

Booklet No.:

EXAMINATION QUESTION BOOKLET

540481

Duration: 90 minutes

Test Booklet Series: A

Roll No.:

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Answer Sheet No

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Name of Candidate _____

Signature of candidate _____

उम्मीदवारों के लिए निर्देश**Instructions for Candidate**

इस प्रश्न-पुस्तिका में 100 बहुविकल्पीय प्रश्न हैं। प्रत्येक प्रश्न के चार विकल्प दिए गए हैं (A),(B),(C) और (D)। प्रत्येक प्रश्न का केवल एक सही विकल्प है। सही विकल्प का चुनाव करें और प्रश्न के सामने वाले सही गोले को उत्तर पुस्तिका में काला करें।	This booklet consists of 100 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 1 अंक 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.
उम्मीदवार के पास इलेक्ट्रॉनिक्स एवं कम्युनिकेशन इंजीनियरिंग भाग अथवा कम्प्यूटर साइंस एवं सूचना प्रौद्योगिकी भाग में से किसी एक भाग को हल करने का विकल्प है। ओ.एम. आर. उत्तर पुस्तिका में चुने गए विकल्प के सामने वाले गोले को काला करना अनिवार्य है।	Candidate has choice to attempt either Electronics and Communication Engineering Part OR Computer Science and Information Technology Part. The choice attempted should be marked by darkening the correct circle on OMR answer sheet.
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 करें। दिए गए निर्देशों के अनुसार आप सही गोले को काला करने में असफल रहते हैं 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 circle. 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 पढ़िए। उत्तर-पुस्तिका को किसी भी तरह से न मोड़ें।	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 हॉल नहीं छोड़ सकता है और उपस्थिति पत्रिका पर हस्ताक्षर करना अनिवार्य है। ऐसा नहीं 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.
<p>नोट : परीक्षा पुस्तिका के हिन्दी संस्करण में यदि कोई विसंगति पाई जाती है, तो अँग्रेजी संस्करण मान्य होगा।</p> <p>Note : In case of discrepancy in Hindi language, English version will be treated as final.</p>	

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 (1-2): In the following questions, a part of the sentence is printed in bold. Below are given alternatives to the bold part at (A), (B) and (C) which may improve the sentence. Choose the correct alternative. In case no improvement is needed, your answer is (D).

1. **By studying AIDS** has engaged many researchers in the last decade.
 (A) Important study (B) Now that the study
 (C) The study of (D) No improvement
2. His Master's thesis was **highly estimated** and is now being prepared for publication.
 (A) was highly discussed
 (B) was highly commended
 (C) is highly appraised
 (D) No improvement

Directions: Choose the most appropriate option.

3. क्रिकेट के खेल में शुरूआती 10 ओवरों में रन रेट केवल 3.2 था। शेष 40 ओवरों में 282 रनों का लक्ष्य पूरा करने के लिए रन बनाने की दर कितनी होनी चाहिए ?
 (A) 6.25 (B) 6.5
 (C) 6.75 (D) 7
- In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?
- (A) 6.25 (B) 6.5
 (C) 6.75 (D) 7

4. एक दुकानदार की बिक्री लगातार 5 माह तक 6435 रु., 6927 रु., 6855 रु., 7230 रु. और 6562 रु. है। छठे माह में उसकी बिक्री कितनी होनी चाहिए कि वह 6500 रु. की औसत बिक्री कर सके ?
 (A) रु. 4991 (B) रु. 5991
 (C) रु. 6001 (D) रु. 6991

A grocer has a sale of Rs. 6435, Rs. 6927, Rs. 6855, Rs. 7230 and Rs. 6562 for 5 consecutive months. How much sale must he have in the sixth month so that he gets an average sale of Rs. 6500?

- (A) Rs. 4991 (B) Rs. 5991
 (C) Rs. 6001 (D) Rs. 6991

5. एक व्यक्ति 6 घंटे में 5 कि. मी. प्रति घंटे और 12 घंटे में 4 कि. मी./प्रति घंटे की दूरी तय करता है तो उसकी औसत गति है
 (A) $4 \frac{1}{3}$ प्रति कि. मी. प्रति घंटा
 (B) $9 \frac{2}{3}$ प्रति कि. मी. प्रति घंटा
 (C) $9 \frac{1}{2}$ प्रति कि. मी. प्रति घंटा
 (D) 8 प्रति कि. मी. प्रति घंटा

A man walks at 5 kmph for 6hr and at 4km/h for 12hr. His average speed is

- (A) $4 \frac{1}{3}$ km/h (B) $9 \frac{2}{3}$ km/h
 (B) $9 \frac{1}{2}$ km/h (D) 8 km/h

6. दो रेलों की गति का अनुपात 7:8 है। यदि दूसरी 4 घंटे में 440 कि. मी. चलती है तो पहली रेल की गति है :
 (A) 47.4 प्रति कि. मी. प्रति घंटा
 (B) 57.19 प्रति कि. मी. प्रति घंटा
 (C) 48.13 प्रति कि. मी. प्रति घंटा
 (D) 96.25 प्रति कि. मी. प्रति घंटा

The ratio between the speeds of two trains is 7: 8. If the second train runs 440 kms in 4 hours, then the speed of the first train is:

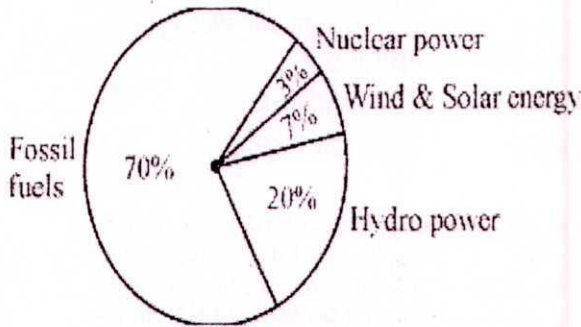
- (A) 47.4 km/hr (B) 57.19 km/hr
 (C) 48.13 km/hr (D) 96.25 km/hr

Directions (7): In the following question, a part of the sentence is printed in bold. Below are given alternatives to the bold part at (A), (B) and (C) which may improve the sentence. Choose the correct alternative. In case no improvement is needed, your answer is (D).

7. Sordid and sensational books tend to **vitiate** the public taste.
 (A) divide (B) distract
 (C) distort (D) No improvement

Directions (8-9): Answer the following questions by reading and analyzing the data given below.

The total electricity generation in a country is 97 GW. The contribution of various energy sources is indicated in percentage terms in the Pie Chart given below ;



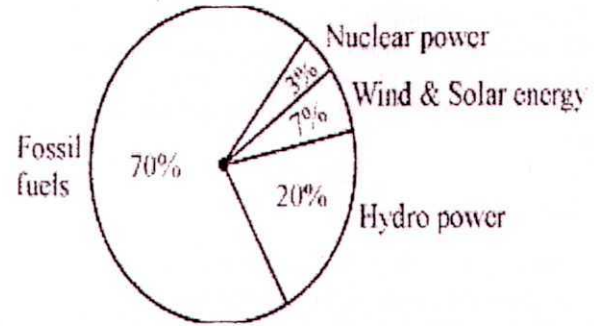
8. What is the contribution of wind and solar power in absolute terms in the electricity generation?

- (A) 6.79 GW (B) 9.4 GW
(C) 19.7 GW (D) 29.1 GW

9. What is the contribution of renewable energy sources in absolute terms in the electricity generation ?

- (A) 09.1 GW (B) 26.19 GW
(C) 67.9 GW (D) 97 GW

देश में कुल बिजली उत्पादन 97 गीगावॉट है। दिए गए पाई चार्ट में प्रतिशत में विभिन्न ऊर्जा स्रोतों का योगदान बताया गया है।



8. विद्युत उत्पादन में परम संदर्भ में पवन और सौर विद्युत का कितना योगदान है?

- (A) 6.79 गीगावॉट
(B) 9.4 गीगावॉट
(C) 19.7 गीगावॉट
(D) 29.1 गीगावॉट

9. विद्युत उत्पादन में परम संदर्भ में नवीकरणीय ऊर्जा स्रोतों का कितना योगदान है?

- (A) 09.1 गीगावॉट
(B) 26.19 गीगावॉट
(C) 67.9 गीगावॉट
(D) 97 गीगावॉट

Directions(10-15): Choose the most appropriate option.

10. यदि 34 पुरुष एक दिन में 9 घंटे कार्य करते हुए 8 दिनों में कार्य का $\frac{2}{5}$ वां हिस्सा पूरा करते हैं। शेष कार्य को एक दिन में 9 घंटे कार्य करते हुए 6 दिनों में कितने पुरुष पूरा करने के लिए तैनात किए जाने चाहिए ?
- (A) 189 (B) 198
(C) 102 (D) 142

If 34 men completed $\frac{2}{5}$ th of a work in 8 days working 9 hours a day. How many more man should be engaged to finish the rest of the work in 6 days working 9 hours a day?

- (A) 189 (B) 198
(C) 102 (D) 142

11. 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) 40/0 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

12. अभिव्यक्ति $(11.98 \times 11.98 + 11.98 \times x + 0.02 \times 0.02)$ एक्स के इसके बराबर होने पर पूर्ण वर्ग होगी।

- A. 2.02 (B) 0.17
C. 0.04 (D) 1.4

The expression $(11.98 \times 11.98 + 11.98 \times x + 0.02 \times 0.02)$ will be a perfect square for x equal to:

- A. 2.02 (B) 0.17
C. 0.04 (D) 1.4

13. 0.04×0.0162 इसके बराबर है
- A. 2.02 (B) 0.17
C. 0.04 (D) 1.4

0.04×0.0162 is equal to:

- A. 6.48×10^{-8} (B) 6.48×10^{-4}
C. 6.48×10^{-9} (D) 6.48×10^{-7}

14. एक कार मालिक ने लगातार 3 वर्षों में 7.50 रु., 8 रु. और 8.50 रु. प्रति ली. की दर से पेट्रोल खरीदा। यदि वह प्रत्येक वर्ष 4000 रु. खर्च करता है तो उसने प्रति लीटर पेट्रोल पर लगभग औसतन कितना खर्च किया ?

- (A) रु. 7.98 (B) रु. 6
(C) रु. 9.50 (D) रु. 9.5

A car owner buys petrol at Rs.7.50, Rs. 8 and Rs. 8.50 per litre for three successive years. What approximately is the average cost per litre of petrol if he spends Rs. 4000 each year?

- (A) Rs. 7.98 (B) Rs. 6
(C) Rs. 9.50 (D) Rs. 9.5

15. मूल्यांकन करें $\frac{(0.96)^3 - (0.1)^3}{(0.96)^2 + 0.096 + (0.1)^2}$
- A. 0.86 (B) 0.95
C. 0.97 (D) 1.06

The value of $\frac{(0.96)^3 - (0.1)^3}{(0.96)^2 + 0.096 + (0.1)^2}$ is:

- A. 0.86 (B) 0.95
C. 0.97 (D) 1.06

Section B – Engineering Mathematics

Directions: Choose the most appropriate option.

16. The Newton-Raphson iteration $x_{n+1} = \frac{x_n}{2} + \frac{3}{2x_n}$ can be used to solve the equation

- (A) $x^2 = 3$ (B) $x^3 = 3$
 (C) $x^2 = 2$ (D) $x^3 = 2$

17. The function $f(x) = x^5 - 5x^4 + 5x^3 - 1$ has

- (A) one minima and two maxima
 (B) two minima and one maxima
 (C) two minima and two maxima
 (D) one minima and one maxima

18. The matrices $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$ and $\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$ commute under the multiplication

- (A) if $a = b$ (or) $\theta = n\pi$, n is an integer
 (B) always
 (C) never
 (D) if $a \cos \theta \neq b \sin \theta$

19. If A and B are two related events, and $P(A|B)$ represents the conditional probability, Bayes' theorem states that

- (A) $P(A|B) = \frac{P(A)}{P(B)} P(B|A)$
 (B) $P(A|B) = P(A)P(B)P(B|A)$
 (C) $P(A|B) = \frac{P(A)}{P(B)}$
 (D) $P(A|B) = P(A) + P(B)$

20. If $f(x, y) = x^3y + e^x$, the partial derivatives, $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}$ are

- (A) $3x^2y + 1, x^3 + 1$
 (B) $3x^2y + e^x, x^3$
 (C) $x^3y + xe^x, x^3 + e^x$
 (D) $2x^2y + \frac{e^x}{x}$

21. If $y=f(x)$, in the interval $[a, b]$ is rotated about the x-axis, the Volume of the solid of revolution is ($f'(x)=dy/dx$)

- (A) $\int_a^b \pi [f(x)]^2 dx$ (B) $\int_a^b [f(x)]^3 dx$
 (C) $\int_a^b \pi [f'(x)]^2 dx$ (D) $\int_a^b \pi^2 f(x) dx$

22. The area under the curve $y(x) = 3e^{-5x}$ from $x = 0$ to $x = \infty$ is

- (A) $\frac{3}{5}$ (B) $\frac{-3}{5}$
 (C) 5 (D) $\frac{5}{3}$

23. The eigenvalues of the matrix $\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$ are

- (A) 5 and -5 (B) 5 and -1
 (C) 1 and -5 (D) 2 and 3

24. Consider three vectors $x = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, y = \begin{bmatrix} 4 \\ 8 \end{bmatrix}, z = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$. Which of the following statements is true

- (A) x and y are linearly independent
 (B) x and y are linearly dependent
 (C) x and z are linearly dependent
 (D) y and z are linearly dependent

25. $\lim_{x \rightarrow 0} \frac{x^3 + x^2 - 5x - 2}{2x^3 - 7x^2 + 4x + 4} = ?$

- (A) -0.5 (B) (0.5)
 (C) ∞ (D) None of the above

26. $\int_0^{\frac{\pi}{2}} \sin^7 \theta \cos^4 \theta d\theta = ?$

- (A) 16 / 1155 (B) 16 / 385
 (C) 16 π / 385 (D) 8 π / 385

27. $\lim_{x \rightarrow a} \frac{1}{x^2 - a^2} \int_a^x \sin(t^2) dt = ?$

- (A) $2a \sin(a^2)$
 (B) 2a
 (C) $\sin(a^2)$
 (D) None of the above

28. $\lim_{x \rightarrow 0} \frac{1}{x^6} \int_0^{x^2} \frac{t^2 dt}{t^6 + 1} = ?$

- (A) $1/4$ (B) $1/3$
 (C) $1/2$ (D) 1

29. Find the area bounded by the curve $y = \sqrt{5 - x^2}$ and $y = |x - 1|$

- (A) $\frac{2}{0}(2\sqrt{6} - \sqrt{3}) - \frac{5}{2}$
 (B) $\frac{2}{3}(6\sqrt{6} + 3\sqrt{3}) + \frac{5}{2}$
 (C) $2(\sqrt{6} - \sqrt{3}) - 5$
 (D) $\frac{2}{3}(\sqrt{6} - \sqrt{3}) + 5$

30. 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) $7x - 8y - 3z - 25 = 0$

31. Evaluate the sum

$$S = 1 + 1 + \frac{3}{2^2} + \frac{3}{2^3} + \frac{5}{2^4} + \dots$$

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

32. A ladder 13 feet long rests against the side of a house. The bottom of the ladder slides away from the house at a rate of 0.5 ft/s. How fast is the top of the ladder sliding down the wall when the bottom of the ladder is 5 feet from the house?

- (A) $\frac{5}{24} \text{ ft/s}$ (B) $\frac{5}{12} \text{ ft/s}$
 (C) $-\frac{5}{24} \text{ ft/s}$ (D) $-\frac{5}{12} \text{ ft/s}$

33. Find the volume of the solid obtained by rotating the region bound by the curves $y = x^3 + 1$, $x = 1$, and $y = 0$ about the x-axis.

- (A) $\frac{23\pi}{7}$ (B) $\frac{16\pi}{7}$
 (C) 2π (D) $\frac{19\pi}{7}$

34. If product of matrix

$$A = \begin{bmatrix} \cos^2 \theta & \cos \theta \sin \theta \\ \cos \theta \sin \theta & \sin^2 \theta \end{bmatrix} \text{ and}$$

$$B = \begin{bmatrix} \cos^2 \phi & \cos \phi \sin \phi \\ \cos \phi \sin \phi & \sin^2 \phi \end{bmatrix}$$

is a null matrix, then θ and ϕ differ by an

- (A) odd multiple of π
 (B) even multiple of π
 (C) odd multiple of $\pi/2$
 (D) even multiple of $\pi/2$

35. Degree of each vertex in K_n is

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

**SECTION C –COMPUTER SCIENCE &
INFORMATION TECHNOLOGY
TO BE ATTEMPTED BY THE CANDIDATE WHO
OPTED FOR**

Directions: Choose the most appropriate option.

36. The advantage of better testing in software development is in

- (A) waterfall model (B) prototyping
(C) iterative (D) all of these

37. The file manager is responsible for

- (A) naming files (B) saving files
(C) deleting files (D) all of these

38. Every Boyce-Codd Normal Form (BCNF) decomposition is

- (A) dependency preserving
(B) not dependency preserving
(C) need be dependency preserving
(D) none of these

39. A functional dependency of the form $x \rightarrow y$ is trivial if

- (A) $y \subseteq x$ (B) $y \subset x$
(C) $x \subseteq y$ (D) $x \subset y$ and $y \subset x$

40. A primary key, if combined with a foreign key creates

- (A) parent child relationship between the tables that connect them
(B) many-to-many relationship between the tables that connect them
(C) network model between the tables connect them
(D) none of these

41. Memory mapped displays

- (A) are utilized for high resolution graphics such as maps
(B) uses ordinary memory to store the display data in character form
(C) stores the display data as individual bits
(D) are associated with electromechanical teleprinters

42. In real-time operating systems, which of the following is the most suitable scheduling scheme?

- (A) round-robin
(B) first-come-first-served
(C) preemptive
(D) random scheduling

43. If there are 32 segments, each of size 1 K byte, then the logical address should have

- (A) 13 bits (B) 14 bits
(C) 15 bits (D) 16 bits

44. Which of the following can be accessed by transfer vector approach of linking?

- (A) External data segments
(B) External subroutines
(C) Data located in other procedure
(D) All of these

45. Relocation bits used by relocating loader are specified by

- (A) Relocating loader itself
(B) Linker
(C) Assembler
(D) Macro processor

46. The most powerful parser is

- (A) SLR
(B) LALR
(C) Canonical LR
(D) Operator-precedence

47. YACC builds up

- (A) SLR parsing table
(B) Canonical LR parsing table
(C) LALR parsing table
(D) None of these

48. Context-free grammar can be recognized by

- (A) finite state automation
(B) 2-way linear bounded automata
(C) push down automata
(D) both (B) and (C)

49. If every string of a language can be determined, whether it is legal or illegal in finite time, the language is called

- (A) decidable (B) undecidable
(C) interpretive (D) non-deterministic

S C – C – B

50. The defining language for developing a formalism in which language definitions can be stated, is called
- (A) syntactic meta language
 (B) decidable language
 (C) intermediate language
 (D) high level language
51. If $f: \{a, b\}^* \rightarrow \{a, b\}^*$ be given by $f(n) = ax$ for every value of $n \in \{a, b\}$, then f is
- (A) one to one not onto
 (B) one to one and onto
 (C) not one to one and not onto
 (D) not one to one and onto
52. Regular expression $(a | b) (a | b)$ denotes the set
- (A) $\{a, b, ab, aa\}$
 (B) $\{a, b, ba, bb\}$
 (C) $\{a, b\}$
 (D) $\{aa, ab, ba, bb\}$
53. Two alternative package A and B are available for processing a database having 10^k records. Package A requires $0.0001 n^2$ time units and package B requires $10 \log_{10} n$ time units to process n records. What is the smallest value of k for which package B will be preferred over A?
- (A) 12 (B) 10
 (C) 6 (D) 5
54. When a subroutine is called, then address of the instruction following the CALL instruction is stored in / on the
- (A) Stack pointer (B) Accumulator
 (C) Program counter (D) Stack
55. Start and stop bits are used in serial communication for
- (A) error detection
 (B) error correction
 (C) synchronization
 (D) slowing down the communication
56. Repeaters function in
- (A) Physical layer (B) Data link layer
 (C) Network layer (D) Both (A) and (B)
57. What are the primary characteristics that distinguish a cell from a packet?
- (A) cells are generally smaller than packets
 (B) cells do not incorporate physical address
 (C) all cells have the same fixed length
 (D) packet cannot be switched
58. The graph theoretic concept will be useful in software testing is
- (A) Cyclomatic number
 (B) Hamiltonian circuit
 (C) Eulerian cycle
 (D) None of these
59. In testing phase, the effort distribution is upto
- (A) 10% (B) 20%
 (C) 40% (D) 50%
60. Which of the following is FALSE?
 Read \wedge as AND, \vee as OR, \sim as NOT, \rightarrow as one way implication and \leftrightarrow as two way implication ?
- (A) $((x \rightarrow y) \wedge x) \rightarrow y$
 (B) $((\sim x \rightarrow y) \wedge (\sim x \wedge \sim y)) \rightarrow x$
 (C) $(x \rightarrow (x \vee y))$
 (D) $((x \vee y) \leftrightarrow (\sim x \vee \sim y))$
61. The seek time of a disk is 30 ms. It rotates at the rate of 30 rotations/ second. The capacity of each track is 300 words. The access time is (approximately)
- (A) 62 ms (B) 60 ms
 (C) 50 ms (D) 47 ms
62. The process of entering data into a storage location
- (A) causes variation in its address number
 (B) adds to the contents of the location
 (C) is called a readout operation
 (D) is destructive of previous contents
63. Serial access memories are useful in applications where
- (A) data consists of numbers
 (B) short access time is required
 (C) each stored word is processed differently
 (D) data naturally needs to flow in and out in serial form

64. An external variable
 (A) is globally accessible by all functions
 (B) has a declaration "extern" associated with it when declared within a function
 (C) will be initialized to 0 if not initialized
 (D) all of these

65. A hash table with 10 buckets with one slot per bucket is depicted. The symbols, S1 to S7 are initially emerged using a hashing function with linear probing. Maximum number of comparisons needed in searching an item that is not present is

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

66. A full binary tree with n non-leaf nodes contains

- (A) $\log_2 n$ nodes (B) $n + 1$ nodes
 (C) $2n$ nodes (D) $2n + 1$ nodes

67. Two finite state machines are said to be equivalent if they

- (A) have same number of states
 (B) have same number of edges
 (C) have same number of states and edges
 (D) recognize same set of tokens

68. In networking terminology UTP means

- (A) Unshielded Twisted pair
 (B) Ubiquitous Teflon port
 (C) Uniformly Terminating port
 (D) Unshielded T-connector port

69. Given following relation instance:

X	Y	Z
1	4	2
1	5	3
1	6	3
3	2	2

Which of the following functional dependencies are satisfied by the instance ?

- (A) $XY \rightarrow Z$ and $Z \rightarrow Y$
 (B) $YZ \rightarrow X$ and $Y \rightarrow Z$
 (C) $YZ \rightarrow X$ and $X \rightarrow Z$
 (D) $XZ \rightarrow Y$ and $Y \rightarrow X$

70. Consider the schema $R = (S T U V)$ and the dependencies

$S \rightarrow T, T \rightarrow U, U \rightarrow V$ and $V \rightarrow S$.

If $R = (R1 \text{ and } R2)$ be a decomposition such that $R1 \cap R2 = \phi$, then decomposition is

- (A) not in 2NF
 (B) in 2NF but not in 3NF
 (C) in 3NF but not in 2NF
 (D) in both 2NF and 3NF

71. Odd parity of word can be conveniently tested by

- (A) OR gate (B) AND gate
 (C) NOR gate (D) XOR gate

72. A sequential circuit outputs a ONE when an even number (> 0) of one's are input; otherwise the output is ZERO. The minimum number of states required is

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

73. How many bits are required to encode all twenty six letters, ten symbols, and ten numerals?

- (A) 5 (B) 6
 (C) 7 (D) 46

74. If a clock with time period "T" is used with n stage shift register, then output of final stage will be delayed by

- (A) nT sec (B) $(n - 1)T$ sec
 (C) n/T sec (D) $(2n - 1)T$ sec

75. If the input J is connected through K input of J-K, then flip-flop will behave as a

- (A) D type flip-flop (B) T type flip-flop
 (C) S-R flip-flop (D) Toggle switch

76. To build a mod-19 counter the number of flip-flop required is

- (A) 3 (B) 5
 (C) 7 (D) 8

77. A stable multivibrator are used as

- (A) comparator circuit
 (B) squaring circuit
 (C) frequency to voltage converter
 (D) voltage to frequency converter

78. The astable multivibrator has
 (A) two quasi stable states
 (B) two stable states
 (C) one stable and one quasi-stable state
 (D) none of these
79. which of the following conditions must be met to avoid race around problem?
 (A) $\Delta t < t_p < T$ (B) $T > \Delta t > t_p$
 (C) $2 t_p < \Delta t < T$ (D) none of these
80. An instruction used to set the carry flag in a computer can be classified as
 (A) data transfer (B) process control
 (C) logical (D) program control
81. Micro program is
 (A) the name of source program in micro computers
 (B) the set of instructions indicating the primitive operations in a system
 (C) primitive form of macros used in assembly language programming
 (D) program of very small size
82. If a processor does not have any stack pointer register, then
 (A) it cannot have subroutine call instruction
 (B) it can have subroutine call instruction, but no nested subroutine calls
 (C) nested subroutine calls are possible, but interrupts are not
 (D) all sequences of subroutine calls and also interrupts are possible
83. In a microcomputer, WAIT states are used to
 (A) make the processor wait during a DMA operation
 (B) make the processor wait during a power interrupt processing
 (C) make the processor wait during a power shutdown
 (D) interface slow peripherals to the processor

84. We have a binary heap on n elements and wish to insert n more elements (not necessarily one after another) into this heap. Total time required for this is
 (A) $\Theta(\log n)$ (B) $\Theta(n)$
 (C) $\Theta(n \log n)$ (D) $\Theta(n^2)$
85. You are given the postorder traversal, P , of a binary search tree on the n elements $1, 2, \dots, n$. You have to determine the unique binary search tree that has P as its postorder traversal. What is the time complexity of the most efficient algorithm for doing this?
 (A) $\Theta(\log n)$
 (B) $\Theta(n)$
 (C) $\Theta(n \log n)$
 (D) None of the above, as the tree cannot be uniquely determined.
86. The most efficient algorithm for finding the number of connected components in a n undirected graph on n vertices and m edges has time complexity
 (A) $\Theta(n)$ (B) $\Theta(m)$
 (C) $\Theta(m + n)$ (D) $\Theta(mn)$
87. Consider the process of inserting an element into a *Max Heap*, where the *Max Heap* is represented by an *array*. Suppose we perform a binary search on the path from the new leaf to the root to find the position for the newly inserted element, the number of *comparisons* performed is
 (A) $\Theta(\log_2 n)$ (B) $\Theta(n \log_2 n)$
 (C) Θn (D) $\Theta(n \log_2 n)$
88. An element in an array X is called a leader if it is greater than all elements to the right of it in X . The best algorithm to find all leaders in an array
 (A) solves it in linear time using a left to right pass of the array
 (B) solves in linear time using a right to left pass of the array
 (C) solves it using divide and conquer in time $\Theta(n \log n)$
 (D) solves it in time $\Theta(n^2)$

89. In a circularly linked list organization, insertion of a record involves the modification of

- (A) no pointer (B) 1 pointer
(C) 2 pointers (D) 3 pointers

90. To sort many large objects or structures, it would be most efficient to place

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

91. The average search time of hashing, with linear probing will be less if the load factor

- (A) is far less than one
(B) equals one
(C) is far greater than one
(D) none of these

92. If initialization is a part of declaration of a structure, then storage class can be

- (A) automatic (B) register
(C) static (D) anything

93. For x and y are variables as declared below $double x = 0.005, y = -0.01$; What is the value of $\text{ceil}(x + y)$, where ceil is a function to compute ceiling of a number?

- (A) 1 (B) 0
(C) 0.005 (D) 0.5

94. In C programming language, if the first and the second operands of operator $+$ are of types int and float , respectively, the result will be of type

- (A) int (B) float
(C) char (D) long int

95. What will be the value of x and y after execution of the following statement (C language)

$n = 5; x = n++; y = -x;$

- (A) 5, -4 (B) 6, -5
(C) 6, -6 (D) 5, -5

96. Microprogramming is a technique for

- (A) writing small programs effectively
(B) programming output/input routines
(C) programming the microprocessors
(D) programming the control steps of a computer

97. The excess 3 code is also called

- (A) cyclic redundancy code
(B) weighted code
(C) self complementing code
(D) algebraic code

98. The range of the numbers which can be stored in an eight bit register is

- (A) -128 to $+127$
(B) -128 to $+128$
(C) -999999 to $+999999$
(D) none of these

99. How many flip-flop are needed to divide the input frequency by 64?

- (A) 4 (B) 5
(C) 6 (D) 8

100. In propositional logic, which of the following is equivalent to $p \rightarrow q$?

- (A) $\sim p \rightarrow q$
(B) $\sim p \vee q$
(C) $\sim p \vee \sim q$
(D) $p \rightarrow \sim q$

SECTION C – ELECTRONICS AND COMMUNICATIONS
TO BE ATTEMPTED BY THE CANDIDATE WHO OPTED FOR

Directions: Choose the most appropriate option.

36. An op-amp, having a slew rate of 62.8 V/msec, is connected in a voltage follower configuration. If maximum amplitude of the input sinusoid is 10 V, then minimum frequency at which slew rate limited distortion would set in at the output is
 (A) 1.0 MHz (B) 6.28 MHz
 (C) 10.0 MHz (D) 62.8 MHz

37. The logical expression $Y = A + \bar{A}B$ is equivalent to

- (A) $Y = AB$ (B) $Y = \bar{A}\bar{B}$
 (C) $Y = \bar{A} + B$ (D) $Y = A + B$

38. Given $f(t) = 3e^{-t}u(t)$. Its Fourier transform $F(\omega)$ at $\omega = 4$ is

- (A) $\frac{1}{1+j}$ (B) $\frac{3/4}{1+j}$
 (C) $\frac{1}{1+\frac{4}{3}j}$ (D) $\frac{4/3}{1+\frac{4}{3}j}$

39. If the function $H_1(z) = (1 + 1.5z^{-1} - z^{-2})$ and $H_2(z) = z^2 + 1.5z^{-1}$, then

- (A) poles and zeros of the functions will be the same
 (B) poles of the functions will be identical but not zeros
 (C) zeros of the functions will be identical but not the poles
 (D) neither the poles nor the zeros of the two functions will be identical

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

41. 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

42. The main application of enhancement mode MOSFET is in

- (A) oscillator circuits (B) amplifier circuits
 (C) clipper circuit (D) switching circuits

43. The minimum number of two input NAND gates required to implement the Boolean function $Z = ABC$ is

- (A) 2 (B) 3
 (C) 5 (D) 6

44. Which of the following input combination is not desirable for SR flip flop?

- (A) $S = 0, R = 0$ (B) $S = 0, R = 1$
 (C) $S = 1, R = 0$ (D) $S = 1, R = 1$

45. Power spectral density of white noise

- (A) is constant with frequency
 (B) increases with frequency
 (C) decreases with frequency
 (D) varies exponentially with frequency

46. The VHF frequency range is

- (A) 30 to 300 KHZ (B) 3 to 30 MHZ
 (C) 30 to 300 MHZ (D) 300 to 3000 MHZ

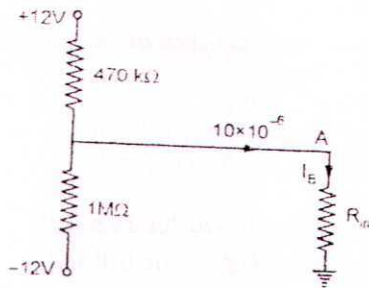
47. In a uniform plane wave E and H are related by

- (A) $\frac{E}{H} = 1$ (B) $\frac{E}{H} = \sqrt{\frac{\epsilon}{\mu}}$
 (C) $\frac{E}{H} = \pi$ (D) $\frac{E}{H} = \sqrt{\frac{\mu}{\epsilon}}$

48. In a lossless RLC circuit the transient current is

- (A) sinusoidal (B) square wave
 (C) triangular wave (D) non-oscillating

49. In the circuit shown in figure, $I_B = 10$ micro-amperes, the value of resistance R_{in} is



- (A) 1 kilo-ohm (B) 10 kilo-ohm
(C) 100 kilo-ohm (D) 1 Mega-ohm

50. When two coupled coils of equal self-inductance are connected in series in one way the net inductance is 12 mH, and when they are connected in the other way, the net inductance is 4 mH. The maximum value of net inductance when they are connected in parallel in a suitable way is

- (A) 2 Mh (B) 3 mH
(C) 4 mH (D) 6 mH

51. The ideal characteristic of a stabilizer is
- (A) constant output voltage with low internal resistance
(B) constant output with low internal resistance
(C) constant output voltage with high internal resistance
(D) constant internal resistance with variable output voltage

52. A system has a single pole at origin. Its impulse response will be

- (A) Constant (B) Ramp
(C) Decaying exponential (D) Oscillatory

53. A network is said to be linear if and only if the response is proportional to the excitation function

- (A) the principle of superposition applies
(B) the principle of homogeneity applies
(C) both (A) and (B)
(D) both (A) and (B)

54. Negative feedback in amplifiers
- (A) improves signal to noise ratio at the input
(B) improves signal to noise ratio at the output
(C) does not affect signal to noise ratio at the output
(D) reduces distortion

55. The transit time of the current carriers through the channel of an FET decides its _____ characteristics.

- (A) Switching (B) On/off
(C) Dynamic (D) Load

56. In a CMOS CS amplifier, the active load is obtained by connecting

- (A) p channel current mirror circuit
(B) n channel transistor
(C) p channel transistor
(D) BJT current mirror

57. Which one of the following power amplifier has the maximum efficiency?

- (A) Class A (B) Class B
(C) Class AB (D) Class C

58. A ramp voltage $v(t) = 100$ volts, is applied to an RC differentiating circuit with $R = 5$ k Ω and $C = 4$ μ F. The maximum output voltage is

- (A) 0.2 volt (B) 2.0 volts
(C) 10.0 volts (D) 50.0 volts

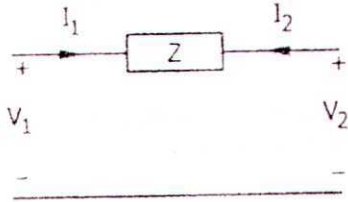
59. A sample of silicon at $T = 300$ K is doped with boron at a concentration of 2.5×10^{13} cm^{-3} and with arsenic at a concentration of 1×10^{13} cm^{-3} . The material is

- (A) p -type with $p_0 = 1.5 \times 10^{13}$ cm^{-3}
(B) p -type with $p_0 = 1.5 \times 10^7$ cm^{-3}
(C) n -type with $n_0 = 1.5 \times 10^{13}$ cm^{-3}
(D) n -type with $n_0 = 1.5 \times 10^7$ cm^{-3}

60. In a superhetrodyne receiver the IF is 455 KHz if it is tuned to 1200 KHz, the image frequency will be

- (A) 1655 KHz (B) 745 KHz
(C) 2110 KHz (D) 910 KHz

61. Which one of the following parameters does not exist for the two-port network shown in the given figure?



- (A) ABCD (B) y
(C) h (D) z
62. Which one of the following is not a property of root loci?
(A) The root locus is symmetrical about $j\omega$ axis
(B) They start from the open loop poles and terminate at the open loop zeros.
(C) The breakaway points are determined from $dK/ds = 0$.
(D) Segments of the real axis are part of the root locus if and only if the total number of real poles and zeros of their right is odd.

63. Given Boolean theorem $AB + \bar{A}C + BC = AB + \bar{A}C$ Which one of the following identities is true?
(A) $(A + B)(\bar{A} + C)(B + C) = (A + B)(\bar{A} + C)$
(B) $AB + \bar{A}C + BC = AB + BC$
(C) $AB + \bar{A}C + BC = (A + B)(\bar{A} + C)(B + C)$
(D) $(A + B)(\bar{A} + C)(B + C) = AB + \bar{A}C$

64. For the transfer function $G(s)H(s) = \frac{1}{s(s+1)(s+0.5)}$ the phase cross-over frequency is
(A) 0.5 rad/sec (B) 0.707 rad/sec
(C) 1.732 rad/sec (D) 2 rad/sec

65. The transfer function of a system is $\frac{2s^2 + 6s + 5}{(s+1)^2(s+2)}$

The characteristic equation of the system is

- (A) $2s^2 + 6s + 5 = 0$
(B) $(s+1)^2(s+2) = 0$
(C) $2s^2 + 6s + 5 + (s+1)^2(s+2) = 0$
(D) $2s^2 + 6s + 5 - (s+1)^2(s+2) = 0$
66. What is the Nyquist rate for the signal $x(t) = \cos 2000\pi t + 3\sin 6000\pi t$?
(A) 2 kHz (B) 4 kHz
(C) 12 kHz (D) 6 kHz

67. The time signal $x(t)$ corresponding to $X(s) = \frac{s+3}{s^2+2s+2}$

will be

- (A) $(2e^{-2t} + e^{-t})u(t)$
(B) $(2e^{-t} - e^{-2t})u(t)$
(C) $(2e^{-2t} - e^{-t})u(t)$
(D) $(2e^{-t} + e^{-2t})u(t)$
68. Zener breakdown results basically due to
(A) impact ionization
(B) strong electric field across the junction
(C) emission of electrons
(D) high thermal energy of the electrons
69. An n-channel silicon ($E_g = 1.1\text{eV}$) MOSFET was fabricated using n+ poly silicon gate and threshold voltage was found to be 1V. Now, if gate is changed to p+ poly-silicon, other things remaining the same, the new threshold voltage should be
(A) -0.1 V (B) 0 V
(C) 1.0 V (D) 2.1 V

70. A junction transistor operating at room temperature with $I_C = 2\text{ mA}$, where $kT/q = 25\text{ mV}$ has $\beta = 100$. The values of parameters g_m in mhos and r_x in ohms will be respectively
(A) 0.04 and 2500 (B) 0.08 and 1250
(C) 0.5 and 800 (D) 0.08 and 5000

71. Maximum electric field in reverse-biased silicon pn junction is $|E_{\max}| = 3 \times 10^5$ V/cm. The doping concentration are $N_d = 4 \times 10^{16}$ cm⁻³ and $N_a = 4 \times 10^{17}$ cm⁻³. Magnitude of the reverse bias voltage is
- (A) 3.6 V (B) 9.8 V
(C) 7.2 V (D) 12.3 V

72. Which of the following is not possible in a circular wave guide?

- (A) TE₁₀ (B) TE₀₁
(C) TE₁₁ (D) TE₁₂

73. Which one of the following blocks is not common in both AM and FM receivers?

- (A) RF amplifier (B) Mixer
(C) IF amplifier (D) Slope detector

74. A certain optical fibre has refractive index of clad (N₁) = 1.40 and that of core (N₂) = 1.05. Its numerical aperture is

- (A) 0.8575 (B) 0.9260
(C) 0.3500 (D) 0.1585

75. For the K-map shown in figure, the minimized function is SOP for is:

		YZ			
		00	01	11	10
WX	00	1	1		1
	01				
	11			1	1
	10	1		1	1

- (A) $\overline{W}X\overline{Y} + WY + \overline{X}YZ + \overline{W}XZ$
(B) $\overline{W} \overline{X} \overline{Y} + \overline{X} \overline{Z} + WY$
(C) $\overline{W}X\overline{Y} + WY + \overline{W}X\overline{Y}Z + \overline{W}X\overline{Y}Z$
(D) $\overline{W} \overline{X} \overline{Y} + WY + \overline{W} \overline{X} \overline{Z}$

76. A circuit which resonates at 1MHz has Q of 100. Bandwidth between half power points is

- (A) 10 KHz (B) 100 KHz
(C) 10 Hz (D) 100 Hz

77. Op-amp used as a tuned amplifier has the tuned circuit connected

- (A) across input
(B) across series impedance at the input
(C) across feedback impedance Z_f
(D) across output

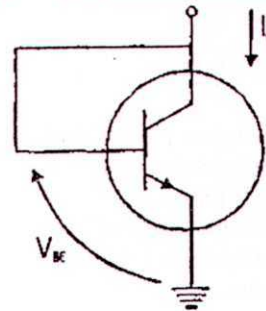
78. If an amplifier with gain of -1000 and feedback of $b = -0.1$ had a gain change of 20% due to temperature, then change in gain of the feedback amplifier would be

- (A) 10% (B) 5%
(C) 0.2% (D) 0.01%

79. Which of the following pulse modulation is analog?

- (A) PCM (B) Differential PCM
(C) PWM (D) Delta modulation

80. For an npn transistor connected as shown in the figure. $V_{BE} = 0.7$ volts. Given that reverse saturation current of the junction at room temperature 300°K is 10^{-13} A, the emitter current is



- (A) 30 mA (B) 39 mA
(C) 49 mA (D) 20 mA

81. A message signal with bandwidth 10 kHz is Lower-Side Band SSB modulated with carrier frequency $f_{c1} = 10^6$ Hz. The resulting signal is then passed through a Narrow-Band Frequency Modulator with carrier frequency $f_{c2} = 10^9$ Hz.

The bandwidth of the output would be

- (A) 4×10^4 Hz (B) 2×10^6 Hz
(C) 2×10^9 Hz (D) 2×10^{10} Hz

82. A Hilbert transformer is a

- (A) linear system (B) non-casual system
(C) time-varying system (D) low-pass system

83. The probability density function of the envelope of narrow band Gaussian noise is

- (A) Poisson (B) Gaussian
(C) Rayleigh (D) Rician

84. The noise at the input to an ideal frequency detector is white. The detector is operating above threshold. The power spectral density of the noise at the output is

- (A) raised-cosine (B) flat
(C) parabolic (D) Gaussian

85. During transmission over a communication channel, bit error occur independently with probability p . If a block of n bits is transmitted, the probability of at most one bit error is equal to

- (A) $1 - (1 - p)^n$ (B) $p + (n - 1)(1 - p)$
(C) $np(1 - p)^{n-1}$ (D) $(1 - p)^n + np(1 - p)^{n-1}$

86. A sinusoidal signal with peak-to-peak amplitude of 1536 V is quantized into 128 levels using a mid-rise uniform quantizer. The quantization-noise power is

- (A) 0.768 V (B) $48 \times 10^{-6} \text{ V}^2$
(C) $12 \times 10^{-6} \text{ V}^2$ (D) 3.072 V

87. For a microprocessor system using I/O-mapped I/O the following statement(s) is NOT true

- (A) Memory space available is greater
(B) Not all data transfer instructions are available.
(C) I/O and Memory address spaces are distinct.
(D) I/O address space is greater.

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

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

89. A system with transfer function $H(z)$ has impulse $h(n)$ defined as $h(2) = 1$, $h(3) = -1$ and $h(k) = 0$ otherwise. Consider the following statements

S_1 : $H(z)$ is a low-pass filter

S_2 : $H(z)$ is an FIR filter.

Which of the following is correct?

- (A) Only S_2 is true
(B) Both S_1 and S_2 are false
(C) Both S_1 and S_2 are true, and S_2 is a reason for S_1
(D) Both S_1 and S_2 are true, but S_2 is not a reason for S_1

90. The function $f(t)$ has Fourier transform $g(\omega)$. The Fourier transform $g(t)$

$$g(t) = \int_{-\infty}^{\infty} g(\omega) e^{-j\omega t} dt, \text{ is}$$

- (A) $\frac{1}{2\pi} f(\omega)$ (B) $\frac{1}{2\pi} f(-\omega)$
(C) $2\pi f(-\omega)$ (D) none of these

91. Parameters of FET are $g_m = 95 \text{ mA/volt}$, total capacitance = 500 pF. For a voltage gain of -30 , bandwidth will be

- (A) 333 Ω (B) 3 k Ω
(C) 2.7 k Ω (D) 300 Ω

92. The maximum power dissipation capacity of a transistor is 50mW. If the collector emitter voltage is 10 V, what is the safe collector current that can be allowed through the transistor?

- (A) 5 mA (B) 2.5 mA
(C) 10 mA (D) 25 mA

93. If the radiated power of AM transmitter is 10 kW the power in the carrier for modulation index of 0.6 is nearly

- (A) 8.24 kW (B) 8.47 kW
(C) 9.26 kW (D) 9.6 kW

94. The doping concentration on the n-side of a p-n junction diode is enhanced. Which one of the following will get affected?

- (A) Width of the depletion region on n-side
(B) Width of the depletion region on p-side
(C) Width of the depletion region on both sides
(D) No change in width of depletion regions

95. Consider the following statements for a p-n junction diode:

1. It is an active component.
2. Depletion layer width decreases with forward biasing.
3. In the reverse biasing case, saturation current increases with increasing temperature.

Which of the statements given above are correct?

- (A) 1, 2 and 3 (B) 1 and 2 only
(C) 2 and 3 only (D) 1 and 3 only

96. An amplifier has an open-loop gain of 100, and its lower-and upper-cut-off frequency of 100 Hz and 100 kHz, respectively. A feedback network with a feedback factor of 0.99 is connected to the amplifier. The new lower and upper-cut-off frequencies are at

- (A) $f_H = 10$ MHz and $f_L = 1$ Hz
(B) $f_H = 25$ MHz and $f_L = 10$ Hz
(C) $f_H = 100$ MHz and $f_L = 100$ Hz
(D) $f_H = 10$ MHz and $f_L = 10$ Hz

97. With negative feedback in a closed loop control system the system sensitivity to parameter variations:

- (A) Increases (B) Decreases
(C) Becomes zero (D) Becomes infinite

98. The gain margin of the transfer function

$$G(s) = \frac{0.75}{(s+1)(s+2)} \text{ will be}$$

- (A) 4 dB (B) 8 dB
(C) 12 dB (D) 16 dB

99. The bit rate of a digital communication system is 34 M bit/s. The modulation scheme is QPSK. The baud rate of the system is

- (A) 68 M bit/s (B) 34 M bit/s
(C) 17 M bit/s (D) 8.5 M bit/s

100. A metal rod moves at a constant velocity in a direction perpendicular to its length. A uniform magnetic field exists in space in a direction perpendicular to the length of the rod as well as its velocity. Select the correct statement(s) from the following

- (A) The electric potential is maximum at the center and decreases towards the ends
(B) The electric potential is minimum at the center and increases towards the ends
(C) The entire rod is at the same potential
(D) There is an electric field in the rod