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

परीक्षा पुस्तिका सं. :
Test Booklet No. :

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

परीक्षा प्रश्न–पुस्तिका
EXAMINATION QUESTION BOOKLET
IC-SB

निर्धारित समय : 180 मिनट
Time Allowed : 180 Minutes

अधिकतम अंक : 120
Maximum Marks : 120

रोल नं.
Roll No. :

उत्तर शीट सं.:
Answer Sheet No. :

प्रश्नों के उत्तर देने से पहले निम्नलिखित अनुदेशों को ध्यान से पढ़ लें।
Read the following instructions carefully before you begin to answer the questions.

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 (1-32) 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 **पोस्ट** 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 लें।
2. **ओ एम् आर उत्तर-शीट प्रश्न पुस्तिका में ही उपलब्ध रहेगी। कृपया सुनिश्चित करें कि ओ एम् आर उत्तर-शीट संख्या और परीक्षण पुस्तिका संख्या समान हैं। ओ एम् आर उत्तर-शीट पर जानकारी भरने से पहले ओ एम् आर शीट पर छपे निर्देशों को ध्यान से पढ़ें। आपको ओ एम् आर उत्तर पत्रक पर सभी विवरणों को सही ढंग से पूरा और कोड करना होगा, ऐसा न करने पर आपकी उत्तर पुस्तिका का मूल्यांकन नहीं किया जा सकता है। प्रश्नों का उत्तर देना शुरु करने से पहले आपको ओ एम् आर उत्तर-पत्रक पर दिये गए निर्धारित स्थान पर अपने हस्ताक्षर करने होंगे। इन निर्देशों का पूर्ण रूप से पालन किया जाना चाहिए, ऐसा न करने पर आपकी ओ एम् आर उत्तर-पुस्तिका का मूल्यांकन नहीं किया जा सकता है।** (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों को ओ एम् 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 एम् आर उत्तर-शीट तीन प्रतियों में होंगी (मूल तथा कार्बन की दो प्रतिलिपियाँ)। परीक्षा समाप्ति के बाद ओ.एम्.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 उसकी उम्मीदवारी रद्द कर दी जायेगी। यदि कोई उम्मीदवार 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 120 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 संबंधित प्रश्न के सामने वाले उपयुक्त गोले को काला करें।
5. प्रश्न पुस्तिका में **दो** भाग हैं : **भाग ए** : सामान्य क्षेत्र (प्रश्न **1-42**), **भाग बी :** तकनीकी क्षेत्र जिसे आगे दो भागों में विभाजित किया जाएगा (i) इंजीनियरिंग गणित (प्रश्न संख्या **43-52**) (ii) **CS/IT** (प्रश्न संख्या **53-120**) या **ECE** (प्रश्न संख्या **53-120**) **भाग बी** (ii) के लिए उम्मीदवार के पास **CS/IT** भाग या **ECE** भाग को हल करने का विकल्प होगा। **भाग ए** और **भाग बी** (i) इंजीनियरिंग गणित, सभी उम्मीदवारों के लिए समान होगा।
6. उम्मीदवार के पास या तो इलेक्ट्रॉनिक्स और संचार भाग या कंप्यूटर विज्ञान और सूचना प्रौद्योगिकी भाग का प्रयास करने का विकल्प है। प्रयास किए गए विकल्प को ओ एम् आर उत्तर पत्रक पर सही गोले को काला करके चिह्नित किया जाना चाहिए।
7. प्रत्येक सही उत्तर के लिए एक अंक दिया जाएगा और प्रत्येक गलत उत्तर के लिए **0.25** अंक काट लिए जाएंगे।
8. 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।
9. उत्तर-पुस्तिका 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. **अभ्यर्थी अपनी उत्तर पुस्तिका पर्यवेक्षक को सौंपे बिना और अपने रोल नंबर के सामने उचित स्थान पर उपस्थिति पत्रक पर हस्ताक्षर किए बिना परीक्षा हॉल/कक्ष से बाहर नहीं जा सकता। इसके अलावा अभ्यर्थी को उपस्थिति पत्रक पर हस्ताक्षर करने से पहले यह भी सुनिश्चित करना चाहिए कि बुकलेट नंबर, बुकलेट सीरीज और ओ एम् आर उत्तर पुस्तिका संख्या सही ढंग से लिखी गई हो। ऐसा ना करने पर, ओ एम् आर उत्तर पुस्तिका को अमान्य माना जाएगा/मूल्यांकन नहीं किया जा सकता है।**

Instructions to the Candidates

1. Before you start to answer the questions you must check this booklet and ensure that it contains all the pages (1-32) 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 strictly for the **post** candidate has applied for. If you find any defect in this Booklet, you must get it replaced immediately.
2. **OMR Answer-Sheet is within the Question booklet. Please ensure OMR Answer-Sheet number and Test Booklet No. of Question Paper are same. Read the instructions printed on OMR Answer sheet carefully before filling the information on the OMR Answer sheet. You must complete and code all the details on the OMR answer sheet correctly failing which your answer sheet may not be evaluated. 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 may 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). Candidate 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 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.
5. Question Booklet consists of **two** parts : **Part A :** Generic Area **(Q.No.1-42)**. **Part B** : Technical Area which will be further divided in two parts (i) Engineerig mathematics **(Q.No. 43-52)** (ii) **CS/IT (Q.No. 53-120)** or **ECE (Q.No. 53-120)**. For **Part B** (ii) Candidate will have choice to attempt either **CS/IT** part or **ECE** part. **Part A** and **Part B** (i) Engineering mathematics will be common for all candidates.
6. Candidate has choice to attempt either Electronics and Communication Part OR Computer Science and Information Technology Part. The choice attempted must be marked by darkening the correct circle on OMR answer sheet.
7. For each correct answer One mark will be given and for each incorrect answer **0.25** marks will be deducted.
8. 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.
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 at proper place against your roll number, further candidate should also ensure that booklet no., booklet series and OMR Answer sheet no. are correctly written on attendance sheet before signing on it, failing in doing so, may lead to disqualification/no evaluation of OMR Answer sheet.**

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 : _____

PART –A
(GENERIC)
(Q.no. 1 to 42)

1. The Indian Army's 'Quantum computing laboratory and a centre for artificial intelligence (AI)' has been set up in which state ?

(A) Gujarat (B) Maharashtra
(C) Madhya Pradesh (D) Kerala

2. By selling a pen for Rs. 99, Mohan gains 12.5%. What would be the cost price of the pen ?

(A) Rs. 77 (B) Rs. 85 (C) Rs. 88 (D) Rs. 82

3. Which Indian company has formed a Joint Venture (JV) with Foxconn, to manufacture semiconductors in India ?

(A) Vedanta (B) Hindalco (C) Tata (D) NALCO

4. Who was appointed as the Vice Chairman of Niti Aayog in 2022 ?

(A) Dr. Suman K Bery (B) Dr. Vijay Kumar Saraswat
(C) Dr. Arvind Virmani (D) Mr. Rao Inderjit Singh

5. In the question below are given three statements followed by two conclusions numbered I and II. You have to take the given statements to be true even if they seem to be at variance from commonly known facts and decide which of the given conclusion(s) logically follow (s) from the three given statements ?

Statements

I. All labels are packets.
II. All mobiles are cables.
III. Some mobiles are packets.

Conclusions

I. Some labels are mobile.
II. Some cables are label.

(A) If only Conclusion I follows
(B) If only Conclusion II follows
(C) If both Conclusions I and II follow
(D) If neither Conclusion I nor II follows

6. Study the information carefully and answer the question given below :

P is the husband of Q. R is the grandchild of P. P has only one child (son) who is married to T's child. T has only two children one son and one daughter. X is grandson of T. S is brother in law of son of T. U and V are children of T. W is married to the son of T. X is son of U's brother.

If T is married to Y then how is T related to R ?

(A) Maternal Grandfather or Maternal Grandmother
(B) Paternal Grandmother
(C) Paternal Grandfather
(D) Mother

7. The product of two numbers is 1575 and their quotient is 97. Then the sum of the numbers is :
(A) 80 (B) 74 (C) 90 (D) 78

8. Who is the current CEO of Youtube ?
(A) Susan Wojcicki (B) Neal Mohan
(C) Ajay Singh Banga (D) None of the option

9. If 10 persons can complete 2/5 of a work in 8 days, then how many persons would be required to complete the remaining work in 12 days ?
(A) 10 persons (B) 12 persons (C) 15 persons (D) 20 persons

10. Two taps A and B can fill a cistern in 30 minutes and 60 minutes, respectively. There is a third exhaust tap C at the bottom of the tank. If all the taps are opened at the same time, the cistern will be full in 45 minutes. In how much time can exhaust tap C empty the cistern when it is full ?
(A) 30 minutes (B) 90 minutes (C) 60 minutes (D) 36 minutes

11. In a family of five persons, Dinesh is Jairam's son and Gopal's brother while Meeta is Gopal's mother and Jayanti's daughter. If there are no step brothers or half brothers in the family, which of the following statements is **true** ?
(A) Jayanti is Dinesh's mother (B) Jayanti is Jairam's grandmother
(C) Meeta is Dinesh's mother (D) All of the above statements

12. Seats for Mathematics, Physics and Biology in a school are in the ratio 4 : 6 : 8. There is a proposal to increase these seats by 20%, 20% and 50% respectively. What will be the ratio of increased seats ?
(A) 2 : 3 : 4 (B) 6 : 7 : 8 (C) 6 : 8 : 9 (D) 2 : 3 : 5

13. Twelve per cent of Kaushal's monthly salary is equal to sixteen per cent of Nandini's monthly salary. Suresh's monthly salary is half that of Nandini's monthly salary. If Suresh's annual salary is Rs. 1.08 Lakhs, what is Kaushal's monthly salary ?
(A) Rs. 20,000 (B) Rs. 18,000 (C) Rs. 26,000 (D) Rs. 24,000

14. If a man spends 5/6 part of money and, again earns 1/2 part of the remaining money, what part of his money is with him now ?
(A) 1/2 (B) 1/4 (C) 2/3 (D) 5/12

15. The sum of the squares of two consecutive even numbers is 6500. Which is the smaller number ?
(A) 54 (B) 52 (C) 48 (D) 56

16. A survey of 100 candidates with respect to their choice of icecream flavour-vanilla, chocolate and strawberry produced the following information. 50 candidates like vanilla, 43 like chocolate, 28 like strawberry, 13 like vanilla and chocolate, 11 like chocolate and strawberry, 12 like strawberry and vanilla and 5 like all the three flavours. How many candidates like chocolate and strawberry, but not vanilla ?
(A) 24 (B) 10 (C) 6 (D) 32

17. Who has become the first Indian woman to scale five peaks above 8,000 metres ?

(A) Santosh Yadav (B) Malavath Purna

(C) Shivangi Pathak (D) Priyanka Mohite

18. If $\sqrt{15625} = 125$, then the value of $\sqrt{15625} + \sqrt{156.25} + \sqrt{1.5625}$, is :

(A) 1.3875 (B) 13.875 (C) 138.75 (D) 156.25

19. 5 persons A, B, C, D and E are sitting in a row facing North such that D is on the left of C and B is on the right of E. A is on the right of C and B is on the left of D. If E occupies a corner position, then who is sitting in the centre ?

(A) A (B) B (C) C (D) D

20. If A's income is 25% less than that of B, then how much per cent is B's income more than that of A ?

(A) $33\frac{1}{3}\%$ (B) $66\frac{2}{3}\%$ (C) $11\frac{2}{3}\%$ (D) None of these

21. Which one of the lakes of West Africa has become dry and turned into a desert ?

(A) Lake Victoria (B) Lake Faguibine (C) Lake Oguta (D) Lake Volta

22. From a class of 90 students, 45 appeared for JEE - Mains, 33 appeared for NEET and 19 appeared both JEE – Mains and NEET. How many of the students have neither appeared in JEE – Mains nor NEET ?

(A) 15 (B) 20 (C) 19 (D) 31

23. Which among the following longitudes determines Indian Standard Time ?

(A) 85.5°E (B) 83.5°E (C) 82.5°E (D) 84.5°E

24. PM Gati Shakti is a digital platform to :

(A) Increase the electricity generation from existing power stations

(B) Increase the speed of vehicles in National Highways

(C) Accelerate the electrification of Railways

(D) Facilitate integrated planning and coordinated implementation of infrastructure connectivity projects by different ministries

25. The ratio of students in school A, B and C is 5 : 4 : 7 respectively. If the number of students in the schools are increased by 20 per cent, 25 per cent and 20 per cent respectively then what will be the ratio of students in school A, B and C, respectively ?

(A) 5 : 5 : 7 (B) 30 : 25 : 42

(C) 30 : 20 : 49 (D) Cannot be determined

26. In a class, the average height of 35 girls was measured 160 cm. Later, on it was discovered that height of one of the girls was misread as 144 cm, while her actual height was 104 cm. What was the actual average height of the girls in the class ? (rounded off to two digits after decimal)

(A) 159.86 cm (B) 157.20 cm (C) 159.56 cm (D) None of these

27. Tata Motors Limited's electric vehicle arm, Tata Passenger Electric Mobility Limited (TPEML), completed its acquisition of Ford India's integrated manufacturing facility in January 2023, where was this facility located ?

(A) Chakan, Maharashtra (B) Kharkhoda, Haryana

(C) Sanand, Gujarat (D) Bhuj, Gujarat

28. The question below has a statement followed by two Conclusions I and II. Consider the statement and the following conclusions. Decide which of the conclusion follows from the statement ?

Statement : The best evidence of India's glorious past is the growing popularity of Ayurvedic medicines in the West.

Conclusions :

I. Ayurvedic medicines are not popular in India.

II. Allopathic medicines are more popular in India.

(A) If Conclusion I follows

(B) If Conclusion II follows

(C) If both Conclusions I and II follow

(D) If neither Conclusion I nor II follows

29. What can come in place of question mark (?) in the series given below ?

B, C, E, H, L, ?

(A) M (B) P (C) N (D) Q

30. Study the following instructions carefully and then answer the question that follows. In making decisions about the question, it is desirable to be able to distinguish between 'strong' and 'weak' arguments so far as they relate to the question. 'Weak' arguments may not be directly related to the question and may be of minor importance or may be related to the trivial aspect of the question. The question given below is followed by two arguments numbered I and II. You have to decide which of the arguments is a 'strong' argument and which is a 'weak' argument ?

Statement : Should computer knowledge be made compulsory for all school students ?

Arguments :

I. Yes, India is aiming at digitalizing its villages and starting computer education at school level will facilitate this.

II. Yes, this will help the youth to be better equipped to seek jobs as computer knowledge is considered as an essential skill.

(A) If only Argument I is strong

(B) If only Argument II is strong

(C) Neither Argument I nor II is strong

(D) If both Arguments I and II are strong

31. A and B are two partners in a business. A contributes Rs. 1,200 for 5 months and B contributes Rs. 750 for 4 months. If total profit is Rs. 450, what would be the profit share of A ?

(A) Rs. 350 (B) Rs. 200 (C) Rs. 150 (D) Rs. 300

32. Find the odd word.

(A) Raft (B) Igloo (C) Canoe (D) Dinghy

33. In the question given below, there is a statement followed by two conclusions numbered I and II. You have to assume everything in the statement to be true, then consider the two conclusions together and decide which of them logically follows from the information given in the statement

Statement : Unemployment is one of the main reasons for the poverty of the country.

Conclusions :

I. To end poverty, it is required to create employment opportunities.

II. All the people in the country are unemployed.

(A) If only Conclusion I follows (B) If only Conclusion II follows

(C) If both I and II follow (D) If neither I nor II follows

34. In making decisions about an important question, it is desirable to be able to distinguish between 'strong' arguments and 'weak' arguments. 'Strong' arguments are those which are both important and directly related to the question. 'Weak' arguments are those which are of minor importance and also may not be directly related to the question or may be related to a trivial aspect of the question. The question given below is followed by two arguments numbered I and II. You have to decide which of the arguments is a 'strong' argument and which is a 'weak' argument ?

Statement : Should young entrepreneurs be encouraged ?

Arguments :

I. Yes, they will help in the industrial development of the country.

II. Yes, they will reduce the burden on the employment market.

(A) If only Argument I is strong

(B) If only Argument II is strong

(C) If both Arguments I and II are strong

(D) Neither Argument I nor II is strong

35. A man can row 7 km/h in still water. If the river is running at 3 km/h, it takes 6 hours more in upstream than to go downstream for the same distance. What is the distance ?

(A) 10 km (B) 40 km (C) 20 km (D) 35 km

36. What can come in place of question mark (?) in the series given below ?

95, 94, 92, 89, 85, 80, ?

(A) 74 (B) 75 (C) 69 (D) 77

37. There are deer and peacocks in a zoo. By counting heads they are 80. The number of their legs is 200. How many peacocks are there ?

(A) 50 (B) 30 (C) 20 (D) 60

38. Choose an option that is a valid assumption for the below statement.

Statement : The Ministry of Railways introduces additional holiday special trains and also adds extra coaches to existing trains during vacations.

(A) During vacations, kids love to travel by trains instead of airplanes.

(B) Passenger traffic in trains significantly increases during vacations.

(C) People need change and like to see new trains during vacations.

(D) Engine drivers like to work for more hours during vacations.

39. From which country did the USA purchase Alaska to make it the 50th federating State ?

(A) Canada (B) Britain (C) Russia (D) France

40. Study the following information carefully and answer the given question.

Twelve persons are sitting in two parallel rows at equal distance facing each other. Q, R, S, T, U and V are sitting in Row-1 facing South. B, C, D, E, F and G are sitting in Row-2 facing North (but not necessarily in the same order).

G sits third to the right of B and one of them sits at the end of the row. Q sits at the right end of the row. Three persons sit between Q and T. F sits to the immediate left of G. Two persons sit between F and C. C who faces R sits to the immediate right of E. S faces D.U sits to the immediate left of S.

Who sits second to the left of the person facing V ?

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

41. What approximate value should come in place of the question mark (?) in the following questions ? (Note : You are not expected to calculate the exact value.)

$8787 \div 343 \times \sqrt{50} = ?$

(A) 180 (B) 140 (C) 250 (D) 100

42. Three years ago the average age of a family of 5 members was 27 years. On addition of a new member to the family, the present average age of the family is still 27 years. Find out the present age of the new member of the family.

(A) 16 Years (B) 12 Years (C) 24 Years (D) 20 Years

PART - B (Technical)
(i) : Engineering Mathematics
(Q.no. 43 to 52)

43. How many unique colors will be required for the proper vertex coloring of a bipartite graph having n vertices ?

(A) 0 (B) 1 (C) 2 (D) n

44. Consider a differential equation $y'(x) - y(x) = x$ with the initial condition $y(0)=0$. Using Euler's first order method with a step size of 0.1, the value of $y(0.3)$ is _____.

(A) 0.01 (B) 0.031 (C) 0.0631 (D) 0.1

45. A committee of two persons is selected from two men and two women. The probability that the committee will have no men is _____.

(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{3}{4}$

46. Which is not a Familiar Connectives in First Order Logic ?

(A) not (B) or (C) iff (D) and

47. Discuss minimum value of $f(x,y) = x^2 + y^2 + 6x + 12$.

(A) 3 (B) 6 (C) 9 (D) 12

48. Find the solution of the homogeneous system of equation whose coefficient matrix is $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 1 & 0 \\ 1 & 2 & 1 \end{bmatrix}$

(A) $(1,2,3)$ (B) $(0,0,0)$ (C) $(0,1,2)$ (D) $(1,1,1)$

49. The number of squares that can be formed on a chessboard is _____.

(A) 64 (B) 160 (C) 204 (D) 224

50. In a school, there are 1000 students, out of which 480 are girls. It is known that out of 480, 20% of the girls study in class XII. What is the probability that a student chosen randomly studies in Class XII, given that the chosen student is a girl ?

(A) 0.1 (B) 0.2 (C) 0.3 (D) 0.4

51. A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product P and 450 consumers like product Q. The least number of the consumers that must have liked both products is _____.

(A) 30 (B) 170 (C) 280 (D) 550

52. The value of $\oint[(cos\ x\ sin\ y\ -xy)\ dx\ +\ sin\ x\ cos\ y\ dy]$ over C : $x^2+y^2=1$, is :

(A) 0 (B) 1 (C) 2 (D) 3

PART - B (Technical)
(ii) : CS/IT
[Q.no. 53 to 120]

53. A digital signature is :
(A) a bit string giving identity of a correspondent
(B) a unique identification of a sender
(C) an encrypted signature of a sender
(D) an authentication of an electronic record by tying it uniquely to a key only a sender knows

54. Amongst which of the following is/are the type of agile methodologies ?
(A) Scrum (B) FDD
(C) DSDM (D) All of the mentioned above

55. In a ripple counter :
(A) whenever a flipflop sets to 1, the next higher FF toggles
(B) whenever a flipflop sets to 0, the next higher FF remains unchanged
(C) whenever a flipflop sets to 1, the next higher FF faces race condition
(D) whenever a flipflop sets to 0, the next higher FF faces race condition

56. A process executes the code :
fork();
fork();
fork();
The total number of child processes created is :
(A) 3 (B) 4 (C) 7 (D) 8

57. Let G be the context free grammar and is in the form of Chomsky Normal Form. If we want to derive a string of length n, then the number of productions to be used is : (length of derivation)
(A) $n+1$ (B) $n-1$ (C) $2*n+1$ (D) $2*n-1$

58. Firewalls operate by :
(A) The pre-purchase phase.
(B) Isolating Intranet from Extranet.
(C) Screening packets to/from the Network and provide controllable filtering of network traffic.
(D) None of the above.

59. Host X (on TCP/IPv4 network) sends an IP datagram M to host Y (also on TCP/IPv4 network). We assume that no error occurred during the transmission of datagram M. When M reaches Y, which of the following IP header field(s) may be different from that of the original datagram M ?
(i) TTL (ii) Checksum (iii) Fragment Offset
(A) (i) only (B) (i) and (ii) only
(C) (ii) and (iii) only (D) (i), (ii) and (iii)

60. Suppose that everyone in a group of N people wants to communicate secretly with the N–1 others using symmetric key cryptographic system. The communication between any two persons should not be decodable by the others in the group. The number of keys required in the system as a whole to satisfy the confidentiality requirement is :

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

61. In a compiler, keywords of a language are recognized during :

(A) parsing of the program
(B) code generation
(C) the lexical analysis of the program
(D) dataflow analysis

62. Which one of the following is a key factor for preferring B-trees to binary search trees for indexing database relations ?

(A) Database relations have a large number of records
(B) Database relations are sorted on the primary key
(C) B-trees require less memory than binary search trees
(D) Data transfer form disks is in blocks

63. Consider the grammar G = ({S, X, Y}, {a, b, c}, {S → XY, X → aXb | ∈, Y→ cY | ∈}). Which of the following string will not be generated by G ?

(A) w = aabbbbbcc (B) w = aabbcc
(C) w = aaabbbcccc (D) none

64. The value of j at the end of the execution of the following C program.

```
int incr (int i)
{
  static int count = 0;
  count = count + i;
  return (count);
}
main ()
{
  int i,j;
  for (i = 0; i <=4; i++)
    j = incr(i);
}
```

(A) 10 (B) 4 (C) 6 (D) 7

65. An application loads 100 libraries at start-up. Loading each library requires exactly one disk access. The seek time of the disk to a random location is given as 10 ms. Rotational speed of disk is 6000 rpm. If all 100 libraries are loaded from random locations on the disk, how long does it take to load all libraries ? (The time to transfer data from the disk block once the head has been positioned at the start of the block may be neglected).

(A) 0.50 s (B) 1.50 s (C) 1.25 s (D) 1.00 s

66. The following C declarations

```
struct node
{
  int i;
  float j;
};
struct node *s[10] ;
```

define s to be :

(A) An array, each element of which is a pointer to a structure of type node

(B) A structure of 2 fields, each field being a pointer to an array of 10 elements

(C) A structure of 3 fields : an integer, a float and an array of 10 elements

(D) An array, each element of which is a structure of type node

67. Which of the following statement is true about error detection techniques used on communications link ?

(A) Cyclic Redundancy Check (CRC) sequence can detect as well as correct errors.

(B) Error detection cannot be used on simplex links.

(C) Hamming code can detect up to 3-bit errors.

(D) All of the these.

68. An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which of the following conditions, can the relational table for R be merged with that of A ?

(A) Relation R is one-to-many and the participation of A in R is total.

(B) Relation R is one-to-many and the participation of A in R is partial.

(C) Relation R is many-to-one and the participation of A in R is total.

(D) Relation R is many-to-one and the participation of A in R is partial.

69. How many distinct binary search trees can be created out of 4 distinct keys ?

(A) 5 (B) 14 (C) 24 (D) 42

70. Let G be a weighted connected undirected graph with distinct positive edge weights. If every edge weight is increased by the same value, then which of the following statements is/are **TRUE** ?

P : Minimum spanning tree of G does not change

Q : Shortest path between any pair of vertices does not change

(A) Only Q correct (B) Only P correct

(C) Both P and Q are correct (D) Both P and Q are wrong

71. Given the basic ER and relational models, which of the following is **INCORRECT** ?

(A) An attribute of an entity can have more than one value

(B) An attribute of an entity can be composite

(C) In a row of a relational table, an attribute can have more than one value

(D) In a row of a relational table, an attribute can have exactly one value or a NULL value

72. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH→G, A→BC, B→CFH, E→A, F→EG} is a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs that hold for R.

How many candidate keys does the relation R have ?

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

73. Amongst which of the following is a **correct** sequence of the user interface design process ?

(A) Interface analysis and modelling → Interface design → Interface construction → Interface validation

(B) Interface design → Interface construction → Interface validation → Interface analysis and modelling

(C) Interface construction → Interface design → Interface validation → Interface analysis and modelling

(D) Interface validation → Interface design → Interface construction → Interface analysis and modelling

74. Consider the C function given below :

```
int f(int j)
{
  static int i = 50;
  int k;
  if (i == j)
  {
    printf("something");
    k = f(i);
    return 0;
  }
  else return 0;
}
```

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

(A) The function returns 0 for all values of j.

(B) The function prints the string something for all values of j.

(C) The function returns 0 when j = 50.

(D) The function will exhaust the runtime stack or run into an infinite loop when j = 50.

75. Companies like Flipkart, Amazon and Myntra belong to mainly which type of E-commerce (EC) segment ?

(A) B2B (B) B2C (C) P2P (D) C2B

76. In public key encryption if A wants to send an encrypted message :

(A) A encrypts message using his private key

(B) A encrypts message using B's private key

(C) A encrypts message using B's public key

(D) A encrypts message using his public key

77. The message 100100 is to be transmitted using the CRC polynomial x^3+x^2+1 to protect it from errors. The message that should be transmitted is :

(A) 001100100 (B) 100001100 (C) 100100001 (D) 100100101

78. Consider the following productions :

$S \rightarrow aA \mid bB$

$A \rightarrow aA \mid b$

$B \rightarrow bB \mid c$

What is the First(S) ?

(A) {a} (B) {b} (C) {a, b} (D) {$\in$}

79. convert the $1101.11_{(2)}$ to decimal :

(A) 13.75 (B) 13.65 (C) 13.55 (D) None

80. In which step of SDLC actual programming of software code is done ?

(A) Development and Documentation

(B) Maintenance and Evaluation

(C) Design

(D) Analysis

81. In quick sort, for sorting n elements, the $(n/4)^{th}$ smallest element is selected as pivot using an O(n) time algorithm. What is the worst case time complexity of the quick sort ?

(A) $\theta(n)$ (B) $\theta(n \log n)$ (C) $\theta(n^2)$ (D) $\theta(n^2 \log n)$

82. Which is the **correct** CSS syntax ?

(A) body:color=black; (B) {body;color:black;}

(C) {body:color=black(body)} (D) body {color: black;}

83. The functionality of software model to its users to quickly and then refines and expands on that functionality in later software releases _____.

(A) Incremental Process Model (B) Waterfall Model

(C) Spiral Model (D) All of the mentioned above

84. In an IPv4 datagram, the M bit is 0, the value of HLEN is 20, the value of total length is 500 and the fragment offset value is 300. The position of the datagram, the sequence numbers of the first and the last bytes of the payload, respectively are :

(A) Last fragment, 2400 and 2789

(B) Last fragment, 2400 and 2819

(C) First fragment, 2400 and 2819

(D) Middle fragment, 300 and 420

85. Consider the function *func* shown below :

```
int func(int num)
{
   int count = 0;
   while (num)
   {
      count++;
      num >>= 1;
   }
   return (count);
}
```

The value returned by func(435) is _____.

(A) 435 (B) 76 (C) 9 (D) 24

86. _____ means that data used during the execution of a transaction cannot be used by a second transaction until the first one is completed.

(A) Serializability (B) Atomicity (C) Isolation (D) Time stamping

87. A shared variable x, initialized to zero, is operated on by four concurrent processes W, X, Y, Z as follows. Each of the processes W and X reads x from memory, increments by one, stores it to memory, and then terminates. Each of the processes Y and Z reads x from memory, decrements by two, stores it to memory, and then terminates. Each process before reading x invokes the P operation (i.e., wait) on a counting semaphore S and invokes the V operation (i.e., signal) on the semaphore S after storing x to memory. Semaphore S is initialized to two. What is the maximum possible value of x after all processes complete execution ?

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

88. Consider the following program in C language :

```
#include <stdio.h>
main()
{
   int i;
   int *pi = &i;
   scanf("%d", pi);
   printf("%d\n", i+5);
}
```

Which one of the following statements is **TRUE** ?

(A) Compilation fails.

(B) Execution results in a run-time error.

(C) On execution, the value printed is 5 more than the address of variable i.

(D) On execution, the value printed is 5 more than the integer value entered.

89. The number of tokens in the following C statement is :

printf("i = %d, &i = %x",i, &i);

(A) 10 (B) 3 (C) 26 (D) 21

90. For a database relation R (a, b, c, d), where the domains of a, b, c, d include only atomic values, only the following functional dependencies and those that can be inferred from them hold :

$a \rightarrow c$

$b \rightarrow d$

This relation is _____.

(A) in first normal form but not in second normal form

(B) in second normal form but not in third normal form

(C) in third normal form

(D) None of the above

91. In fractional Knapsack problem, the best strategy to get the optimal solution, where Pi, Wi is the Profit, Weight associated with each of the Xi th object respectively is to :

(A) Arrange the values Pi/Wi in ascending order

(B) Arrange the values Pi/Xi in ascending order

(C) Arrange the values Pi/Wi in descending order

(D) Arrange the values Pi/Xi in descending order

92. A system uses FIFO policy for page replacement. It has 4-page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then accesses the same 100 pages but now in the reverse order. How many page faults will occur ?

(A) 194 (B) 195 (C) 196 (D) 197

93. The time complexity of the normal quick sort, randomized quick sort algorithms in the worst case is :

(A) $O(n^2)$, $O(n \log n)$ (B) $O(n^2)$, $O(n^2)$

(C) $O(n \log n)$, $O(n^2)$ (D) $O(n \log n)$, $O(n \log n)$

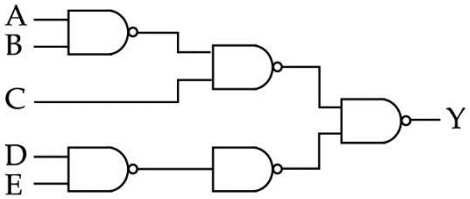
94. After groups have been established, SQL applies predicates in the _____ clause, allowing aggregate functions to be used.

(A) where (B) having (C) group by (D) with

95. A multithreaded program P executes with x number of threads and uses y number of locks for ensuring mutual exclusion while operating on shared memory locations. All locks in the program are *non-reentrant*, i.e., if a thread holds a lock l, then it cannot re-acquire lock l without releasing it. If a thread is unable to acquire a lock, it blocks until the lock becomes available. The *minimum* value of x and the *minimum* value of y together for which execution of P can result in a deadlock are :

(A) $x = 1, y = 2$ (B) $x = 2, y = 1$ (C) $x = 2, y = 2$ (D) $x = 1, y = 1$

96. The circuit of the given figure realizes the function _____.



(A) Y = (A' + B')C + (DE)' (B) Y = A' + B' + C' + D' + E'

(C) Y = AB + C + DE (D) Y = AB + C(D + E)

97. CMM model is used to _____.

(A) Improve the software process (B) Software maintenance

(C) Software testing (D) None of the mentioned above

98. Which of the property of software modularity is **incorrect** with respect to benefits software modularity ?

(A) Modules are robust

(B) Module can use other modules

(C) Modules can be separately compiled and stored in a library

(D) Modules are mostly dependent

99. The inorder and preorder traversal of a binary tree are 'd b e a f c g' and 'a b d e c f g' respectively. The postorder traversal of the binary tree is :

(A) d e f g b c a (B) e d b f g c a

(C) e d b g f c a (D) d e b f g c a

100. Assume that in a certain computer, the virtual addresses are 64 bits long and the physical addresses are 48 bits long. The memory is word addressable. The page size is 8 kB and the word size is 4 bytes. The Translation Look-aside Buffer (TLB) in the address translation path has 128 valid entries. At most how many distinct virtual addresses can be translated without any TLB miss ?

(A) 16×2^{10} (B) 256×2^{10} (C) 4×2^{20} (D) 8×2^{10}

101. Consider the following C-program :

```
void foo(int n, int sum)
{
 int k = 0, j = 0;
 if (n == 0) return;
   k = n % 10;
 j = n / 10;
 sum = sum + k;
 foo (j, sum);
 printf ("%d,", k);
}
int main ()
{
 int a = 2048, sum = 0;
 foo (a, sum);
 printf ("%d\n", sum);
 getchar();
}
```

What does the above program print ?

(A) 8, 4, 0, 2, 14 (B) 8, 4, 0, 2, 0 (C) 2, 0, 4, 8, 14 (D) 2, 0, 4, 8, 0

102. Using which tag we insert a JavaScript in HTML page ?

(A) <JavaScript type="text/javascript">

(B) <script type="text/javascript">

(C) <JScript type="text/javascript">

(D) <HTMLScript type="text/javascript">

103. Let S be an NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial-time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is **true** ?

(A) R is NP-Hard (B) R is NP-Complete

(C) Q is NP-Hard (D) Q is NP-Complete

104. The phrase _____ describes viruses, worms, trojan horse attack applets and attack scripts.

(A) malware (B) spam (C) phish (D) virus

105. A non-pipelined single cycle processor operating at 100 MHz is converted into a synchronous pipelined processor with five stages requiring 2.5 nsec, 1.5 nsec, 2 nsec, 1.5 nsec and 2.5 nsec respectively. The delay of the latches is 0.5 nsec. The speedup of the pipeline processor for a large number of instructions is :

(A) 4.5 (B) 4.0 (C) 3.33 (D) 3.0

106. Which of the following statement is **True** ?

(A) <%-- comment --%> is JSP comment. <!-- comment --> is an HTML comment.
(B) <%-- comment --%> is ignored by JSP container.
(C) <!-- comment --> is ignored by browser.
(D) All of the above

107. The JavaScript exception is available to the Java code as an instance of _____.

(A) netscape.javascript.JSObject (B) netscape.javascript.JSException

(C) netscape.plugin.JSException (D) None of the above

108. Suppose two hosts use a TCP connection to transfer a large file. Which of the following statements is/are False with respect to the TCP connection ?

(i) If the sequence number of a segment is m, then the sequence number of the subsequent segment is always m+1.

(ii) If the estimated round trip time at any given point of time is t sec, the value of the retransmission timeout is always set to greater than or equal to t sec.

(iii) The size of the advertised window never changes during the course of the TCP connection.

(iv) The number of unacknowledged bytes at the sender is always less than or equal to the advertised window.

(A) (iii) only (B) (i) and (iii) only

(C) (i) and (iv) only (D) (ii) and (iv) only

109. Consider the following languages
L1 = {ab, aabb, aaabbb, aaaabbbb}.
L2 = {w | w ∈ (a + b) * and the number a's in w is equal to number of b's in w}.
Which of the following statement is correct ?

(A) L1 is not regular and L2 is regular
(B) Both L1 and L2 are regular
(C) L1 is regular but L2 is not regular
(D) Both L1 and L2 are not regular

110. An undirected graph G has n nodes. Its adjacency matrix is given by an $n \times n$ square matrix whose (i) diagonal elements are 0's and (ii) non-diagonal elements are 1's.

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

(A) Graph G has no minimum spanning tree (MST)

(B) Graph G has a unique MST of cost $n-1$

(C) Graph G has multiple distinct MSTs, each of cost $n-1$

(D) Graph G has multiple spanning trees of different costs

111. The time complexity of the following recurrence relation is :

$$T(n) = \begin{cases} T(n-1) + O(n), & \text{if } n > 1 \\ O(1), if\ n = 1 \end{cases}$$

(A) O(n) (B) O(nlog n) (C) $O(n^2 \log n)$ (D) $O(n^2)$

112. Consider three CPU-intensive processes, which require 10, 20 and 30-time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm ? Do not count the context switches at time zero and at the end.

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

113. Which of the following is **TRUE** ?

(A) Every relation in 3NF is also in BCNF

(B) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R

(C) Every relation in BCNF is also in 3NF

(D) No relation can be in both BCNF and 3NF

114. What will be the output of the following C++ code ?

```
#include <iostream>
#include <string>
Using namespace std;
Int  main(int argc, char const *argv[ ])
{
      Char  s1[6] = "Hello";
Char  s2[6] = "World";
Char  s3[12] =  s1 + " " + s2;
Cout<<s3;
return 0;
}
```

(A) Hello (B) World (C) Error (D) Hello World

115. Consider the following three C functions :

```
[P1] int * g (void)
{
 int x = 10;
 return (&x);
}

[P2] int * g (void)
{
 int * px;
 *px = 10;
 return px;
}

[P3] int *g (void)
{
 int *px;
 px = (int *) malloc (sizeof(int));
 *px = 10;
 return px;
}
```

Which of the above three functions are likely to cause problems with pointers ?

(A) Only P3

(B) Only P1 and P3

(C) Only P1 and P2

(D) P1, P2 and P3

116. In which one of the following page replacement policies, Belady's anomaly may occur ?

(A) FIFO (B) Optimal (C) LRU (D) MRU

117. Cyclomatic complexity is :

(A) White-box testing (B) Black box testing

(C) Grey box testing (D) All of the above

118. Consider the following C function :

```
int fun1 (int n)
{
  int i, j, k, p, q = 0;
  for (i = 1; i<n; ++i)
  {
    p = 0;
    for (j=n; j>1; j=j/2)
      ++p;
    for (k=1; k<p; k=k*2)
      ++q;
  }
  return q;
}
```

Which one of the following most closely approximates the return value of the function fun1 ?

(A) n3 (B) n (log n)2 (C) n log n (D) n log (log n)

119. A Priority-Queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is given below :

10, 8, 5, 3, 2. Two new elements '1' and '7' are inserted in the heap in that order. The level-order traversal of the heap after the insertion of the elements is :

(A) 10, 8, 7, 5, 3, 2, 1 (B) 10, 8, 7, 2, 3, 1, 5

(C) 10, 8, 7, 1, 2, 3, 5 (D) 10, 8, 7, 3, 2, 1, 5

120. Which of the following is/are shared by all the threads in a process ?

I. Program counter II. Stack

III. Address space IV. Registers

(A) I and II only (B) IV only

(C) III only (D) III and IV only

PART B (Technical)
(ii) : ECE [Q.No. 53 to 120]

53. What is the major drawback of anomaly detection IDS ?
(A) These are very slow at detection
(B) It generates many false alarms
(C) It doesn't detect novel attacks
(D) None of the mentioned

54. Consider the following 8086 program.
MOV AX, BB11H
MOV CX, 1122H
ADD AX, CX
HLT
The result of this program will be :
(A) CX = CC33H (B) AX = CC33H (C) CX = BB11H (D) AX = BB11H

55. If a Zener diode having breakdown voltage 5.8 V and knee current 0.5 mA is used in a voltage regulator circuit with 1000 Ω series resistor. What will be the maximum load current drawn from the circuit ensuring proper functioning over the input voltage range between 20 and 30 volts ?
(A) 23.7 mA (B) 14.2 mA (C) 13.7 mA (D) 24.2 mA

56. If the characteristic equation of a closed loop system is $s^2 + 2s + 2 = 0$ then the system is :
(A) Over damped (B) Critically damped
(C) Under damped (D) Undamped

57. An N channel JFET has $I_{DSS} = 2$ mA, $V_P = -4$V. Its transconductance g_m (in mʊ) for an applied $V_{GS} = -2$ V will be :
(A) 0.25 (B) 0.5 (C) 0.75 (D) 1.0

58. In _____, a claimant proves his/her identity to the verifier by using one of the three kinds of witnesses.
(A) Message authentication (B) Entity authentication
(C) Message confidentiality (D) Message integrity

59. A system has poles at 0.01 Hz, 1 Hz and 80 Hz; zeros at 5 Hz, 100 Hz and 200 Hz. The approximate phase of the system at 20 Hz is _____.
(A) $-90°$ (B) $0°$ (C) $90°$ (D) $-180°$

60. Which component is included in IP security ?
(A) Authentication Header (AH)
(B) Encapsulating Security Payload (ESP)
(C) Internet Key Exchange (IKE)
(D) All of the mentioned

61. Which of the following is true when the sampling time becomes less than the Nyquist interval ?

(A) Original signal can be recreated

(B) Bandwidth decreases

(C) Bandwidth increases

(D) Channel capacity decreases

62. The resolution of a 4-bit ADC is 0.5 V. For an analog input of 6.6 V the digital data generated by the ADC will be :

(A) 1011 (B) 1101 (C) 1100 (D) 1110

63. The early effect in a BJT is caused by :

(A) Fast turn on (B) Fast turn off

(C) Large CB junction reverse bias (D) Large EB junction forward bias

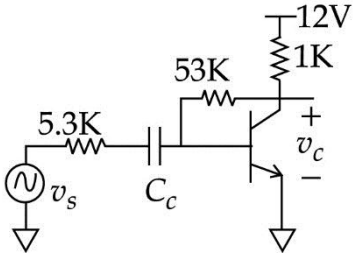
64. The output of an LVDT is connected to a 5 V voltmeter through an amplifier of gain 250. If an output of 2 mV appears across the terminals of LVDT with core movement of 0.5 mm then the sensitivity of the LVDT and the whole setup will be _____ respectively.

(A) 4 mV/mm and 100 mV/mm (B) 4 mV/mm and 1000 mV/mm

(C) 0.4 mV/mm and 1 V/mm (D) 0.4 mV/mm and .1 V/mm

65. The transistor of the circuit shown in the figure below has the following parameters $\beta_{DC} = 60$, $V_{BE} = 0.7$, $h_{ie} \to \infty$, $h_{fe} \to \infty$

Under DC conditions the collector to emitter voltage drop will be :



(A) 4.8 V (B) 5.3 V (C) 5.95 V (D) 6.6 V

66. The output Y of a 2-bit comparator is logic 1 whenever the 2-bit input A is greater than the 2-bit input B. The number of combinations for which output is logic 1 is _____.

(A) 4 (B) 6 (C) 8 (D) 10

67. The open loop transfer function with unity gain feedback is given below for different systems. The unstable system is _____.

(A) $12/s+2$ (B) $12/s^2(s+2)$ (C) $12/s(s+2)$ (D) $12(s+1)/s(s+2)$

68. A memory connected to a microprocessor has 20 address lines and 16 data lines. What will be the memory capacity ?

(A) 8 kB (B) 2 MB (C) 16 MB (D) 64 kB

69. If 8085 executes the following instructions :

MVI A, 3AH

MVI B, 49H

SUB B

then :

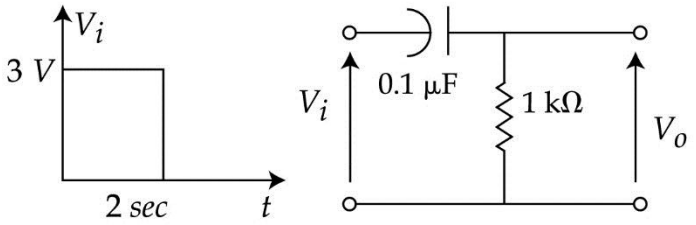
(A) A = F1, CY = 1, S = 1 (B) A = 0F, CY = 1, S = 1

(C) A = F1, CY = 0, S = 0 (D) A = 1F, CY = 1, S = 1

70. A sinusoidal modulating waveform of amplitude 5 V and a frequency of 2 kHz is applied to FM generator, which has a frequency sensitivity of 40 Hz/volt. Calculate the bandwidth.

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

71. A square pulse of 3 V amplitude is applied to a CR circuit as shown in the following circuit. If the capacitor is initially uncharged then the output voltage V_0 at time t = 2 seconds is :



(A) 3 V (B) −3 V (C) 4 V (D) −4 V

72. If SS : 3860H, SP : 1735H and BP : 4826H then starting address of the stack and Top of the stack will be _____ respectively.

(A) 17350H and 48260H (B) 38600H and 48260H

(C) 38600H and 17350H (D) 41226H and 38135H

73. In 8051 microcontroller internal RAM is of 128 bytes, out of which _____ bytes are bit addressable.

(A) 8 (B) 16 (C) 32 (D) 64

74. A moving coil meter gives a full-scale deflection of 10 mA when the potential difference across its terminals is 100 mV. The shunt and series resistances for making this meter 0-100 A ammeter and 0-1000 V voltmeter will be _____ respectively.

(A) 0.11 Ω and 1 kΩ (B) 0.010 Ω and 10 kΩ

(C) 0.1 Ω and 100 kΩ (D) 0.001 Ω and 100 kΩ

75. Aging register is :

(A) Counters which indicate how long ago their associated pages have been referenced

(B) Registers which keep track of when the program was last accessed

(C) Counters to keep track of last accessed instruction

(D) Counters to keep track of the latest data structures referred

76. Which of the following statements is true about the VPN in Network security ?
(A) It is a type of device that helps to ensure that communication between a device and a network is secured.
(B) It is usually based on the IPsec (IP Security) or SSL (Secure Sockets Layer).
(C) It typically creates a secured, encrypted virtual "tunnel" over the open internet.
(D) All of the above

77. Twelve 1 Ohm resistors are used as edges to form a cube. The resistance between the two diagonally opposite corners of the cube is :
(A) 5/6 Ohm (B) 1 Ohm (C) 6/5 Ohm (D) 3/2 Ohms

78. The bandwidth of FDMA channel is _____.
(A) Wide (B) Narrow (C) Large (D) Zero

79. A silicon sample is doped with 10^{18} atom/cm^3 of Boron. Another sample of B of identical dimensions is doped with 10^{18} atom/cm^3 of Phosphorous. If the ratio of electron to hole mobility is 3 then the ratio of conductivity of the sample A to B is :
(A) 3 (B) 1/3 (C) 2/3 (D) 3/2

80. The instruction, MOV AX, 1234H is an example of :
(A) register addressing mode (B) direct addressing mode
(C) immediate addressing mode (D) based indexed addressing mode

81. A TDMA system uses 25 MHz for the forward link, which is broken into radio channels of 200 kHz. If 8 speech channels are supported on a single radio channel, how many simultaneous users can be accommodated ?
(A) 25 (B) 200 (C) 1600 (D) 1000

82. Cache memory works on the principle of :
(A) Locality of data (B) Locality of memory
(C) Locality of reference (D) Locality of reference and memory

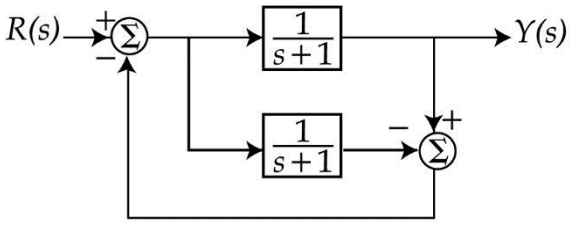
83. In 8086 the length of the instruction queue is of :
(A) 6 bytes (B) 8 bytes (C) 16 bytes (D) 16 bits

84. If a PD controller is used to compensate a system, then compared to uncompensated system, the compensated system has :
(A) More rise time
(B) Reduced damping
(C) Higher noise amplification
(D) Larger transient overshoot

85. A thermometer is calibrated between 150°C to 200°C. If the accuracy is specified within $+/-$ 0.25% then the maximum static error will be :
(A) $+/-$ 0.125°C (B) $+/-$ 0.25°C (C) $+/-$ 0.4°C (D) $+/-$ 0.8°C

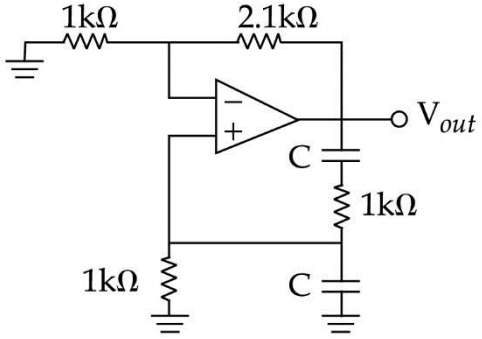
86. 8086 flag register size is of _____ Bit. It has _____ status flag and _____ control flags.
(A) 16, 6 and 3 (B) 8, 6 and 3 (C) 16, 5 and 4 (D) 16, 7 and 2

87. The transfer function Y(s)/R(s) of the system shown in the figure below is :



(A) 0 (B) $1/(s+1)$ (C) $2/(s+1)$ (D) $2/(s+33)$

88. In the circuit shown below, the value of C required for sinusoidal oscillations of frequency 1 kHz is :



(A) $[1/2\pi]$ μF (B) $[2\pi]$ μF (C) $[1/2\pi(6)^{1/2}]$ μF (D) $[2\pi(6)^{1/2}]$ μF

89. In an ADC, over sampling is a technique used to _____.

(A) reduce the effect of input noise
(B) improve conversion clock stability
(C) reduce quantization noise
(D) improve power supply rejection ratio

90. Which of the following addressing method does the instruction MOV AX, [BX] represent ?

(A) register indirect addressing mode
(B) direct addressing mode
(C) register addressing mode
(D) register relative addressing mode

91. The action of a JFET in its equivalent circuit can be best represented as a :

(A) Current controlled current source
(B) Current controlled voltage source
(C) Voltage controlled voltage source
(D) Voltage controlled current source

92. In a direct sequence CDMA system, the chip rate is 1.2288×10^6 chips per second. If the processing gain is desired to be at least 100, the data rate _____.

(A) must be less than or equal to 12.288×10^3 bps

(B) must be greater than or equal to 12.268×10^3 bps

(C) must be equal to 12.268×10^3 bps

(D) None of the above

93. The current gain of BJT is :

(A) $g_m r_o$ (B) g_m / r_o (C) $g_m r_\pi$ (D) g_m / r_π

94. A source of angular frequency 1 rad/sec has a source impedance of 1 ohm resistance in series with 1 H inductance. The load that will obtain the maximum power transfer is _____.

(A) 1 Ohm resistance

(B) 1 Ohm resistance in parallel with 1 H inductance

(C) 1 Ohm resistance in series with 1 F capacitance

(D) 1 Ohm resistance in parallel with 1 F capacitance

95. Which of the following statement is correct ?

(A) Bandwidth requirement of DPCM is more than PCM

(B) Bandwidth requirement of DPCM is equal to PCM

(C) Bandwidth requirement of DPCM is less than PCM

(D) None of the above

96. The concentration of minority carriers in an extrinsic semiconductor is :

(A) directly proportional to doping concentration

(B) inversely proportional to doping concentration

(C) directly proportional to intrinsic concentration

(D) inversely proportional to intrinsic concentration

97. In 8255 Port A can be operated in _____ different modes.

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

98. After 8051 microcontroller is reset which of the following is **true** ?

(A) SP = 08H, P1 = 00H, RS1 = 0, RS0 = 0

(B) SP = 07H, P1 = 00H, RS1 = 1, RS0 = 0

(C) SP = 07H, P1 = FFH, RS1 = 0, RS0 = 1

(D) SP = 07H, P1 = FFH, RS1 = 0, RS0 = 0

99. A modulating signal $m(t)=10\cos(2\pi\times10^3t)$ is amplitude modulated with a carrier signal $c(t)=50\cos(2\pi\times10^5t)$. If the value of modulation index is 0.2, then the power required for transmitting AM wave :

(A) 1350 W (B) 1275 W (C) 625 W (D) 1450 W

100. Companding is used _____.

(A) to overcome quantizing noise in PCM

(B) in PCM transmitters, to allow amplitude limiting in the receivers

(C) to protect small signals in PCM from quantizing distortion

(D) in PCM receivers, to overcome impulse noise

101. The minimum number of 2×1 multiplexer needed for implementing 2 input AND gate and XOR gate will be _____ respectively.

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

102. If the byte address of port 0 of 8051 microcontroller is 80h then its D0 pin will be addressed by :

(A) 00h (B) 08h (C) 80h (D) FFh

103. A 2000 bps binary information data signal is required to be transmitted in half duplex mode using BFSK digital modulation technique. If the separation between two carrier frequencies is 4000 Hz, then the minimum bandwidth of the BPSK signal is _____.

(A) 4 kHz (B) 6 kHz (C) 8 kHz (D) 12 kHz

104. A qualitative risk assessment is used to identify :

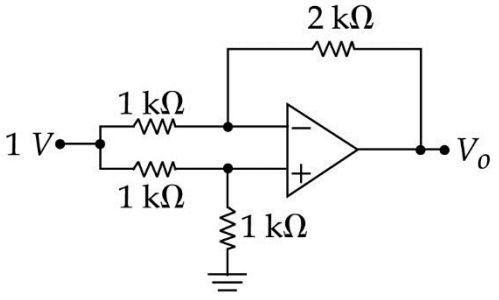
(A) Vulnerabilities, threats and countermeasures

(B) Vulnerabilities, threats, threat probabilities and countermeasures

(C) Assets, risks and mitigation plans

(D) Vulnerabilities and countermeasures

105. For the OPAMP circuit shown in the figure V_o is :

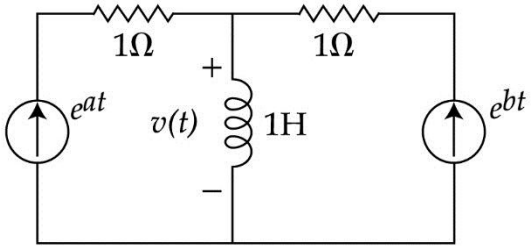


(A) -2 V (B) -1 V (C) -0.5 V (D) 0.5 V

106. How many address lines will be needed to address 8 kB RAM chip ?
(A) 11 (B) 12 (C) 13 (D) 14

107. If CS = 1115H and IP = 5554H then BIU will fetch the instruction from the location :
(A) 11150H (B) 55540H (C) 66690H (D) 166A4H

108. In the following circuit, the voltage v(t) is :



(A) $e^{at} - e^{bt}$ (B) $e^{at} + e^{bt}$ (C) $ae^{at} - be^{bt}$ (D) $ae^{at} + be^{bt}$

109. A particular green LED emits light of wavelength 5490 A. Taking $h = 6.626 \times 10^{-34}$ J-sec the energy band gap of the semiconductor material used in the LED is :
(A) 2.26 eV (B) 1.98 eV (C) 1.17 eV (D) 0.74 eV

110. A 0 to 6 counter consists of 3 F/Fs and a combinational circuit of 2 input logic gates. The combinational circuit consists of _____.
(A) one AND gate
(B) one OR gate
(C) one AND gate and one OR gate
(D) two AND gates

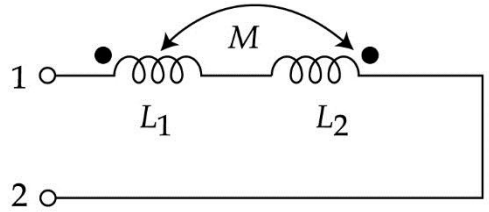
111. Which of the following modulation schemes gives the maximum probability of error ?
(A) DBPSK (B) PSK (C) BPSK (D) ASK

112. Choose the correct match for input resistance of various amplifier configurations shown below.

Configurations	Input resistance
(i) Common Base	(a) LOW
(ii) Common Collector	(b) MODERATE
(iii) Common Emitter	(c) HIGH

(A) (i)-(a), (ii)-(b), (iii)-(c) (B) (i)-(a), (ii)-(c), (iii)-(b)
(C) (i)-(b), (ii)-(c), (iii)-(a) (D) (i)-(c), (ii)-(a), (iii)-(b)

113. The equivalent inductance measured between the terminals 1 and 2 for the circuit shown in figure below is :



(A) $L_1 + L_2 + M$ (B) $L_1 + L_2 - M$ (C) $L_1 + L_2 + 2M°$ (D) $L_1 + L_2 - 2M$

114. For a binary half subtractor having two inputs A and B, the correct set of two outputs D = A − B and X = borrow are :

(A) $D = AB + A'B, X = A'B$ (B) $D = A'B + AB', X = AB'$

(C) $D = A'B + AB', X = A'B$ (D) $D = AB + A'B' X = AB'$

115. A CRT has an anode voltage of 2000 V, and vertical deflecting plates are 2 cm long and 5 mm apart. What will be the input voltage to the vertical amplifier of gain 100 for deflecting the electron beam to 3 cm ?

(A) 1 V (B) 10 V (C) 100 V (D) 1000 V

116. Which of the following subsystem provides radio transmission between mobile station and MSC ?

(A) BSS (B) NSS (C) OSS (D) BSC

117. In 8086 MUL CX instruction multiplies two 16-bit word and store the result in :

(A) AX and BX registers (B) BX and CX registers

(C) AX and CX registers (D) DX and AX registers

118. A video camera generates data at a rate of 5 Mbps. The data is channel coded at rate 1/3 and 8 PSK modulated. Which of the following statements is **correct** ?

(A) Information rate : 15 Mbps ; Symbol rate : 5 Msps

(B) Information rate : 5 Mbps ; Symbol rate : 15 Msps

(C) Information rate : 15 Mbps ; Symbol rate : 15 Msps

(D) Information rate : 5 Mbps ; Symbol rate : 5 Msps

119. Match the following.

GROUP A		GROUP B	
P	Shift register	1	Frequency division
Q	Counter	2	Addressing in memory chips
R	Decoder	3	Serial to parallel data conversion

(A) P-3, Q-2, R-1 (B) P-3, Q-1, R-2

(C) P-2, Q-1, R-3 (D) P-1, Q-3, R-2

120. The representation of 4 bit code 1101 into 7 bit, even parity Hamming code is :

(A) (1010101) (B) (1111001) (C) (1011101) (D) (1110000)

- o O o -

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK