends upon :
(A) IF amplifiers only
(B) RF and IF amplifiers only
(C) Pre selector, RF and IF amplifiers
(D) 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 :
(A) Increase by a factor of 2
(B) Decrease by a factor of 4
(C) Remain the same
(D) 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.
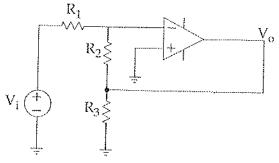
List-I
(a) Power efficient transmission of signals
(b) Most bandwidth efficient transmission of voice signals
(c) Simplest receiver structure
(d) Bandwidth efficient transmission of signals with significant dc component
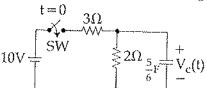
List-II
(i) Conventional AM
(ii) FM
(iii) VSB
(iv) SSB-SC

	(a)	(b)	(c)	(d)
(A)	(iv)	(ii)	(i)	(iii)
(B)	(ii)	(iv)	(i)	(iii)
(C)	(iii)	(ii)	(i)	(iv)
(D)	(ii)	(iv)	(iii)	(i)

83. Assuming the op-amp to be ideal, the voltage gain of the amplifier shown below is :
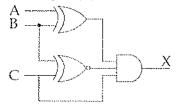
(A) $-\dfrac{R_2}{R_1}$

(B) $-\dfrac{R_3}{R_1}$

(C) $-\left(\dfrac{R_2\|R_3}{R_1}\right)$

(D) $-\left(\dfrac{R_2 + R_3}{R_1}\right)$

84. The open-loop DC gain of a unity negative feedback system with closed-loop transfer Function $(S+4)/(S^2 +7S+13)$ is :
(A) 4/13   (B) 4/9
(C) 4   (D) 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 :


(A) $4 - 4e^{-t}$ (B) $4e^{-t}$
(C) $10/3 - 4e^{-t}$ (D) $4 - 4e^{-t/2}$

86. The Nyquist sampling interval, for the signal $\sin(700t) + \text{sinc}(500t)$ is :
(A) $1/350$ sec   (B) $\pi/350$ sec
(C) $1/700$ sec   (D) $\pi/175$ 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 μsec (B) 20 μsec
(C) 0.2 μsec (D) 1 μsec
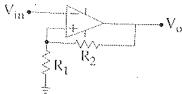
93. In a full wave rectifier, if the input frequency is 50 Hz, then output frequency will be :
(A) 50 Hz (B) 75 Hz
(C) 100 Hz (D) 200 Hz

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
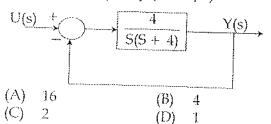
97. The z - transform F(z) of the function $f(nT) = a^{nT}$ is :
(A) $\dfrac{z}{z - a^T}$ (B) $\dfrac{z}{z + a^T}$
(C) $\dfrac{z}{z - a^{-T}}$ (D) $\dfrac{z}{z + a^{-T}}$

98. Consider sinusoidal modulation in an AM systems. Assuming no over modulation, the modulation index (μ) 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

SPACE FOR ROUGH WORK

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 :

(A) 16
(B) 4
(C) 2
(D) 1
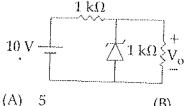
103. A system is defined by its impulse response $h(n) = 2^n u(n-2)$. The system is :
(A) Stable and causal
(B) Causal but not stable
(C) Stable but not causal
(D) Unstable and non-causal

104. A message signal $(t) = \cos 2000\pi t + 4\cos 4000\pi t$ modulates the carriers $c(t) = \cos 2\pi fct$ where $fc = 1$ 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 ms< RC < 1 ms
(B) 1 μs << RC < 0.5 ms
(C) RC << 1 μs
(D) RC >> 0.5 ms
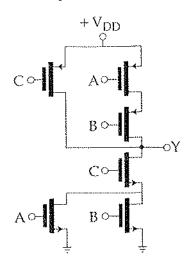
105. In the circuit shown below, the Zener diode is ideal and the Zener voltage is 6 V.
The output Voltage V_0 (in volts) is :

(A) 5
(B) 6
(C) 5.5
(D) 0
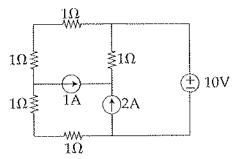
106. The EM field and current is concentrated close to the surface of the conductor. The phenomenon is called :
(A) Faraday's effect
(B) Skin effect
(C) EM Concentration effect
(D) Ohm's effect

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) $[n-1][n-2]$

SPACE FOR ROUGH WORK

108. Consider the CMOS circuit shown below. The output Y is :
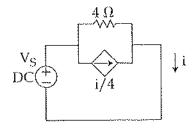
(A) $\overline{(A + C)B}$ (B) $\overline{(A + B)C}$

(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 Ω) 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 :
    (A) $|z|>1$
    (B) $|z|<1$
    (C) (Real part of z) > 0
    (D) (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
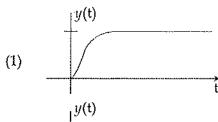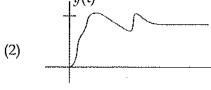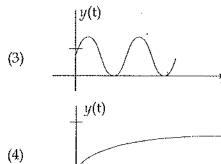
    (A) P — (3), Q — (1), R — (4), S — (2)
    (B) P — (3), Q — (2), R — (4), S — (1)
    (C) P — (2), Q — (1), R — (4), S — (3)
    (D) P — (3), Q — (4), R — (1), S — (2)

118. In the circuit shown in figure below, V_0 will be :
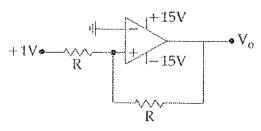
    (A) − 1V   (B) 2V
    (C) + 1V   (D) + 15V

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

- o O o -