(2)

Booklet No.:

EXAMINATION QUESTION BOOKLET 620781

Duration: 90 minutes

Test Booklet Series: A

Roll No.: | | | | | |

Answer Sheet No | | | | | |

Name of Candidate_____

Signature of candidate_____

उम्मीदवारों के लिए निर्देश	Instructions for Candidate
इस प्रश्न-पुस्तिका में **85** बहुविकल्पीय प्रश्न है।प्रत्येक प्रश्न के चार विकल्प दिए गए है (A),(B),(C) और (D)। प्रत्येक प्रश्न का केवल एक सही विकल्प है। सही विकल्प का चुनाव करे और प्रश्न के सामने वाले सही गोले को उत्तर पुस्तिका में काला करें।	This booklet consists of 85 Multiple choice questions. Each question has 4 (four) alternatives (A), (B), (C), and (D). In any case only one alternative will be the correct answer. Choose the right alternative and darken the appropriate circle in the answer sheet in front of the related question.
प्रत्येक सही उत्तर के लिए 1अंक दिया जाएगा, **गलत देने पर** 0.25 **अंक काट लिया जाएगा।**	For each correct answer One mark will be given and **for each incorrect answer 0.25 mark will be deducted.**
गोले को काला करने के लिए केवल काले/नीले बॉल प्वाइंट पेन का प्रयोग करें। गोले को एक बार काला करने के बाद इसको मिटाना या बदलना नहीं है। किसी प्रश्न का एक से ज्यादा गोले काले करने पर मशीन द्वारा इसके लिए **शून्य अंक** दिया जाएगा।	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.
ओएमआर उत्तर पुस्तिका में सभी जानकारी देते हुए सही गोले को काला करे। दिए गए निर्देशों के अनुसार आप सही गोले को काला करने में असफल रहते है तो आपके उत्तर पुस्तिका की जाँच नहीं की जाएगी।	In OMR answer sheet candidate must fill up all required information and for this candidate must darken the appropriate circles. The OMR Answer sheet will not be evaluated if the candidate fails to fill up the required circles correctly as per the given directions.
उत्तर-पुस्तिका में सूचनाओं को भरने से पहले, उत्तर-पुस्तिका में दिए गए निर्देशों को ध्यानपूर्वक पढिए। उत्तर-पुस्तिका को किसी भी तरह से न मोड़े।	Read the instructions printed on Answer sheet carefully before filling the information on the answer Sheet. Do not fold answer sheet in any case.
प्रश्नो का उत्तर देने से पहले यह जाँच कर लें कि उत्तर-पुस्तिका और प्रश्न-पुस्तिका में आपने सारी जानकारी भर दी है।	Before beginning to answer the questions please make sure that all entries on OMR answer-sheet and Test Question booklet have been duly completed.
परीक्षार्थी अपनी उत्तर पुस्तिका पत्र निरीक्षक को सौंपे बिना परीक्षा हाल नहीं छोड़ सकता हैं और उपस्थिती पत्रिका पर हस्ताक्षर करना अनिवार्य हैं। ऐसा नही करने पर अयोग्य घोषित कर दिया जाएगा।	**Candidate should not leave the examination hall/room without handing over his Answer sheet to the invigilator and without signing on the attendance sheet. Failing in doing so, will amount to disqualification.**
प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात एवं उत्तर देने से पहले उम्मीदवार यह जाँच कर ले कि प्रश्न-पुस्तिका पूर्ण है।	After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question booklet is complete.
नोट : परीक्षा पुस्तिका के हिन्दी संस्करण में यदि कोई विसंगति पाई जाती है, तो अँग्रेजी संस्करण मान्य होगा । **Note : In case of discrepancy in Hindi language, English version will be treated as final.**	

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.

Section A – General Aptitude

Directions: Choose the most appropriate option.

