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

पुस्तिका सं./Booklet No. : 12673

परीक्षा प्रश्न-पुस्तिका/EXAMINATION QUESTION BOOKLET

निर्धारित समय : 3 घंटे (दृष्टिबाधित उम्मीदवारों के लिए : 4 घंटे) अधिकतम अंक : 120

Time Allowed : 3 Hours (For V.H. Candidates : 4 Hours) 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। इस पुस्तिका में प्रश्न अंग्रेजी में दिए गए हैं।

Read the following instructions carefully before you begin to answer the questions. This booklet contains question in English.

उम्मीदवारों के लिए अनुदेश

1. प्रश्नों के उत्तर लिखना आरंभ करने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-24) हैं तथा कोई पृष्ठ या उसका भाग कम या दुबारा तो नहीं आ गया है। उम्मीदवारों को यह भी जाँच करनी है कि उनको केवल उस स्ट्रीम की परीक्षा-पुस्तिका मिली है जिसके लिए उन्होंने आवेदन किया है अर्थात कंप्यूटर साइंस/इंजीनियरिंग भाग या सूचना प्रौद्योगिकी भाग या इलेक्ट्रॉनिक्स और कम्युनिकेशन/टेलीकम्यूनिकेशन भाग। यदि आप इस पुस्तिका में कोई त्रुटि पाएं, तो तत्काल इसके बदले दूसरी पुस्तिका ले लें।
2. निरीक्षक द्वारा आपको ओ एम् आर उत्तर-शीट अलग से दी जाएगी। ओ एम् आर उत्तर-शीट में विवरण भरने से पहले, आपको ओ एम् आर उत्तर-शीट पर मुद्रित अनुदेशों को सावधानी पूर्वक पढ़ना चाहिए। आपको ओ एम् 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 एम् 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 एम् आर उत्तर-शीट का मूल्यांकन नहीं किया जायेगा। (दृष्टिहीन उम्मीदवारों के लिए यह विवरण लेखक द्वारा भरे जायेंगे। फिर भी, सभी दृष्टिहीन उम्मीदवारों को ओ 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. इस प्रश्न-पुस्तिका में 120 बहुविकल्पीय प्रश्न हैं (भाग A एवं भाग B प्रत्येक में 60 प्रश्न है)। 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 और प्रत्येक गलत उत्तर के लिए 0.25 अंक काट लिया जाएगा।**
5. उम्मीदवार को दोनों भागों के उत्तर लिखना अनिवार्य है।
6. 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।
7. किसी भी स्थिति में उत्तर-शीट को न मोड़ें।
8. उत्तर-पुस्तिका पर कोई भी रफ कार्य नहीं करना है रफ कार्य के लिए इस पुस्तिका में स्थान दिया गया है।
9. 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।
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।

Instructions to the Candidates

1. Before you start to answer the questions you must check up this booklet and ensure that it contains all the pages (1-24) and see that no page or portion thereof is missing or repeated. Candidates are also required to check that they have got the right question 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 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 Answer sheet carefully before filling the information on the OMR Answer sheet. You must complete and code the details as per the instructions given in the OMR answer sheet carefully. You must also put your signature on the OMR Answer-Sheet at the prescribed place before you actually start answering the questions. These instructions must be fully complied with, failing which, your 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 (Section A and Section B both contains 60 questions each). 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 Sections 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 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 : _____

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SECTION – A

GENERAL APTITUDE

Choose the most appropriate option.

1. What is the maximum number of distinct handshakes that can happen in the room with 5 people in it ?

   A) 15

   B) 10

   C) 6

   D) 5

2. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train ?

   A) 120 metres

   B) 180 metres

   C) 324 metres

   D) 150 metres

3. The percentage profit earned by selling an article for Rs. 1,920 is equal to the percentage loss incurred by selling the same article for Rs. 1,280. At what price should the article be sold to make 25% profit ?

   A) Rs. 2,000

   B) Rs. 2,200

   C) Rs. 2,400

   D) Data inadequate

4. A boatman goes 2 km against the current of the stream in 1 hour and goes 1 km along the current in 10 minutes. How long will it take to go 5 km in stationary water ?

   A) 40 minutes

   B) 1 hour

   C) 1 hr 15 min

   D) 1 hr 30 min

5. The present ages of three persons in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years).

   A) 8, 20, 28

   B) 16, 28, 36

   C) 20, 35, 45

   D) None of the above options

6. A tank is filled by three pipes with uniform flow. The first two pipes operating simultaneously fill the tank in the same time during which the tank is filled by the third pipe alone. The second pipe fills the tank 5 hours faster than the first pipe and 4 hours slower than the third pipe. The time required by the first pipe is

   A) 6 hours

   B) 10 hours

   C) 15 hours

   D) 30 hours

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7. A rectangular field is to be fenced on three sides leaving a side of 20 feet uncovered. If the area of the field is 680 sq. feet, how many feet of fencing will be required ?

A) 34

B) 40

C) 68

D) 88

8. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together ?

A) 810

B) 1440

C) 2880

D) 50400

9. Seats for Mathematics, Physics and Biology in a school are in the ratio of 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats ?

A) 2 : 3 : 4

B) 6 : 7 : 8

C) 6 : 8 : 9

D) None of the above options

10. A flagstaff 17.5 m high casts a shadow of length 40.25 m. The height of the building, which casts a shadow of length 28.75 m under similar condition will be

A) 10 m

B) 12.5 m

C) 17.5 m

D) 21.25 m

Find the odd one in the following series for **Q. 11** and **12 :**

11. 396, 462, 572, 427, 671, 264

A) 396

B) 427

C) 671

D) 264

12. 2, 5, 10, 17, 26, 37, 50, 64

A) 50

B) 26

C) 37

D) 64

13. The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Re. 1. The sum (in Rs.) is

A) 625

B) 630

C) 640

D) 650

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14. The angle of elevation of the sun, when the length of the shadow of a tree is 3 times the height of the tree, is

A) 30°

B) 45°

C) 60°

D) 90°

15. Let N be the greatest number that will divide 1305, 4665 and 6905, leaving the same remainder in each case. Then sum of the digits in N is

A) 4

B) 5

C) 6

D) 8

16. The study of fossils is known as

A) Ethnology

B) Palaeontology

C) Synecology

D) Ombrology

17. Who has been elected as the President of Cricket Association of Bengal (CAB) in 2015 ?

A) Sourav Ganguly

B) Anil Kumble

C) Sunil Gavaskar

D) Mohd. Azharuddin

18. Which company committed to invest $150 million for the Indian Startups during the Indian Prime Minister's Sept., 2015 US trip ?

A) Qualcomm

B) Yahoo

C) Google

D) Microsoft

19. What is the name of the Second Guided Missile Destroyer which has been commissioned into Indian Navy recently ?

A) INS Vajram

B) INS Kochi

C) INS Kolkata

D) INS Mumbai

20. Which cities hosted South Asian Games in January 2016 ?

A) Bhopal and Jaipur

B) Mumbai and Kolkata

C) New Delhi and Pune

D) Guwahati and Shillong

21. Which country is poised to become the third largest buyer of commercial passenger planes in the world with only the US and China ahead of it ?

A) France

B) India

C) Germany

D) None of the above options

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22. Which city is being developed as the new capital of current state of Andhra Pradesh ?
A) Hyderabad
B) Amaravati
C) Vishakhapatnam
D) None of the above options

23. Garampani sanctuary is located at
A) Junagarh, Gujarat
B) Diphu, Assam
C) Kohima, Nagaland
D) Gangtok, Sikkim

24. Ashoka's 'Dhamma' or 'Law of Piety'
A) had the essence of all religions
B) was a revolt against inefficiency in the Buddhist Sangha
C) was a new religion which he founded after the Kalinga War
D) laid emphasis on following a strict set of rituals

25. Which two countries have voted against a Feb. 2017 UN resolution to impose sanctions against Syria over its alleged use of chemical weapons ?
A) US and Russia
B) US and France
C) Russia and China
D) France and China

26. Which country has recently unveiled a project dubbed "Mars 2117", under which it aims to establish the first inhabitable human settlement on planet Mars by year 2117 ?
A) China
B) Japan
C) UAE
D) South Korea

27. Daniel Ortega has been sworn in for a third consecutive term as President of which Central American Country ?
A) Costa Rica
B) Honduras
C) Nicaragua
D) El Salvador

28. Which among the following airports has claimed that it has become the first aerodrome in the world to adopt unique performance and benchmarking digital platform, Arc, which helps in tracking and monitoring building performance ?
A) Indira Gandhi International (IGI) Airport, Delhi
B) Babasaheb Ambedkar International Airport, Nagpur
C) Sardar Vallabhbhai Patel International Airport, Ahmedabad
D) Lokpriya Gopinath Bordoloi International Airport, Guwahati

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29. "Socialist", "Secular", "Unity and Integrity of the Nation" [to replace only "Unity of the Nation"], were added in the Preamble as per which Amendment to the Indian Constitution ?

A) Thirty eighth Amendment 1975

B) Forty second Amendment 1976

C) Thirty first Amendment 1973

D) Forty fourth Amendment 1978

30. Which Nation won Davis Cup in 2016 ?

A) Switzerland

B) Spain

C) Argentina

D) England

31. 1. The hotel is two blocks east of the drugstore.
2. The market is one block west of the hotel.
3. The drugstore is west of the market.

If the first two statements are true, the third statement is

A) True

B) False

C) Uncertain

D) Insufficient data

32. Vincent has a paper route. Each morning, he delivers 37 newspapers to customers in his neighborhood. It takes Vincent 50 minutes to deliver all the papers. If Vincent is sick or has other plans, his friend Thomas, who lives on the same street, will sometimes deliver the papers for him.

From the above data, which of the following statements must be true ?

A) Vincent and Thomas live in the same neighborhood

B) It takes Thomas more than 50 minutes to deliver the papers

C) It is dark outside when Vincent begins his deliveries

D) Thomas would like to have his own paper route

33. Which number pair comes next in the series ?

4 7 26 10 13 20 16

A) 14 4

B) 14 17

C) 18 14

D) 19 14

34. Which word does not belong with the others ?

A) Cornea

B) Retina

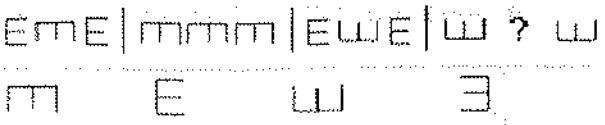
C) Vision

D) Pupil

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35. Complete the missing element of the following series :



(1) (2) (3) (4)

A) 1

B) 2

C) 3

D) 4

36. JAK, KBL, LCM, MDN, _____

A) OEP

B) NEO

C) MEN

D) PFQ

37. FAG, GAF, HAI, IAH, _____

A) JAK

B) HAL

C) HAK

D) JAI

38. Applying for Seasonal Employment occurs when a person requests to be considered for a job that is dependent on a particular season or time of year. Which situation below is the best example of Applying for Seasonal Employment ?

A) The Ski instructors at Top of the Peak Ski School work from December through March

B) Matthew prefers jobs that allow him to work outdoors

C) Lucinda makes an appointment with the beach resort restaurant manager to interview for the summer waitressing position that was advertised in the newspaper

D) Doug's ice cream shop stays open until 11 p.m. during the summer months

39. QAR, RAS, SAT, TAU, _____

A) UAV

B) UAT

C) TAS

D) TAT

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40. If
gorblflur means fan belt
pixngorbl means ceiling fan
arthtusl means tile roof
Which word could mean "ceiling tile" ?

A) gorbltusl

B) flurgorbl

C) arthflur

D) pixnarth

41. The town of Paranda is located on Green Lake. The town of Akram is West of Paranda. Tokhada is East of Akram but West of Paranda. Kokran is East of Bopri but West of Tokhada and Akram. If they are all in the same district, which town is the farthest West ?

A) Paranda

B) Kokran

C) Akram

D) Bopri

42. Get odd one out.

A) YWU

B) NLJ

C) KIF

D) VTR

43. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks were 56% of the sum of their marks. The marks obtained by them are

A) 39, 30

B) 41, 32

C) 42, 33

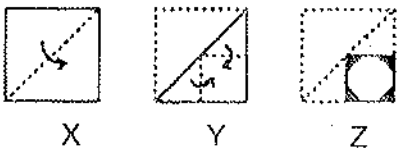
D) 43, 34

44. Find the number of triangles in the given figure.



A) 8
B) 10
C) 12
D) 14

45. Choose a figure which would most closely resemble the unfolded form of Figure (Z).



X Y Z



(1) (2) (3) (4)

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

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Each of questions **46** to **50** are based on the information given below :

8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

46. Who among the following is to the immediate left of F ?

A) G

B) I

C) J

D) H

47. What is true about J and K ?

A) J is male, K is female

B) J is female, K is male

C) Both are female

D) Both are male

48. How many persons are seated between K and F ?

A) 1

B) 2

C) 3

D) 4

49. Who among the following are three lady members ?

A) E, H and J

B) E, F and G

C) E, H and G

D) C, H and J

50. Who among the following is seated between E and H ?

A) F

B) I

C) K

D) Cannot be determined

51. Choose the most appropriate words from the options given below to complete the following sentence :

Female sparrows and immatures are ____, while the typical adult male sparrow is _____ by its markings: a black bib, a grey cap, and white lines trailing down from the mouth.

A) somewhat nondescript, easily recognized

B) difficult to spot, better camouflaged

C) considered to be endangered, characterized

D) comparatively small, made more conspicuous

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52. Find the best correction for the underlined sentence from the four options given below:
Under a provision of the Constitution that was never applied, Congress has been required to call a convention for considering possible amendments to the document when formally asked to do it by the legislatures of two-thirds of the states.

A) was never applied, Congress has been required to call a convention for considering possible amendments to the document when formally asked to do it
B) was never applied, there has been a requirement that Congress call a convention for consideration of possible amendments to the document when asked to do it formally
C) has never been applied, whereby Congress is required to call a convention to consider possible amendments to the document when formally asked to do so
D) has never been applied, Congress is required to call a convention to consider possible amendments to the document when formally asked to do so

53. **Statement :** Should all the drugs patented and manufactured in Western countries be first tried out on sample basis before giving license for sale to general public in India?

Arguments :

I. Yes. Many such drugs require different doses and duration for Indian population and hence it is necessary.
II. No. This is just not feasible and hence cannot be implemented.

Choose from the following :

A) Only argument I is strong
B) Only argument II is strong
C) Either I or II is strong
D) Neither I nor II is strong

54. A Huge majority - 84 percent - of th population identifies as Hindu. There ar many variations of Hinduism, and fou predominant sects - Shaiva, Vaishnava Shakteya and Smarta. About 13 percer of Indians are Muslim, making it one of th largest Islamic nations in the world Christians and Sikhs make up a sma percentage of the population, and there ar even fewer Buddhists and Jains.

The passage best supports the statemer that

A) Culture, Traditions and Customs c India are diverse
B) India is known as a multilingual countr
C) India is identified as the birthplace c Hinduism and Buddhism
D) India is a country where diversity i religion exists

55. Choose the appropriate answer t complete the following sentence :

To those of us who had always though him timid, his _____ came as a surprise

A) inability
B) inevitability
C) intrepidity
D) inertness

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56. Three ladies X, Y and Z marry three men A, B and C. X is married to A, Y is not married to an engineer, Z is not married to a doctor, C is not a doctor and A is a lawyer. Only monogamous relationships are permitted. Then which of the following statements is correct ?

A) Y is married to C who is an engineer
B) Z is married to C who is a doctor
C) X is married to a doctor
D) None of the above options

57. Arrange sentences **A, B, C** and **D** between sentences **1** and **6,** to form a logical sequence of six sentences.

1. The new economic policy comprises the various measures and changes introduced since July 1991.

A) There is a common thread running through all these measures
B) The objective is simple – to improve the efficiency of the system.
C) The regulatory mechanism involving multitude of controls has fragmented the capacity and reduced competition even in the private sector.
D) The thrust of the new policy is towards creating a more competitive environment as a means to improving the productivity and efficiency of the economy.

6. This is to be activated by removing the barriers and restrictions on the entry and growth of firms.

A) DCAB B) ABCD
C) BDAC D) DCBA

58. Correct the underlined part of the sentence by choosing the correct option.

Bombast is when high sounding words for effect, not suitability, are used.

A) is when high sounding words for effect, not suitability, are used
B) is the use of high-sounding words for effect rather than for suitability
C) is where high-sounding words are used for effect not suitability
D) is the using of high-sounding words for effect only

59. Pick the word from the four options which is most nearly opposite in meaning to the bold word.

RECALCITRANT

A) feckless B) yielding
C) sombre D) polished

60. The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.

QUISLING : BETRAY

A) taunt : provoke
B) inception : termination
C) juggernaut : crush
D) obstinate : preserve

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SECTION – B

COMPUTER SCIENCE/ENGINEERING

Choose the most appropriate option.

61. What does the following function do for a given Linked List with first node as *head*?

```
void fun1(struct node* head)
{
 if(head == NULL)
  return;
 fun1(head->next);
 printf("%d ", head->data);
}
```

A) Prints all nodes of linked lists

B) Prints all nodes of linked list in reverse order

C) Prints alternate nodes of Linked List

D) Prints alternate nodes in reverse order

62. Which of the following statements is/are TRUE for an undirected graph ?

P : Number of odd degree vertices is even

Q : Sum of degrees of all vertices is even

A) P Only

B) Q Only

C) Both P and Q

D) Neither P nor Q

63. Consider the following function that takes reference to head of a Doubly Linked List as parameter. Assume that a node of doubly linked list has previous pointer as *prev* and next pointer as *next*.

```
void fun(struct node **head_ref)
{
 struct node *temp = NULL;
 struct node *current = *head_ref;
 while (current != NULL)
{
  temp = current->prev;
  current->prev = current->next;
  current->next = temp;
  current = current->prev;
}
  if(temp != NULL )
    *head_ref = temp->prev;
}
```

Assume that reference of head of following doubly linked list is passed to above function 1 <--> 2 <--> 3 <--> 4 <--> 5 <--> 6. What should be the modified linked list after the function call?

A) 2 <--> 1 <--> 4 <--> 3 <--> 6 <--> 5

B) 5 <--> 4 <--> 3 <--> 2 <--> 1 <--> 6

C) 6 <--> 5 <--> 4 <--> 3 <--> 2 <--> 1

D) 6 <--> 5 <--> 4 <--> 3 <--> 1 <--> 2

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64. Let A be a square matrix of size n x n. Consider the following program. What is the expected output ?

```
C = 100
for i = 1 to n do
    for j = 1 to n do
    {
        Temp = A[i][j] + C
        A[i][j] = A[j][i]
        A[j][i] = Temp - C
    }
for i = 1 to n do
    for j = 1 to n do
        Output(A[i][j]);
```

A) The matrix A itself

B) Transpose of matrix A

C) Adding 100 to the upper diagonal elements and subtracting 100 from diagonal elements of A

D) None of the option

65. Following is C like pseudo code of a function that takes a number as an argument, and uses a stack S to do processing.

```
void fun(int n)
{
  Stack S;  // Say it creates an empty stack S
  while (n > 0)
  {
    // This line pushes the value of n%2 to
       stack S
    push(&S, n%2);
    n = n/2;
  }
  // Run while Stack S is not empty
  while (!isEmpty(&S))
    printf("%d", pop(&S)); // pop an element
from S and print it
}
```

What does the above function do in general ?

A) Prints binary representation of n in reverse order

B) Prints binary representation of n

C) Prints the value of Logn

D) Prints the value of Logn in reverse order

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66. Assume that the operators +, –, × are left associative and ^ is right associative. The order of precedence (from highest to lowest) is ^, x, +, –. The postfix expression corresponding to the infix expression a + b × c – d ^ e ^ f is

A) abc × + def ^ ^ –

B) abc × + de ^ f ^ –

C) ab + c × d – e ^ f ^

D) – + a × bc ^ ^ def

67. A balance factor in AVL tree is used to check

A) what rotation to make.

B) if all child nodes are at same level.

C) when the last rotation occurred.

D) if the tree is unbalanced.

68. A priority queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is : 10, 8, 5, 3, 2. Two new elements 1 and 7 are inserted into the heap in that order. The level-order traversal of the heap after the insertion of the elements is

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

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

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

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

69. The worst case running times of Insertion sort, Merge sort and Quick sort, respectively, are

A) $\Theta(n\log n)$, $\Theta(n\log n)$ and $\Theta(n^2)$

B) $\Theta(n^2)$, $\Theta(n^2)$ and $\Theta(n\log n)$

C) $\Theta(n^2)$, $\Theta(n\log n)$ and $\Theta(n\log n)$

D) $\Theta(n^2)$, $\Theta(n\log n)$ and $\Theta(n^2)$

70. A queue is implemented using an array such that ENQUEUE and DEQUEUE operations are performed efficiently. Which one of the following statements is CORRECT (n refers to the number of items in the queue) ?

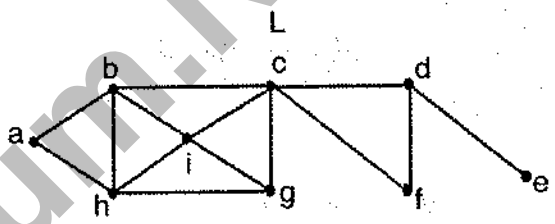
A) Both operations can be performed in O(1) time

B) At most one operation can be performed in O(1) time but the worst case time for the other operation will be $\Omega(n)$

C) The worst case time complexity for both operations will be $\Omega(n)$

D) Worst case time complexity for both operations will be $\Omega(\log n)$

71. Consider the following graph L and find the bridges, if any.



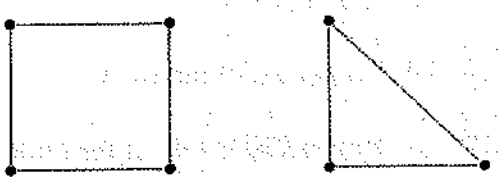
A) No bridge

B) {d, e}

C) {c, d}

D) {c, d} and {c, f}

72. The following graph has no Euler circuit because



A) It has 7 vertices

B) It is even-valent (all vertices have even valence)

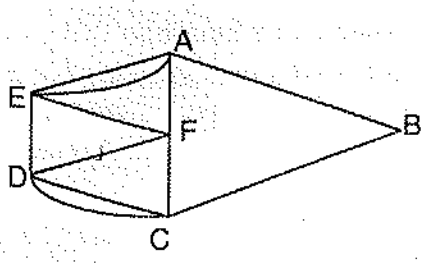
C) It is not connected

D) It does not have a Euler circuit

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73. For the graph shown, which of the following paths is a Hamilton circuit ?



A) ABCDCFDEFAEA
B) AEDCBAF
C) AEFDCBA
D) AFCDEBA

74. If G is an undirected planar graph on n vertices with e edges then
A) e<=n
B) e<=2n
C) e<=3n
D) None of the option

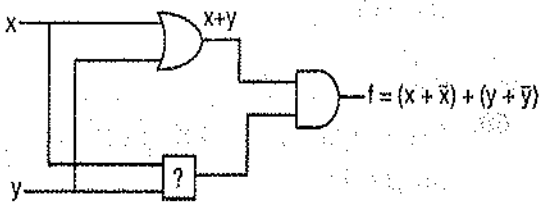
75. Choose the most appropriate definition of plane graph.
A) A simple graph which is Isomorphic to Hamiltonian graph
B) A graph drawn in a plane in such a way that if the vertex set of graph can be partitioned into two non - empty disjoint subset X and Y in such a way that each edge of G has one end in X and one end in Y
C) A graph drawn in a plane in such a way that any pair of edges meet only at their end vertices
D) None of the option

76. Which of the following propositions is tautology ?
A) $(p \vee q) \rightarrow q$
B) $p \vee (q \rightarrow p)$
C) $p \vee (p \rightarrow q)$
D) Both B) and C)

77. The digital multiplexer is basically a combination logic circuit to perform the operation
A) AND-AND
B) OR-OR
C) AND-OR
D) OR-AND

78. If $A \oplus B = C$, then
A) $A \oplus C = B$
B) $B \oplus C = A$
C) $A \oplus B \oplus C = 0$
D) Both A) and B)

79. To make the following circuit a tautology ? marked box should be

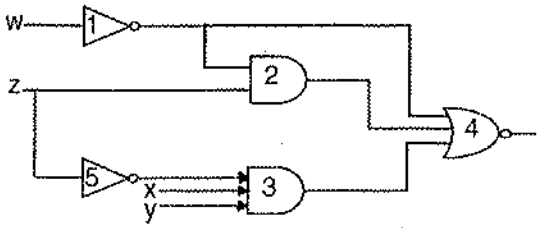


A) OR gate
B) AND gate
C) NAND gate
D) EX-OR gate

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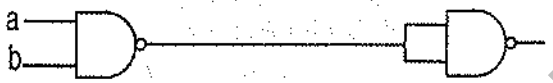
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80. In the following gate network which gate is redundant ?



A) Gate no. 1
B) Gate no. 2
C) Gate no. 3
D) Gate no. 4

81. The combinational circuit given below is implemented with two NAND gates. To which of the following individual gates is its equivalent ?



A) NOT
B) OR
C) AND
D) XOR

82. What is the average Access Time for a Drum rotating at 4000 revolutions per minute ?

A) 2.5 milliseconds
B) 5.0 milliseconds
C) 7.5 milliseconds
D) 4.0 milliseconds

83. Comparing the time T1 taken for a single instruction on a pipelined CPU, with time T2 taken on a non-pipelined but identical CPU, we can say that _ _ _ _ ?

A) T1 = T2
B) T1 > T2
C) T1 < T2
D) T1 is T2 plus time taken for one instruction fetch cycle

84. How many wires are threaded through the cores in a coincident-current core memory ?

A) 2
B) 3
C) 4
D) 6

85. Which access method is used for obtaining a record from cassette tape ?

A) Direct
B) Sequential
C) Random
D) Parallel

86. The process of converting the analog sample into discrete form is called

A) Modulation
B) Multiplexing
C) Quantization
D) Sampling

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87. Which memory is difficult to interface with processor ?

A) Static memory

B) Dynamic memory

C) ROM

D) None of the option

88. For a memory system, the cycle time is

A) Same as the access time

B) Longer than the access time

C) Shorter than the access time

D) Multiple of the access time

89. In comparison with static RAM memory, the dynamic RAM memory has

A) Lower bit density and higher power consumption

B) Higher bit density and lower power consumption

C) Lower bit density and lower power consumption

D) None of the option

90. If each address space represents one byte of storage space, how many address lines are needed to access RAM chips arranged in a 4×6 array, where each chip is $8K \times 4$ bits ?

A) 13

B) 14

C) 16

D) 17

91. At a room temperature of 300K, calculate the thermal noise generated by two resistors of 10 KΩ and 20 KΩ when the bandwidth is 10 KHz.

A) 1.2868×10^{-6} V, 1.819×10^{-6} V

B) 6.08×10^{-6} V, 15.77×10^{-6} V

C) 16.66×10^{-6} V, 2.356×10^{-6} V

D) 1.66×10^{-6} V, 0.23×10^{-6} V

92. A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a Translation Look-aside Buffer (TLB) which can hold a total of 128 page table entries and is 4-way set associative. The minimum size of the TLB tag is

A) 11 bits

B) 13 bits

C) 15 bits

D) 20 bits

93. Computer uses 46–bit virtual address, 32–bit physical address, and a three–level paged page table organization. The page table base register stores the base address of the first–level table (T1), which occupies exactly one page. Each entry of T1 stores the base address of a page of the second–level table (T2). Each entry of T2 stores the base address of a page of the third–level table (T3). Each entry of T3 stores a Page Table Entry (PTE). The PTE is 32 bits in size. The processor used in the computer has a 1 MB 16 way set associative virtually indexed physically tagged cache. The cache block size is 64 bytes.

What is the size of a page in KB in this computer ?

A) 2 B) 4

C) 8 D) 16

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94. Consider data given in the aboye question. What is the minimum number of page colours needed to guarantee that no two synonyms map to different sets in the processor cache of this computer ?

A) 2 B) 4

C) 8 D) 16

95. A disk has 200 tracks (numbered 0 through 199). At a given time, it was servicing the request of reading data from track 120 and at the previous request, service was for track 90. The pending requests (in order of their arrival) are for track numbers.

30 70 115 130 110 80 20 25.

How many times will the head change its direction for the disk scheduling policies SSTF (Shortest Seek Time First) and FCFS (First Come Fist Serve) ?

A) 2 and 3 B) 3 and 3

C) 3 and 4 D) 4 and 4

96. Consider the following snapshot of a system running n processes. Process i is holding Xi instances of a resource R, 1 <= i <= n. Currently, all instances of R are occupied. Further, for all i, process i has placed a request for an additional Yi instances while holding the Xi instances it already has. There are exactly two processes p and q such that Yp = Yq = 0. Which one of the following can serve as a necessary condition to guarantee that the system is not approaching a deadlock ?

A) min (Xp, Xq) < max (Yi) where i ! = p and i ! = q

B) Xp + Xq >= min (Yi) where i ! = p and i ! = q

C) max (Xp, Xq) > 1

D) min (Xp, Xq) > 1

97. A system has n resources $R_0, \ldots, R_{n-1}$ and k processes $P_0, \ldots P_{k-1}$. The implementation of the resource request logic of each process P_i is as follows:

```
if (i % 2 == 0) {
    if (i < n) request Ri
    if (i+2 < n) request Ri+2
}
else {
    if (i < n) request Rn-i
    if (i+2 < n) request Rn-i-2
}
```

In which one of the following situations is a deadlock possible ?

A) n = 40, k = 26

B) n = 21, k = 12

C) n = 20, k = 10

D) n = 41, k = 19

98. A system contains three programs and each requires three tape units for its operation. The minimum number of tape units which the system must have such that deadlocks never arise is _____

A) 6

B) 7

C) 8

D) 9

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99. Which of the following standard algorithms is not Dynamic Programming based ?

A) Bellman–Ford Algorithm for single source shortest path

B) Floyd Warshall Algorithm for all pairs shortest paths

C) 0-1 Knapsack problem

D) Prim's Minimum Spanning Tree

100. Kadane algorithm is used to find

A) Maximum sum subsequence in an array

B) Maximum sum subarray in an array

C) Maximum product subsequence in an array

D) Maximum product subarray in an array

101. Four matrices M_1, M_2, M_3 and M_4 of dimensions $p \times q$, $q \times r$, $r \times s$ and $s \times t$ respectively can be multiplied in several ways with different number of total scalar multiplications. For example, when multiplied as $((M_1 \times M_2) \times (M_3 \times M_4))$, the total number of multiplications is $pqr + rst + prt$. When multiplied as $(((M_1 \times M_2) \times M_3) \times M_4)$, the total number of scalar multiplications is $pqr + prs + pst$.

If $p = 10$, $q = 100$, $r = 20$, $s = 5$ and $t = 80$, then the number of scalar multiplications needed is

A) 248000

B) 44000

C) 19000

D) 25000

102. Let G be a graph with n vertices and m edges. What is the tightest upper bound on the running time on Depth First Search of G ? Assume that the graph is represented using adjacency matrix.

A) O(n)

B) O(m+n)

C) $O(n^2)$

D) O(mn)

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

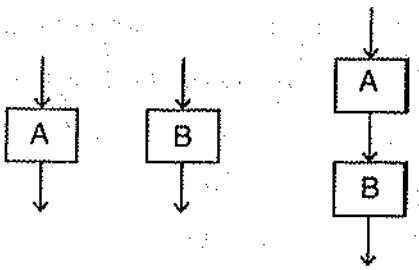
A) Database relations have a large number of records

B) Database relations are sorted on the primary key

C) B-trees require less memory than binary search trees

D) Data transfer from disks is in blocks

104. The Cyclomatic complexity of each of the modules A and B shown below is 10. What is the Cyclomatic complexity of the sequential integration shown on the right hand side ?



A) 19

B) 21

C) 20

D) 10

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105. What is the appropriate pairing of items in the two columns listing various activities encountered in a software life cycle?

P. Requirements Capture	1. Module Development and Integration
Q. Design	2. Domain Analysis
R. Implementation	3. Structural and Behavioral Marketing
S. Maintenance	4. Performance Tunint

A) P-3, Q-2, R-4, S-1
B) P-2, Q-3, R-1, S-4
C) P-3, Q-2, R-1, S-4
D) P-2, Q-3, R-4, S-1

106. Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item x, denoted by r(x) and w(x) respectively. Which one of them is conflict serializable ?

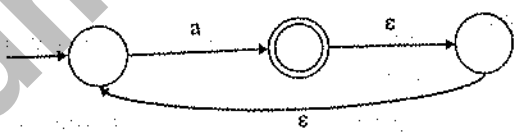
1. $r_1(x); r_2(x); w_1(x); r_3(x); w_2(x)$
2. $r_2(x); r_1(x); w_2(x); r_3(x); w_1(x)$
3. $r_3(x); r_2(x); r_1(x); w_2(x); w_1(x)$
4. $r_2(x); w_2(x); r_3(x); r_1(x); w_1(x)$

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

107. What is the maximum number of reduce moves that can be taken by a bottom-up parser for a grammar with no epsilon- and unit-production (i.e., of type A -> $\in$ and A -> a) to parse a string with n tokens ?

A) n/2
B) n – 1
C) 2n – 1
D) 2^n

108. What is the complement of the language accepted by the NFA shown below ?



1. $\varnothing$
2. $\{\varepsilon\}$
3. a^*
4. $\{a, \varepsilon\}$

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

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109. In a compiler, keywords of a language are recognized during

A) parsing of the program

B) the code generation

C) the lexical analysis of the program

D) dataflow analysis

110. Match the problem domains in GROUP I with the solution technologies in GROUP II

GROUP I	GROUP II
(P) Service oriented computing	(1) Interoperability
(Q) Heterogeneous communicating systems	(2) BPMN
(R) Information representation	(3) Publish-find-bind
(S) Process description	(4) XML

A) P-1, Q-2, R-3, S-4

B) P-3, Q-4, R-2, S-1

C) P-3, Q-1, R-4, S-2

D) P-4, Q-3, R-2, S-1

111. A company needs to develop a strategy for software product development for which it has a choice of two programming languages L1 and L2. The number of Lines Of Code (LOC) developed using L2 is estimated to be twice the LOC developed with L1. The product will have to be maintained for five years. Various parameters for the company are given in the table below :

Parameter	Language L1	Language L2
Man years needed for development	LOC/10000	LOC/10000
Development cost per man year	Rs. 10,00,000	Rs. 7,50,000
Maintenance time	5 years	5 years
Cost of maintenance per year	Rs. 1,00,000	Rs. 50,000

Total cost of the project includes cost of development and maintenance. What is the LOC for L1 for which the cost of the project using L1 is equal to the cost of the project using L2 ?

A) 4000

B) 5000

C) 4333

D) 4667

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112. A company needs to develop digital signal processing software for one of its newest inventions. The software is expected to have 40000 lines of code. The company needs to determine the effort in person-months needed to develop this software using the basic COCOMO model. The multiplicative factor for this model is given as 2.8 for the software development on embedded systems, while the exponentiation factor is given as 1.20. What is the estimated effort in person-months ?

A) 234.25 B) 932.50
C) 287.80 D) 122.40

113. Which one of the following is NOT desired in a good Software Requirement Specifications (SRS) document ?

A) Functional Requirements
B) Non-Functional Requirements
C) Goals of Implementation
D) Algorithms for Software Implementation

114. In a complete k-ary tree, every internal node has exactly k children. The number of leaves in such a tree with n internal nodes is

A) nk B) (n – 1) k+ 1
C) n(k – 1) + 1 D) n(k – 1)

115. Suppose $T(n) = 2T(n/2) + n$, $T(0) = T(1) = 1$ which one of the following is false ?

A) $T(n) = O(n^2)$
B) $T(n) = \Theta(nLogn)$
C) $T(n) = \Omega(n^2)$
D) $T(n) = O(nLogn)$

116. The part of machine level instruction, which tells the central processor what has to be done, is

A) Operation code B) Address
C) Locator D) Flip-Flop

117. A system program that combines the separately compiled modules of a program into a form suitable for execution

A) assembler B) linking loader
C) cross compiler D) load and go

118. Bug means

A) A logical error in a program
B) A difficult syntax error in a program
C) Documenting programs using an efficient documentation tool
D) All of the above

119. Let L be a language and L' be its complement. Which one of the following is NOT a viable possibility ?

A) Neither L nor L' is RE
B) One of L and L' is RE but not recursive; the other is not RE
C) Both L and L' are RE but not recursive
D) Both L and L' are recursive

120. Let L1 be a recursive language, and let L2 be a recursively enumerable but not a recursive language. Which one of the following is TRUE ?

A) L1′ is recursive and L2′ is recursively enumerable
B) L1′ is recursive and L2′ is not recursively enumerable
C) L1′ and L2′ are recursively enumerable
D) L1′ is recursively enumerable and L2′ is recursive

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