1. जब माया और जूलिया ने हरिकेन के बारे में खबर सुनी तो उन्होंने अपनी छुट्टी की योजना बदलना का निर्णय लिया। द्वीप के बीच रिजोर्ट में जाने के स्थान पर उन्होंने पहाड़ों में एक फैंसी नए स्पा में कमरा बुक किया। उनकी योजना कुछ महंगी थी, पर उन्होंने स्पा के बारे में बहुत अच्छा सुना था और वे इतनी कम समय सीमा के अंदर इसके मिल जाने से खुश थे। दी गई जानकारी के अनुसार कौन सा कथन सत्य हो सकता है ?

(A) माया और जूलिया हर साल छुट्टी बिताने बीच पर जाते हैं।
(B) स्पा की कीमत बहुत होती है
(C) आम तौर पर स्पा में कम से कम 6 माह पहले बुक करना जरूरी होता है।
(D) माया और जूलिया ने हरिकेन के कारण अपनी छुट्टी की योजना बदलना का निर्णय लिया।

When they heard news of the hurricane, Maya and Julian decided to change their vacation plans. Instead of traveling to the island beach resort, they booked a room at a fancy new spa in the mountains. Their plans were a bit more expensive, but they'd heard wonderful things about the spa and they were relieved to find availability on such short notice. Given the information presented, which statement that could be considered true ?

(A) Maya and Julian take beach vacations every year.
(B) The spa is overpriced.
(C) It is usually necessary to book at least six months in advance at the spa.
(D) Maya and Julian decided to change their vacation plans because of the hurricane.

2. इस श्रृंखला को देखें : 2, 1, (1/2), (1/4), ... अगली संख्या कौन सी आनी चाहिए ?

(A) (1/3) (B) (1/8)
(C) (2/8) (D) (1/16)

Have a look at the series: 2, 1, (1/2), (1/4), ... What number should come next?

(A) (1/3) (B) (1/8)
(C) (2/8) (D) (1/16)

3. इस श्रृंखला को देखें : 17, 20, 18, 21, 19, 22, ??? अगली संख्या कौन सी आनी चाहिए ?

(A) 17 (B) 20
(C) 25 (D) 23

Have a look at the series: 17, 20, 18, 21, 19, 22, ... What number should come next?

(A) 17 (B) 20
(C) 25 (D) 23

4. REASON : SFBTPO :: THINK : ?

(A) SGHMJ (B) UIJOL
(c) UHNKI (D) UJKPM

5. कार्बन : हीरा : : कोरण्डम : ?

(A) गारनेट (B) रूबी
(C) पुखराज (D) मोती

Carbon : Diamond :: Corundum : ?

(A) Garnet (B) Ruby
(C) Pukhraj (D) Pearl

6. कामगार ए को एक कार्य करने में 8 घंटे का समय लगता है। कामगार बी को यही कार्य करने में 10 घंटे का समय लगता है। ए और बी को एक साथ मिलकर इसी कार्य स्वतंत्र रूप से करने में कितना समय लगेगा ?

(A) 40/9 दिन (B) 40/7 दिन
(C) 7.5 दिन ;;D) 8.5 दिन

Worker A takes 8 hours to do a job. Worker B takes 10 hours to do the same job. How long it take both A & B, working together but independently, to do the same job?

(A) 40/9 days (B) 40/7 days
(C) 7.5 days (D) 8.5 days

7. एक सही घड़ी सुबह 8 बजे समय दर्शाती है। जब घड़ी दोपहर 2 बजे होते हैं तो घंटे की सुई कितने डिग्री पर होगी ?

(A) 144° (B) 140°
(C) 168° (D) 180°

An accurate clock shows 8 o'clock in the morning. Through how may degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

(A) 144° (B) 140°
(C) 168° (D) 180°

ROUGH WORK SPACE:

8. मूल्यांकन करें (0.1 x 0.1 x 0.1 + 0.02 x 0.02 x 0.02) / (0.2 x 0.2 x 0.2 + 0.04 x 0.04 x 0.04)

(A) 0.0125 (B) 0.125
(C) 0.25 (D) 0.5

The value of (0.1 x 0.1 x 0.1 + 0.02 x 0.02 x 0.02) / (0.2 x 0.2 x 0.2 + 0.04 x 0.04 x 0.04) is:

(A) 0.0125 (B) 0.125
(C) 0.25 (D) 0.5

9. एक्स 10 दिनों में कार्य का 1/4 हिस्सा पूरा करता है, वाई 40 दिनों में कार्य का 40 प्रतिशत और जेड 13 दिनों में कार्य का 1/3 हिस्सा करता है। काम को सबसे पहले कौन पूरा करेगा ?

(A) एक्स (B) वाय
(C) जेड (D) इनमें से कोई नहीं

X can do 1/4 of a work in 10 days, Y can do 40% of work in 40 days and Z can do 1/3 of work in 13 days. Who will complete the work first?

(A) X (B) Y
(C) Z (D) None of the above.

10. एक नए व्यक्ति के आने से 8 व्यक्तियों के औसत भार में 2.5 कि.ग्रा. की वृद्धि होती है, जिनमें से एक व्यक्ति का वजन 65 कि.ग्रा. है। नए व्यक्ति का भार क्या होगा ?

(A) 46 कि. ग्रा. (B) 36.5 कि. ग्रा.
(C) 85 कि. ग्रा. (D) आंकड़े पर्याप्त नहीं

The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person?

(A) 46 kg (B) 36.5 kg
(C) 85 kg (D) Data inadequate

11. पी और क्यू की औसत मासिक आय रु. 5050 है। क्यू और आर की औसत मासिक आय रु. 6250 है और पी तथा आर की औसत मासिक आय रु. 5200 है। पी की मासिक आय क्या होगी ?

(A) 2500 (B) 4000
(C) 3050 (D) 6000

The average monthly income of P and Q is Rs. 5050. The average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. The monthly income of P is

(A) 2500 (B) 4000
(C) 3050 (D) 6000

12. यदि 55, 60 और 45 छात्रों के 3 बैचों के औसतन अंक क्रमशः 50, 55, 60 हैं, तो सभी छात्रों के औसत अंक क्या होंगे ?

(A) 43.33 (B) 54.68
(C) 45 (D) 47

If the average marks of three batches of 55, 60 and 45 students respectively is 50, 55, 60, then the average marks of all the students is:

(A) 43.33 (B) 54.68
(C) 45 (D) 47

13. एक्स और वाय एक कार्य को क्रमशः 20 दिनों और 12 दिनों में पूरा कर सकते हैं। एक्स ने अकेले काम शुरू किया और 4 दिन बाद वाय ने साथ आकर कार्य पूरा कराया। यह कार्य कितने दिन चला ?

(A) 6 दिन (B) 10 दिन
(C) 15 दिन (D) 20 दिन

X and Y can do a piece of work in 20 days and 12 days respectively. X started the work alone and then after 4 days Y joined him till the completion of the work. How long did the work last?

(A) 6 days (B) 10 days
(C) 15 days (D) 20 days

Section B – Mathematics

14. Let r_1 and r_2 be the roots of the equation $x^2 - Kx + (K-1) = 0$, K real. Find the value of K for which $r_1^2 + r_2^2$ is a minimum.

(B) 0 (B) -1
(C) +1 (D) -2

15. A curve has equation $y = 2x^2 - 8x$. The gradient of this curve at the point P is 4. The coordinates of P are

(A) (3,6) (B) (3,-6)
(C) (4,0) (D) (-1,10)

16. $\int (2x + 3\cos x)dx = ?$

(A) $x^2 + 3\sin x + C$ (B) $x^2 - 3\sin x + C$
(C) $x + 3\sin x + C$ (D) $x^2 + \sin x + C$

ROUGH WORK SPACE:

17. Solve the following equation for the matrix X:

$$\begin{bmatrix} 0 & 2 \\ 2 & 0 \end{bmatrix} X = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

(A) $\begin{bmatrix} 3/2 & 2 \\ 1/2 & 1 \end{bmatrix}$ (B) $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 1 \\ 2/3 & 0 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$

18. If T is the linear transformation mapping the vectors (0, 0, 1), (0, 1, 0) and (1, 0, 0) into the vectors (0, 0, 1) (-1, -1, 1) and (2, 2, 1), respectively, what is the image of the vector (3, 4, 5) under T?

(A) (1, 2, 3) (B) (2, 3, 4)
(C) (2, 5, 2) (D) (2, 2, 12)

19. The area of the triangle bounded by the lines $y = x$, $y = -x$ and $y = 6$ is _____?

(A) $12\sqrt{2}$ (B) 24
(C) $24\sqrt{2}$ (D) 36

20. The equation of the plane through the point (-1, 3, 2) and perpendicular to each of the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 0$ is

(A) $7x - 8y + 3z + 25 = 0$
(B) $7x + 8y + 3z + 25 = 0$
(C) $7x - 8y + 3z - 25 = 0$
(D) $7x - 8y - 3z - 25 = 0$

21. The derivative of a function is $f(x) = x^3 - 8$. Here are two statements about f:

(i) f is increasing at $x = 1$
(ii) f is stationary at $x = 2$

Which of the following is true?

(A) Neither statement is correct
(B) Only statement (i) is correct
(C) Only statement (ii) is correct
(D) Both statements are correct

22. A problem in mathematics is given to three students whose chances of solving it are respectively 0.5, 1/3, and 0.25. The probability that the problem will be solved is :

(A) 0.75 (B) 1 / 6
(C) 2 / 3 (D) 5 / 6

23. Solution of system of linear equations $x - 2y + 3z = 7$, $3x - y + 4z = 2$, $4x + 2y - 3z = 0$ is

(A) $\left(-\frac{7}{5}, \frac{29}{5}, -2\right)$

(B) $\left(\frac{7}{5}, -\frac{29}{5}, 2\right)$

(C) $\left(-\frac{7}{5}, \frac{29}{5}, 2\right)$

(D) $\left(\frac{7}{5}, -\frac{29}{5}, -2\right)$

24. $\int \sqrt{\frac{1-\cos x}{1+\cos x}}\, dx$ is

(A) $2 \log \sin \frac{x}{2} + c$

(B) $2 \log \tan \frac{x}{2} + c$

(C) $2 \log \cot x + c$

(D) $2 \log \sec \frac{x}{2} + c$

25. $\int_{-3}^{3} f(x)\, dx$, where $f(x) = \begin{cases} 3x+2, & -3 \le x \le 1 \\ 5x+1, & 1 \le x \le 3 \end{cases}$ is

(A) 11 (B) 16
(C) 18 (D) 14

26. An unbiased die is tossed twice. For getting a 4, 5 or 6 on the first toss and a 1, 2, 3 or 4 on the second toss, the probability is

(A) 4 / 7 (B) 2 / 3
(C) 3/ 7 (D) 1 / 3

ROUGH WORK SPACE:

27. $\begin{vmatrix} b^2+c^2 & c^2 & b^2 \\ c^2 & c^2+a^2 & a^2 \\ b^2 & a^2 & a^2+b^2 \end{vmatrix} = ?$

(A) $4\,a^2\,b^2\,c^2$ (B) $(a+b+c)^2$
(C) $a^2+b^2+c^2$ (D) $a^4+b^4+c^4$

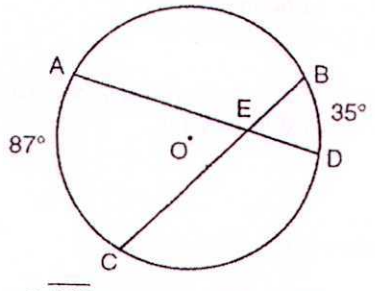
28. The value of the integral $\int_{-3}^{5} |x-3|\,dx$ is

(A) 20 (B) 21
(C) 18 (D) 22

29. The points (3,0), (1,0), (1,-2) and (3,-2) are the vertices of a _____.

(A) square (B) rectangle
(C) parallelogram (D) quadrilateral

30. In the diagram below of circle O, chords $\overline{AD}$



and $\overline{BC}$ intersect at E, ∠AOC=87° and ∠BOD=35°

What is the degree measure of ∠CEA?

(A) 87 (B) 61
(C) 43.5 (D) 26

SECTION C – CS / IT and EC

Directions: Choose the most appropriate option.

31. The response of an initially relaxed linear constant parameter network to a unit impulse applied at $t = 0$ is $4e^{-2t}\,u(t)$. The response of this network to a unit step function will be

(A) $2[1-e^{-2t}]\,u(t)$ (B) $4[e^{-t}-e^{-2t}]\,u(t)$
(C) $\sin 2t$ (D) $(1-4e^{-4t})\,u(t)$

32. Which one of the following systems is completely state controllable?

(A) $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 2 \\ 1 \end{bmatrix} u$

(B) $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 2 \\ 0 \end{bmatrix} u$

(C) $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$

(D) $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 2 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 2 \\ 2 \end{bmatrix} u$

33. A phase-lag compensation will
(A) improve relative stability
(B) increase the speed of response
(C) increase bandwidth
(D) increase overshoot

34. None of the poles of a linear control system lie in the right half of s-plane. For a bounded input, the output of this system
(A) is always bounded
(B) could be unbounded
(C) always tends to zero
(D) none of these

35. The current gain of an amplifier stage is lowest in.
(A) CB configuration
(B) CE configuration
(C) CC configuration
(D) Same in all configuration

ROUGH WORK SPACE:

36. In a class AB amplifier with sinusoidal input signal, the output current flows for.
(A) Half the cycle (B) Full cycle
(C) Less than cycle (D) More than half cycle

37. An Ideal Diode
(A) should have zero resistance in the forward bias as well as reverse bias.
(B) should have zero resistance in the forward bias and an infinitely large resistance in reverse bias.
(C) should have infinite large resistance in the forward bias and zero resistance in reverse bias.
(D) should have infinite large resistance in the forward bias and as well as reverse bias.

38. A practical current source is represented by
(A) A resistance in series with an ideal current source
(B) A resistance in parallel with an ideal current source
(C) A resistance in parallel with an ideal voltage source
(D) None of the above

39. Four resistance 80Ω, 50Ω, 25Ω, and R are connected in parallel. Current through 25Ω resistance is 4 A. Total current is 10 A. the value of R will be
(A) 66.66 Ω (B) 40.25 Ω
(C) 36.36 Ω (D) 76.56 Ω

40. The addition of p-type impurity to intrinsic material creates allowable energy levels
(A) slightly above conduction band
(B) slightly below conduction band
(C) slightly above valence band
(D) slightly below valence band

41. Zener breakdown occurs
(A) due to rupture of covalent bonds
(B) due to thermally generated minority carriers
(C) in lightly doped junctions
(D) only in germanium diodes

42. Negative feedback in an amplifier
(A) increase noise (B) reduce bandwidth
(C) reduce gain (D) increase distortion

43. The gain of a bipolar transistor drops at high frequencies because of
(A) early effect
(B) parasitic inductive elements
(C) high current in base
(D) transistor capacitance

44. The main application of enhancement mode MOSFET is in
(A) oscillator circuits (B) amplifier circuits
(C) clipper circuit (D) switching circuits

45. Which of the following has lowest propagation delay?
(A) ECL (B) TTL
(C) PMOS (D) CMOS

46. The number of address lines in a memory chip of size 8192 x 8 is
(A) 8 (B) 12
(C) 13 (D) 16

47. Vestigial sideband is most commonly used in
(A) radio transmission
(B) telephony
(C) television transmission
(D) all of the above

48. The number of independent loops for a network with n nodes and b branch is
(A) $n-1$
(B) $b-n$
(C) $b-n+1$
(D) independent of the number of nodes

49. Quantization bit rate for an analog input signal with a bandwidth of 3.4 kHz in a delta modulator with a signal to quantization noise ratio of 25 dB, will be
(A) 48 kb/s (B) 68 kb/s
(C) 58 kb/s (D) 78 kb/s

50. A message signal band limited to 5 kHz is sampled at the minimum rate as dictated by the sampling theorem. The number of quantization levels is 64. If samples are encoded in binary form, then transmission rate is
(A) 60 kbps (B) 50 kbps
(C) 32 kbps (D) 10 kbps

ROUGH WORK SPACE:

51. Number of station accommodated in a 100 kHz bandwidth with highest modulating frequency
(A) 5 kHz (B) 10 kHz
(C) 15 kHz (D) 20 kHz

52. 12 signals each band-limited to 5 kHz are to be transmitted over a single channel by frequency division multiplexing. If AM-SSB modulation guard band of 1 kHz is used, then band width of multiplexed signal will be
(A) 131 kHz (B) 81 kHz
(C) 121 kHz (D) 71 kHz

53. If an FM signal with modulation index m_f is passed through a frequency tripler, then modulation index of the output signal will be
(A) m_f (B) $3\,m_f$
(C) $9\,m_f$ (D) $27\,m_f$

54. Pre-emphasis in FM systems involves
(A) compression of the modulating signal
(B) expansion of the modulating signal
(C) amplification of lower frequency components of the modulating signal
(D) amplification of higher frequency components of the modulating signal

55. What is the spectral density of random process whose auto-correlation is $e^{-2\alpha|\tau|}$?
(A) $\frac{4\alpha}{\omega^2+4\alpha^2}$ (B) $\frac{4\alpha}{\omega^2-4\alpha^2}$
(C) $\frac{\alpha}{\omega^2+\alpha^2}$ (D) $\frac{\alpha}{\omega^2-\alpha^2}$

56. The power spectral density of white noise
(A) varies as square root of frequency
(B) varies as inverse of frequency
(C) varies as square of frequency
(D) is constant with frequency

57. The regular sets are closed under
(A) union (B) concatenation
(C) Kleenes closure (D) all of these

58. Compiler can diagnose
(A) grammatical errors only
(B) logical errors only
(C) grammatical as well as logical errors
(D) neither grammatical nor logical errors

59. Software that measures, monitors, analyzes and controls real world events is called
(A) System software
(B) Real time software
(C) Scientific software
(D) Business software

60. Dividing a project into segments and smaller units in order to simplify analysis, design and programming efforts is called
(A) Modular approach
(B) Top down approach
(C) Bottom up approach
(D) Left right approach

61. When a computer is first turned on or restarted, a special type of absolute loader is executed called
(A) "Compile and GO" loader
(B) Boot loader
(C) Boot strap loader
(D) Relating loader

62. The data manipulation language (DML)
(A) refers to data using physical addresses
(B) cannot interface with high-level programming language
(C) is used to define the physical characteristics of each record
(D) none of these

63. A tuple in relational DBMS is a equivalent to
(A) record (B) field
(C) file (D) data base

64. The input auto-correlation of RC-filter which is subjected to a white noise of spectral density $\frac{\eta_0}{2}$ is
(A) $\eta_0[\delta(\tau)]$ (B) $\frac{\eta_0}{2}[\delta(\tau)]$
(C) $-\eta_0[\delta(\tau)]$ (D) $-\frac{\eta_0}{2}[\delta(\tau)]$

ROUGH WORK SPACE:

65. The main difference between the operation of transmission lines and waveguides is that
(A) the latter are not distributed, like transmission line
(B) the former can use stubs and quarter-wave transformers, unlike the latter
(C) transmission lines use the principal mode of propagation, and therefore do not suffer from low-frequency cutoff
(D) terms such as impedance matching and standing-wave ratio cannot be applied to waveguides

66. Which of the following is/are tautology?
(A) $a \vee b \rightarrow b \wedge c$
(B) $a \wedge b \rightarrow b \vee c$
(C) $a \vee b \rightarrow (b \rightarrow c)$
(D) $a \rightarrow b \rightarrow (b \rightarrow c)$

67. The number of circuits in a tree with 'n' nodes is
(A) Zero (B) One
(C) $n-1$ (D) n / 2

68. A complete graph with "n" vertices is
(A) 2-chromatic (B) (n / 2)-chromatic
(C) $(n-1)$-chromatic (D) n-chromatic

69. Which of the following circuit can be used as parallel to serial converter?
(A) Multiplexer (B) Demultiplexer
(C) Decoder (D) Digital counter

70. Minimum number of colours required to colour the vertices of a cycle with n nodes in such a way that no two adjacent nodes have the same colour is
(A) 2 (B) 3
(C) 4 (D) $n-2\left\lceil\frac{n}{2}\right\rceil+2$

71. The number of full and half-adders required to add 16-bit numbers is
(A) 8 half-adders, 8 full-adders
(B) 1 half-adder, 5 full-adders
(C) 16 half-adders, 0 full-adders
(D) 4 half-adders, 12 full-adders

72. Which of the following expressions is not equivalent to $\bar{x}$?
(A) x NAND x (B) x NOR x
(C) x NAND 1 (D) x NOR 1

73. Which one of the following set of gates are best suited for parity checking and pacity generation.
(A) AND, OR, NOT gates
(B) EX-NOR or EX-OR gates
(C) NAND gates
(D) NOR gates

74. The register which keeps track of the execution of a program and which contains the memory address of the instruction currently being executed is called
(A) index register
(B) memory address register
(C) program counter
(D) instruction register

75. The register which holds the address of the location to or from which data are to be transferred is called
(A) index register
(B) instruction register
(C) memory address register
(D) memory data register

76. In a binary max heap containing n numbers, the smallest element can be found in time
(A) O (n) (B) O (log n)
(C) O (log log n) (D) O (A)

77. Pseudo-instructions are
(A) assembler directives
(B) instructions in any program that have no corresponding machine code instruction
(C) instruction in any program whose presence or absence will not change the output for any input
(D) none of these

78. The addressing mode used in the instruction PUSH B is
(A) direct (B) register
(C) register indirect (D) immediate

ROUGH WORK SPACE:

79. Which of the following is the internal memory of the system (computer) ?

(A) CPU register (B) Cache
(C) Main memory (D) All of these

80. The library function exit () causes an exit from

(A) the loop in which it occurs
(B) the block in which it occurs
(C) the function in which it occurs
(D) none of these

81. To sort many large object or structures, it would be most efficient to

(A) place reference to them in and array an sort the array
(B) place them in a linked list and sort the linked list
(C) place pointers to them in an array and sort the array
(D) place them in an array and sort the array

82. Queues serve a major role in

(A) simulation of recursion
(B) simulation of arbitrary linked list
(C) simulation of limited resource allocation
(D) expression evaluation

83. A B-tree of order 4 is built from scratch by 10 successive insertions. What is the maximum number of node splitting operations that may take place?

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

84. Can a DFA simulate NFA?

(A) No (B) Yes
(C) Sometimes (D) Depends on NFA

85. $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow R)$ is equivalent to

(A) P (B) Q
(C) R (D) True $\equiv$T

ROUGH WORK SPACE: