Research Aptitude Test

Model Test Paper

PART (A)

[Common for all Candidates]
(Research Methodology and Quantitative Aptitude)

1. Action-research can be understood as _____
   a. A longitudinal Research
   b. An applied Research
   c. A kind of research being carried out to solve a specific problem
   d. All of the above.

2. The process not needed in experimental research is
   a. Controlling
   b. Observation
   c. Reference collection
   d. Manipulation and replication

3. If FRIEND is coded as HUMJTK, how is CANDLE written in that code?
   a. EDRIRL
   b. DCQHQK
   c. ESJFME
   d. DEQJQM

4. "Sampling Cases" can be defined as
   a. Sampling using a sampling frame
   b. Identifying people who are suitable for research
   c. Literally the researcher's brief case
   d. A sampling of people, newspapers, television programs etc.

5. Biped : Quadruped :: Ostrich : ?
   a. Cat
   b. Kangaroo
   c. Penguin
   d. Duck

6. If you write down all the numbers from 1 to 100, then how many times do you write 3?
   a. 11
   b. 18

c. 20
d. 21

7. What are the core elements of a dissertation?
   a. Introduction; Data Collection; Data Analysis; Conclusions and Recommendations
   b. Executive Summary; Literature Review; Data Gathered; Conclusions; Bibliography
   c. Research Plan; Research Data; Analysis; References
   d. Introduction; Literature Review; Research Methodology; Results; Discussions and Conclusions

8. In a town of 500 people, 285 read Hindu and 212 read Indian Express and 127 read Times of India, 20 read Hindu and Times of India and 29 read Hindu and Indian Express and 35 read Times of India and Indian express. 50 read no newspaper. Then how many read only one paper?
   a. 123
   b. 231
   c. 312
   d. 32

9. On what basis did Jean Piaget give his theory of cognitive development of humans?
   a. Evaluation Research
   b. Fundamental Research
   c. Applied Research
   d. Action Research

10. Which one is called non-probability sampling?
   a. Quota sampling
   b. Cluster sampling
   c. Systematic sampling
   d. Stratified random sampling

11. Authenticity of a research finding is its
   a. Validity
   b. Objectivity
   c. Originality
   d. All of the above.

12. Arrange the words given below in a meaningful sequence.

1.Presentation 2. Recommendation 3. Arrival 4. Discussion 5. Introduction

a. 5, 3, 4, 1, 2

b. 3, 5, 4, 2, 1

c. 3, 5, 1, 4, 2

d. 5, 3, 1, 2, 4

13.

a.

b.

c.

d.

14. Circle graphs are used to show

a. How is one part related to other parts?

b. How various sections share in the whole?

c. How is one whole related to another whole?

d. How are various parts related to the whole?

15. Pointing to a photograph, Vipul said, "She is the daughter of my grandfather's only son." How is Vipul related to the girl in the photograph?

a. Father

b. Brother

c. Cousin

d. Uncle

16. A research problem is feasible only when

a. It has utility and relevance

b. It is new and adds something to knowledge

c. It is researchable

d. All of the above

17. Which of the following is not the method of Research?

a. Survey

b. Historical

c. Observation

d. Philosophical

18. One morning after sunrise, Suresh was standing facing a pole. The shadow of the pole fell exactly to his right. To which direction was he facing?

a. East

b. West

c. South

d. Data is inadequate

19.

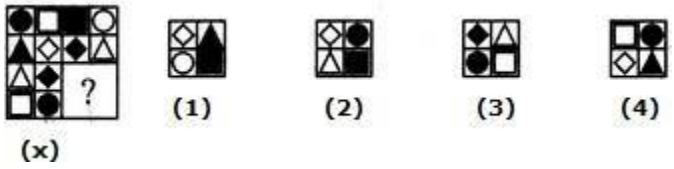
a. 1

b. 2

c. 3

d. 4

20.



a. 1

b. 2

c. 3

d. 4

21. Four usual dice are thrown on the ground. The total of numbers on the top faces of these four dice is 13 as the top faces showed 4, 3, 1 and 5 respectively. What is the total of the faces touching the ground?

a. 12

b. 13

c. 15
d. Cannot be determined

22. How to judge the depth of any research?
    a. By research title
    b. By research duration
    c. By research objectives
    d. By total expenditure on research

23. The conclusions/findings of which type of research cannot be generalized to other situations?
    a. Casual Comparative Research
    b. Historical Research
    c. Descriptive Research
    d. Experimental Research

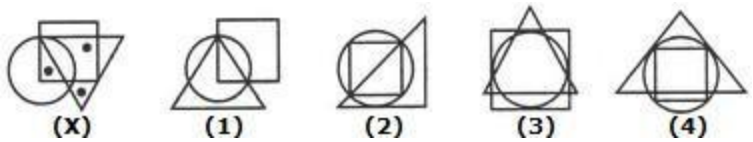
24. The main aim of the scientific method in the research field is to _____
    a. Improve data interpretation
    b. Confirm triangulation
    c. Introduce new variables
    d. Eliminate spurious relations

25. Which of the following does not correspond to characteristics of research?
    a. Research is not passive
    b. Research is systematic
    c. Research is not a problem-oriented
    d. Research is not a process

26. How many pairs of letters are there in the word 'NURSING" which have as many letters between then as in the alphabet?
    a. 1
    b. 3
    c. 5
    d. 6

27. Assertion (A): Pakistan's national cricket team did not participate in the tournament.
    Reason (R): Pakistan does not have enough cricket players.
    a. Both (A) and (R) are true, and (R) is the correct explanation of (A).
    b. Both (A) and (R) are true, but (R) is not the correct explanation of (A).
    c. (A) is true, but (R) is false.
    d. (A) is false, but (R) is true.

28. Select the figure which satisfies the same conditions of placement of the dots as in Figure-X.



a. 1
b. 2
c. 3
d. 4

29. Evaluation Research is concerned with _____

a. How well are we doing?
b. Why are we doing?
c. What are we doing?
d. None of the above

30. What does the longitudinal research approach actually deal with?

a. Long-term research
b. Short-term research
c. Horizontal research
d. None of the above

31. Find the 11th letter to the left of 20th letter from left in the English alphabet.

a. D
b. J
c. K
d. I

32. AZ, CX, FU….?

a. IR
b. IV
c. JQ
d. KP

33. Assertion (A): The Steam engine was invented by James Watt.
Reason (R): There was a problem of taking out water from flooded mines.

a. Both A and R are true and R is the correct explanation of A.
b. Both A and R are true but R is NOT the correct explanation of A
c. A is true but R is false.

d. A is false but R is true.

34. Which one among the following statements is false in the context of participatory research?
    a. It recognizes knowledge as power
    b. It is a collective process of inquiry
    c. It emphasizes people as experts
    d. Its sole purpose is the production of knowledge

35. A research intends to explore the result of possible factors for the organization of effective mid-day meal interventions. Which research method will be most appropriate for this study?
    a. Descriptive survey method
    b. Historical method
    c. Ex-post facto method
    d. Experimental method

36. How is random sampling helpful?
    a. Reasonably accurate
    b. An economical method of data collection
    c. Free from personal biases
    d. All of the above

37. Which of the following features are considered as critical in qualitative research?
    a. Collecting data with the help of standardized research tools.
    b. Design sampling with probability sample techniques.
    c. Collecting data with bottom-up empirical evidence.
    d. Gathering data with top-down schematic evidence.

38. What is the main role of research in education?
    a. To upsurge one's social status.
    b. To increase one's job prospects.
    c. To augment one's personal growth.
    d. To help an applicant in becoming a renowned educationalist.

39. While going on a scooter, you find someone has been hurt by your vehicle, you would
    a. Try to run away from the spot immediately
    b. stop your vehicle and say 'I am sorry'
    c. Take him to doctor and arrange for his medical aid
    d. pay compensation for the injury and in this way

40. In the following question, a number series is given with one term missing. Choose the correct alternative that will the same pattern and fill in the blank spaces.: 1, 4, 9, 16, 25, x
    a. 35
    b. 36
    c. 48
    d. 49

41. 120, 99, 80, 63, 48, ?
    a. 35
    b. 38
    c. 39
    d. 40

42. What is the major attribute of Correlation Analysis?
    a. Association among variables
    b. Difference among variables
    c. Regression among variables
    d. Variations among variables

43. I. All flowers in the garden are red.
    II. Some of the flowers are roses.
    III. All roses in the garden are red.
    If the first two statements are true, the third statement is
    a. False
    b. True
    c. Uncertain
    d. None of the above

44. If the word 'LION' is coded as LMGJ. How is 'MILK' written in that code?
    a. JKFL
    b. KLIM
    c. KILM
    d. IJGK

45. _____is a type of conclusive research which is especially formulated to give a description about a phenomena or group
    a. Longitudinal Research design
    b. Exploratory Research design
    c. Descriptive Research design
    d. Two- Tiered Research design

46. Which of the following is true about field experiment?
    a. High internal validity
    b. High external validity

c. High internal and High external validity
d. None of the above

47. A is B's sister. C is B's mother. D is C's father. E is D's mother. Then, how is A related to D?
    a. Grandfather
    b. Grandmother
    c. Daughter
    d. Granddaughter

48. A and B invest in a business in the ratio 3:2. If 5% of the total profit goes to charity and A's share is Rs. 855, the total profit is:
    a. 500
    b. 1000
    c. 1500
    d. 2000

49. Who was the author of the book named "Methods in Social Research"?
    a. Kerlinger
    b. CR Kothari
    c. Goode and Hatt
    d. Wilkinso

50. Statement 1: A is bigger than B but shorter than C
    Statement 2: D is smaller than C and bigger than A
    Statement 3: B is greater than D
    If statement 1 and statement 2 are true, statement 3 will be –
    a. True
    b. false
    c. uncertain
    d. None of the above

PART (B)

(Domain Specific)

(Computer Science & Engineering /Computer Application/Electronics & Communication Engineering /Management/Mathematics/Physics/Chemistry/Mechanical Engineering/Law) Please attempt questions from only one domain

Computer Science & Engineering/Computer Application

1. Which of the following statements is true for TCP protocol?

a. TCP is a connection-less unreliable protocol.
b. TCP is a connection-less reliable protocol.
c. TCP is a connection-oriented reliable protocol.
d. TCP is a connection-oriented unreliable protocol.

2. The file space allocation of Unix Operating System is:

e. Linked
f. Single level indexed
g. Multi-level Indexed
h. Contiguous

3. The worst-case time complexity of searching an element out of n elements is:

a. $\theta(n)$ for complete binary tree and BST while $\theta(\log n)$ for AVL tree.
b. $\theta(n \log n)$ for complete binary tree, $\theta(n)$ for BST and $\theta(\log n)$ for AVL tree.
c. $\theta(n)$ for complete binary tree while $\theta(\log n)$ for BST and AVL tree.
d. $\theta(\log n)$ for complete binary tree, BST and AVL tree.

4. This examination paper has 100 multiple-choice questions of one mark each, with each question having four choices only one of which is correct. Each incorrect answer fetches -0.25 marks. Suppose you choose all your answers randomly with uniform probability. Then the expected mark you obtain is:

a. 6.25
b. 0
c. 37.5
d. 17.5

5 Suppose we are given pointers to first and last nodes of a singly linked list containing n elements (where each node contains pointer to the next node) Which of the following operations cannot be performed in time independent on the length of the linked list?

a. Insert a new element as the last element.
b. Insert a new element as the first element.
c. Delete the first element.
d. Delete the last element.

6 A CPU has 32-bit address lines and 16-bit data lines. The maximum primary memory addressing capacity of the CPU is:

a. 4 MB
b. 2 GB
c. 64 KB
d. 4 GB

7. Which of the following inter-process communication mechanism is most efficient in an operating system?

a. Semaphore
b. Shared memory
c. Message Passing
d. Message queue

8. In a QAM Modulation scheme, the baud-rate is 4 kilo baud/second. The lowest carrier frequency is 102 KHz. The bandwidth of the channel is 1 MHz. The number of digital channels created would be:

a. 300
b. 250
c. 200
d. 225

9. To reduce thrashing in virtual memory, which of the following data structures is most suitable?

a. Queue
b. Array
c. Hashing
d. Stack

10. An Ethernet frame is 32 bytes long. How many extra bytes should be added to the frame before transmission?

a. 32 bytes
b. 48 bytes
c. 64 bytes
d. 4. 16 bytes

11. The number of 4 digits even numbers where all the digits are distinct is…… (Note that the most significant digit of these numbers cannot be zero)

a. 2296
b. 2240
c. 2520
d. 2620

12. Networks that use different technologies can be connected by using

a. Packets
b. Switches
c. Bridges
d. Routers

13. The postfix expression AB + CD – * can be evaluated using a

a. Stack
b. Tree
c. Queue
d. Linked List

14. Both hosts and routers are TCP/IP protocol software. However, routers do not use protocol from all layers. The layer for which protocol software is not needed by a router is:

a. Application
b. Physical
c. Internet
d. Network Interface

15. The post order traversal of a binary tree is DEBFCA. Find out the preorder traversal.

a. ABFCDE
b. ADBFEC
c. ABDECF
d. None of the above

16. In multiuser database if two users wish to update the same record at the same time, they are prevented from doing so by

a. Jamming
b. Password
c. Documentation
d. Record Lock

17. The branch logic that provides making capabilities in the control unit is known as:

a. Controlled Transfer
b. Conditional Transfer
c. Unconditional Transfer
d. None of the above

18. A binary search tree is a binary tree:

a. All items in the left subtree are less than root
b. All items in the right subtree are greater than or equal to the root
c. Each subtree is itself a binary search tree
d. All of the above

19. The number of colours required to properly colour the vertices of every planer graph is:

a. 2
b. 3
c. 4

d. 5

20. Leaves of which of the following trees are at the same level?

a. Binary Tree
b. B- Tree
c. AVL Tree
d. Expression Tree

21. What deletes the entire file except the file structure?

a. ERASE
b. DELETE
c. ZAP
d. PACK

22. Which of the following TCP/IP Internet protocol is diskless machine uses to obtain its IP address from a server?

a. RAP
b. RIP
c. ARP
d. X.25

23. Which command is the fastest among the following?

a. COPY TO
b. COPY STRUCTURE TO
c. COPY FILE
d. COPY TO MFILE-DAT DELIMITED

24. Decryption and Encryption of data are the responsibility of which of the following layer?

a. Physical Layer
b. Data Link Layer
c. Presentation Layer
d. Session Layer

25. B+ tree is preferred to binary tree in Database because

a. Disk capacities are greater than memory capacities
b. Disk access is much slower than memory access
c. Disk data transfer rates are much less than memory data transfer rate
d. Disks are more reliable than memory

26. In which circuit switching, delivery of data is delayed because data must be stored and retrieved from RAM?

a. Space Division
b. Time Division

c. Virtual
d. Packet

27. With reference to cache memory, the hit ratio is defined as:

a. No. of hits / (No. of hits + No. of miss.
b. No. of hits / No. of miss
c. No. of miss / (No. of hits + No. of miss)
d. No. of miss / No. of hits

28. How many address/data lines are required to access 64k x 8 memory?

a. 16/8
b. 8/16
c. 16/16
d. 8/8

29. In a sliding window ARQ scheme, the transmitter's window size is N and the receiver's window size is M. The minimum number of distinct sequence numbers required to ensure correct operation of the ARQ scheme is:

a. max (M, N)
b. M + N
c. min (M, N)
d. M * N

30. Consider a disk pack with a seek time of 4 milliseconds and rotational speed of 10000 rotations per minute (RPM). It has 600 sectors per track and each sector can store 512 bytes of data. Consider a file stored in the disk. The file contains 2000 sectors. Assume that every sector access necessitates a seek, and the average rotational latency for accessing each sector is half of the time for one complete rotation. The total time (in milliseconds) needed to read the entire file is_.

a. 4020
b. 14200
c. 14400
d. 14040

31. Consider a complete binary tree where the left and the right subtrees of the root are min-heaps. The lower bound for the operations to convert the tree to a heap is:

a. $\Omega(n)$
b. $\Omega(\lg n)$
c. $\Omega(n \lg n)$
d. $\Omega(1)$

32. Let the content of address part of instruction be 1234H and the content of base register be 0236H. Give the address of memory location addressed if base register addressing mode is used.

a. 46BH

b. 1234H

c. 146AH

d. 1470H

33. In which routing method do all the routers have a common database?

a. Link State
b. Link Vector
c. Distance Vector
d. Shortest Path Routing

34. If a network designer wants to connect 5 routers as point-to-point simplex line, then total number of lines required would be:

a. 10
b. 20
c. 30
d. 40

35. PM-CMM stands for:

1. Project Management Capability Maturity Model
2. Process Management Capability Maturity Model
3. People Management Capability Maturity Model
4. Product Management Capability Maturity Model

36. What scheduling policy will you use when the system's efficiency is measured by the percentage of jobs completed?

a. All of the these
b. Round Robin
c. FCFS
d. Shortest Job First

37. A binary ripple counter is required to count 0 to 16383. How many flip-flops are required?

a. 8191
b. 512
c. 14
d. 16382

38. Which model in system modelling depicts the dynamic behaviour of the system?

a. Object Model
b. Context Model
c. Data Model
d. Behavioural Model

39. The height of a tree is the length of the longest root-to-leaf path in it. The maximum and minimum number of nodes in a binary tree of height 7 are:

a. 255 and 8, respectively
b. 127 and 8, respectively
c. 256 and 7, respectively
d. 128 and 7, respectively

40. Consider a main memory with five page frames and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Which one of the following is true with respect to page replacement policies First In First Out (FIFO) and Least Recently Used (LRU)?

a. FIFO incurs 2 more page faults than LRU
b. FIFO incurs 1 more page faults than LRU
c. Both incur the same number of page faults
d. LRU incurs 2 more page faults than FIFO

41. Consider the following transaction involving two bank accounts x and y.

read(x); x:= x – 50; write(x); read(y); y := y + 50; write(y)
The constraint that the sum of the accounts x and y should remain constant is that of:

a. Atomicity
b. Consistency
c. Durability
d. Isolation

42. A binary tree T has 20 leaves. The number of nodes in T having two children is

a. 18
b. 19
c. 17
d. 20

43. Consider the following C function.

```
int fun (int n)
{
  int x=1, k;
  if (n==1) return x;
  for (k=1; k<n; ++k)
     x = x + fun(k) * fun(n – k);
  return x;
}
```

The return value of fun(5) is _____.

a. 0
b. 51
c. 26
d. 20

44. Consider the following function written in the C programming language. The output of the above function on input “ABCD EFGH” is

```
void foo (char *a)
{
 if (*a && *a != ` `)
 {
   foo(a+1);
   putchar(*a);
 }
}
```

a. ABCD
b. ABCDEFGH
c. HGFEDCBA
d. DCBA

45. The cardinality of the power set of {0, 1, 2 . . ., 10} is _____.

a. 1024
b. 1023
c. 2048
d. 2046

46. An Abstract Data Type (ADT) is:

a. Same as an abstract class
b. A data type that cannot be instantiated
c. A data type for which only the operations defined on it can be used, but none else
d. All of the above

47. The time complexity of computing the transitive closure of a binary relation on a set of n elements is known to be

a. O(n)
b. O(n log n)
c. $O(n^3)$
d. None of the above

48. Consider allocation of memory to a new process. Assume that none of the existing holes in the memory will exactly fit the process's memory requirement. Hence, a new hole of smaller size will be created if allocation is made in any of the existing holes. Which one of the following statement is TRUE?

a. The hole created by first fit is always larger than the hole created by next fit.
b. The hole created by worst fit is always larger than the hole created by first fit.
c. The hole created by best fit is never larger than the hole created by first fit.
d. The hole created by next fit is never larger than the hole created by best fit.

49. What is the worst case time complexity of inserting n elements into an empty linked list, if the linked list needs to be maintained in sorted order?

a. O(n)
b. O(n log n)
c. $O(n^2)$
d. None of the above

50. Consider a paging system that uses 1-level page table residing in main memory and a TLB for address translation. Each main memory access takes 100 ns and TLB lookup takes 20 ns. Each page transfer to/from the disk takes 5000 ns. Assume that the TLB hit ratio is 95%, page fault rate is 10%. Assume that for 20% of the total page faults, a dirty page has to be written back to disk before the required page is read from disk. TLB update time is negligible. The average memory access time in ns (round off to 1 decimal places) is _____.

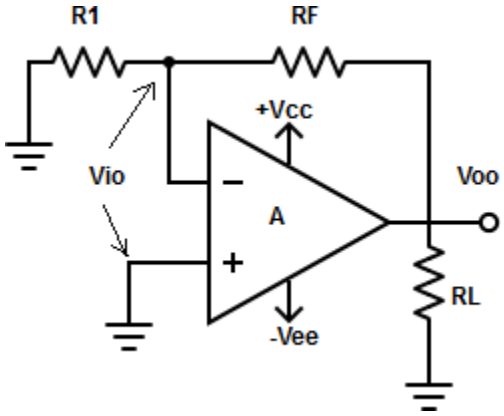
a. 154.5
b. 154
c. 755
d. 725

PART (B)

(Domain Specific)

Electronics & Communication Engineering

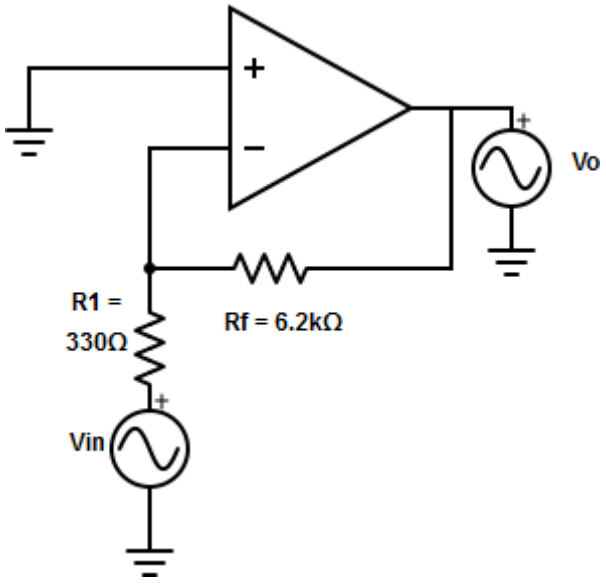
1. What happens if $R_1 >> R_F$ in the circuit



   a. 1.1
   b. 1.6
   c. 1.2
   d. 2.2

2. Voltage shunt feedback amplifier forms
   a. A Positive feedback
   b. A negative feedback
   c. Both positive and negative
   d. None of the mentioned

3. Specification of op-amp 741c is given below:
   A=200000; R_i=2MΩ; R_o=75Ω; Supply voltages= ±15v; output voltage swing =±13v;



   f_o=5hz.

Compute the value of output resistance, bandwidth and closed loop voltage gain for the circuit shown.

a. R_{OF}=8.6mΩ , f_F= 53005hz and A_F=-9.36
b. R_{OF}=4.12mΩ , f_F= 53005hz and A_F=-11.78
c. R_{OF}=7.1mΩ , f_F = 53005hz and A_F=-16.95
d. R_{OF}=1.9mΩ , f_F= 53005hz and A_F=-10

4. Write the formula for closed loop voltage gain of inverting amplifier with feedback using open loop voltage gain and gain of feedback circuit
   a. A_F= A/(1+AB)
   b. A_F= -A/(1+AB)
   c. A_F= -B/(1+AB)
   d. None of the mentioned

5. What are the types of MOSFET devices available?
   a. P-type enhancement type MOSFET
   b. N-type enhancement type MOSFET
   c. Depletion type MOSFET
   d. All of the mentioned

6. Expression for characteristic impedance Z_o of a transmission line in terms of L and C the transmission line is:
   a. √(C/L)
   b. √(CL)
   c. √(L/C)
   d. 1/√(LC)

7. For any mode of propagation in a rectangular waveguide, propagation occurs
   a. Above the cut off frequency
   b. Below the cut off frequency
   c. Only at the cut-off frequency
   d. Depends on the dimension of the waveguide

8. In a two wire transmission line, if the distance between the lines is 20 mm and the radii is 5 mm then the inductance of the line is:
   a. 0.1 µH
   b. 0.526 µH
   c. 0.9 µH
   d. 1 µH

9. If the outer and the inner diameter of a coaxial transmission line are 20 mm and 10 mm respectively, then the inductance /m of the transmission line is:
   a. 0.13 µH
   b. 0.2 µH
   c. 0.3 µH
   d. 0.1 µH

10. The lowest mode of TE mode propagation in a circular waveguide is:
    a. TE10 mode
    b. TE00 mode
    c. TE01 mode
    d. TE11 mode

11. If the wavelength of a signal is 10 mm, then the wavenumber of the material when a waveguide is filled with that material is

a. 628
b. 345
c. 123
d. None of the mentioned

12. The basic requirements of transmitting antennas are:
    a. High efficiency
    b. Low side lobes
    c. Large signal to noise ratio
    d. None of the mentioned

13. . In which of the following semiconductor, the concentration of the holes and electrons is equal?
    a. Intrinsic
    b. Extrinsic
    c. Compound
    d. Elemental

14. An AM signal is represented by $x(t) = (20 + 4\sin(500\pi t))\cos(2\pi t \times 10^5)V$. The modulation index is
    a. 20
    b. 4
    c. 0.2
    d. 10

15. An AM signal is represented by $x(t) = (20 + 4\sin(500\pi t))\cos(2\pi t \times 10^5)V$. Total sideband power is
    a. 8W
    b. 4 W
    c. 2 W
    d. 16 W

16. A carrier is simultaneously modulated by two sine waves with modulation indices of 0.4 and 0.3. The resultant modulation index will be
    a. 1
    b. 0.7
    c. 0.5
    d. 0.35

17. If the positive terminal of the battery is connected to the anode of the diode, then it is known as
    a. Schottky barrier
    b. Equilibrium
    c. Reverse biased
    d. Forward biased

18. Which of the following is a characteristic of digital signal?
    a. It takes quantized value
    b. Its waveform is a continuous function
    c. The maximum number of signals that can be produced by N bits is 2^{N-1}
    d. There is no loss of value after converting an analog signal to digital signal

19. Consider an N-bits ADC (Analog to Digital Converter) whose analog input varies from 0 to Vmax, then which of the following is not true?
    a. The least significant bit correspond to a change of $V_{max}/2^N$ -1 in the analog signal

b. The resolution of the ADC is $V_{max}/2^N - 1$
c. The maximum error in the conversion (or quantization error) is $V_{max}/2(2^N - 1)$
d. None of the mentioned

20. Assuming that the signal is quantized to satisfy the condition of previous question and assuming the approximate bandwidth of the signal is W. The minimum required bandwidth for transmission of a binary PCM signal based on this quantization scheme will be
    a. 5 W
    b. 10 W
    c. 20 W
    d. None of the mentioned

21. In PCM system, if the quantization levels are increased form 2 to 8, the relative bandwidth requirement will
    a. Remain same
    b. Be doubled
    c. Be tripled
    d. Become four times

22. In an NPN transistor, the arrow is pointed towards_____
    a. the collector
    b. the base
    c. depends on the configuration
    d. the emitter

23. Which of the following are true for a PNP transistor?
    a. the emitter current is less than the collector current
    b. the collector current is less than the emitter current
    c. the electrons are majority charge carriers
    d. the holes are the minority charge carriers

24. In the saturated region, the transistor acts like a_____
    a. poor transistor
    b. amplifier
    c. open switch
    d. closed switch

25. When does the transistor act like an open switch?
    a. cut off region
    b. inverted region
    c. saturated region
    d. active region
26. What is pinch off voltage?
    a. The minimum voltage required to turn on the FET
    b. The maximum voltage a FET can withstand
    c. Current amplification factor/voltage gain
    d. The value of voltage at which the current gets pinched to zero

27. A p-channel Ge JFET has max-half channel width 5μm and channel conductivity of 2/Ωcm, if $E_r = 2000cm^2/Vsec$. What is the value of pinch off voltage?
    a. 8.21V
    b. 82.1V
    c. 88.2 V
    d. 5.2 V

28. The number of cars arriving at ICICI bank drive-in window during 10-min period is Poisson random variable X with b=2. The probability that more than 3 cars will arrive during any 10 min period is
    a. 0.249
    b. 0.143
    c. 0.345
    d. 0.5688

29. The number of cars arriving at ICICI bank drive-in window during 10-min period is Poisson random variable X with b=2. The probability that no car will arrive is
    a. 0.516
    b. 0.459
    c. 0.777
    d. 0.135

30. For NMOS transistor which of the following is not true?
    a. The substrate is of p-type semiconductor
    b. Inversion layer or induced channel is of n type
    c. Threshold voltage is negative
    d. None of the mentioned

31. Process transconductance parameter is directly proportional to
    a. Electron mobility only
    b. (Electron mobility)$^{-1}$ only
    c. Oxide capacitance only
    d. Product of oxide capacitance and electron mobility

32. The base current amplification factor β is given by_____
    a. I_C/I_B
    b. I_B/I_C
    c. I_E/I_B
    d. I_B/I_E

33. In an NPN silicon transistor, α=0.995, I_E=10mA and leakage current I_{CBO}=0.5μA. Determine I_{CEO}.
    a. 10μA
    b. 100μA
    c. 90μA
    d. 500μA

34. Where should be the bias point set in order to make transistor work as an amplifier?
    a. Cut off
    b. Active
    c. Saturation
    d. Cut off and Saturation

35. Q point can be s
    a. BE reverse biased and BC forward biased
    b. BE reverse biased and BC reverse biased
    c. BE forward biased and BC reverse biased
    d. BE forward biased and BC forward biased

36. What would be the value of feedback voltage in a negative feedback amplifier with A=100; β =0.03 and input signal voltage = 40mv?
    a. 0.03V

b. 0.06V
c. 0.09V
d. 0.12V

37. DC average current of a bridge full wave rectifier (where I_m is the maximum peak current of input).
a. $2I_m$
b. I_m
c. $I_m/2$
d. $1.414I_m$

38. At what temperature the donor states are completely ionized?
a. 0 K
b. ROOM
c. 300K
d. 900K

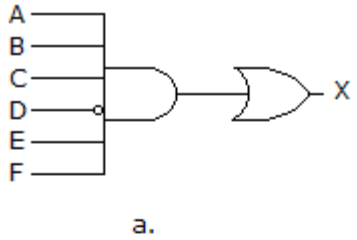
39. In a shunt capacitor filter, the mechanism that helps the removal of ripples is_____
a. The property of capacitor to store electrical energy
b. The current passing through the capacitor
c. The voltage variations produced by shunting the capacitor
d. Uniform charge flow through the rectifier.

40. What are oscillators?
a. Converts dc to ac
b. Switching circuits
c. Converts ac to dc
d. Filter circuits

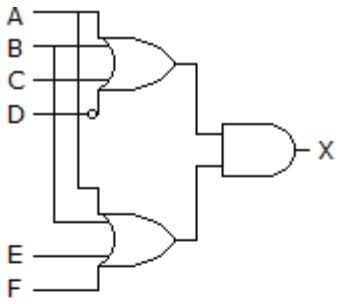
41. Give the relation between output and input voltage of an oscillator?
a. $A_v = V_i/V_o$
b. $V_i = V_o A_v$
c. $V_o = A_v/V_i$
d. $A_v = V_o/V_i$

42. In 1-to-4 multiplexer, if C1 = 1 & C2 = 1, then the output will be _____
a. Y0
b. Y1
c. Y2
d. Y3

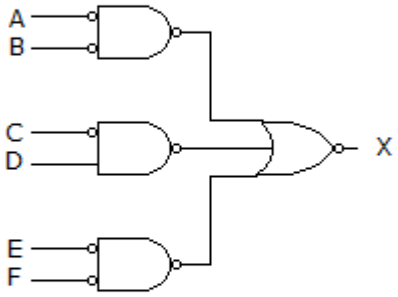
43. Which of the circuits in figure (a to d) is the sum-of-products implementation of figure (e)?



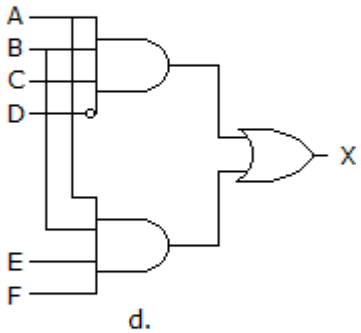
a.



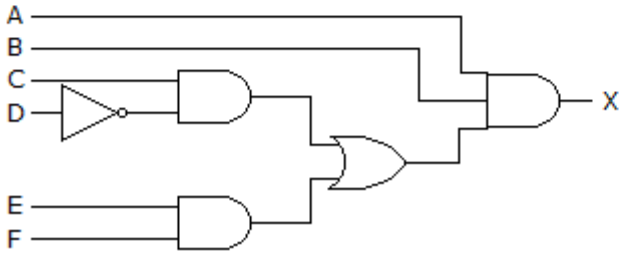
b.



c.



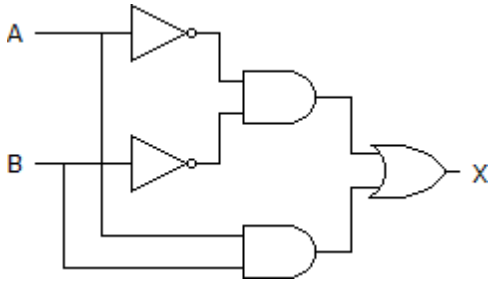
d.



e.

a. a
b. b
c. c
d. d

44. Which of the following logic expressions represents the logic diagram shown?



a. X=AB'+A'B
b. X=(AB)'+AB
c. X=(AB)'+AB
d. X=A'B'+AB

45. A latch is an example of a _____
a. Monostable multivibrator
b. Astable multivibrator
c. Bistable multivibrator
d. 555 timer

46. 2’s complement of 11001011 is _____
    a. 01010111
    b. 11010100
    c. 00110101
    d. 11100010

47. The expression Y=AB+BC+AC shows the _____operation.
    a. EX-OR
    b. SOP
    c. POS
    d. NOR

48. How many natural states will there be in a 4-bit ripple counter?
    a. 2
    b. 4
    c. 8
    d. 16

49. A shift register that will accept a parallel input or a bidirectional serial load and internal shift features is called as?
    a. Tristate
    b. End around
    c. Universal
    d. Conversion

50. The MOS technology based semiconductor ROMs are classified into _____categories.
    a. 2
    b. 3
    c. 4
    d. 5

PART (B)

(Domain Specific)

Management

1. Technology that assists companies to alteration in business by allowing them to use new methods is named as:
   a. Data Processing
   b. Information Systems
   c. Information Technology
   d. Virtualization
2. Which of the following is not an example of a way in which technology is changing business and its relationship with employees?
   a. Technology Cuts Waste
   b. Technology Cuts Development Cycles
   c. Technology Eliminates Layers of Management
   d. Technology Is Breaking Down Corporate Barriers
3. A company-wide network, closed to public access, which uses Internet-type technology is called:
   a. A. Intranet
   b. B. Internet
   c. C. Extranet
   d. D. All of the above
4. The most dynamic change in business technology in recent years is:
   a. The speed of the printers
   b. The move away from mainframe computers toward network systems
   c. The cost of computers
   d. None of the above
5. The computer program that is used to handle anything from a note to a multi chapter book is called a(n)
   a. Data base program
   b. Spreadsheet
   c. Accounting program
   d. Word processing program
6. Delta Co. wants to calculate the Breakeven Point for a product. Which of the following programs would he use?
   a. Database
   b. Spreadsheet
   c. Word processor
   d. None of the above
7. Computer programs that make it possible for different brands of computers to transfer data to each other are called:
   a. Message Centre software
   b. Data base software
   c. Communication software
   d. All of the above
8. Which of the following statements about marketing is true?
   a. It is of little importance when products are standardized.
   b. It can help create jobs in the economy by increasing demand for goods and services.
   c. It is more important for bigger organizations than smaller ones.
   d. It is seldom used by non-profit organizations.

9. _____management is the art and science of choosing target markets and getting, keeping, and growing customers through creating, delivering, and communicating superior customer value.

a. Marketing
b. Knowledge
c. Operations
d. Strategic

10. A social definition of marketing says _____.

a. Effective marketing requires companies to remove intermediaries to achieve a closer connection with direct consumers
b. A company should focus exclusively on achieving high production efficiency, low costs, and mass distribution to facilitate the broadest possible access to the company's products
c. Marketing is the process by which individuals and groups obtain what they need and want through creating, offering, and freely exchanging products and services of value with others
d. Marketing is the process of extracting the maximum value from consumers to facilitate corporate growth

11. As economies advance, a growing proportion of the economy's activities focuses on the production of _____.

a. Products
b. Events
c. Luxury goods
d. Services

12. Soccer's World Cup is promoted aggressively to both companies and fans. This is an example of marketing a(n) _____.

a. Idea
b. Place
c. Luxury item
d. Event

13. In Walt Disney's Magic Kingdom, customers can visit a fairy kingdom, a pirate ship, or even a haunted house. Disney is marketing a(n) _____.

a. Experience
b. Service
c. Event
d. Organization

14. Sales of woollen clothing usually increase during the winter season and decline thereafter. This is an example of _____demand.

a. Seasonal
b. Declining
c. Impulse
d. Latent

15. Young people in emerging countries today are becoming increasingly health conscious and are seeking healthy food choices. As a result, demand for health foods is rising steadily, creating an opportunity for marketers to exploit this _____market.

a. Demographic
b. Business
c. Need
d. Geographic

16. When demand is _____, it implies that more customers would like to buy the product than can be satisfied.

a. Latent
b. Irregular

c. Overfull
d. full

17. A financial instrument is
    a. A type of asset
    b. A type of liability
    c. A type of a contract
    d. A type of asset or liability
18. Debenture securities carry
    a. Voting rights and dividends
    b. Interest and voting rights
    c. Interest and dividend
    d. Only interest
19. A critical assumption of the net operating income (NOI) approach to valuation is:
    a. that debt and equity levels remain unchanged.
    b. that dividends increase at a constant rate.
    c. that ko remains constant regardless of changes in leverage.
    d. that interest expense and taxes are included in the calculation.
20. Cost of capital is the minimum rate of return expected by its investors.
    a. Given statement is false
    b. Given statement is true
    c. Given statement is true in some cases
    d. Given statement is unreasonable
21. Which of the following statement is not true for capital budgeting?
    a. Capital budgeting decisions are irreversible in nature.
    b. Capital budgeting decisions affect the future stability of the firm.
    c. Business expansion decision in a capital expenditure decision.
    d. Sunk cost is a relevant cost in capital budgeting.
22. Gross working capital is based on
    a. Accrual Concept
    b. Money Measurement Concept
    c. Going Concern Concept
    d. Realization Concept

23. An alternative to ___is the objective of wealth maximization.
    a. Profit minimization
    b. Market maximization
    c. Quality maximization
    d. Profit maximization
24. Fredrick Winslow Taylor's Principles of Scientific Management suggested the use of scientific methods to define:
    a. The easiest way of doing a job
    b. The most complex way of doing a job
    c. The best way of doing a job
    d. None of these

25. The perspective that Managers are directly responsible for an organization's success is known as:
    a. Omnipotent view of management
    b. Management orientation
    c. Autocratic management
    d. None of these
26. The internal environment factor(s) that influence management is (are)
    a. Place
    b. Machine
    c. Labour
    d. All the above

27. A person directly involved in operation and accomplishment of main objective of the firm is called
    a. line manager
    b. Close line manager first line manager
    c. staff manager
    d. Line and staff manager

28. _____Studied 5 chief executives at work and identify 10 managerial roles.
    a. Max Weber
    b. Henry Fayol
    c. Henry Mintzberg
    d. F.W. Taylor

29. Control should be placed
    a. where they are cost effective
    b. in problem area of operations
    c. on the single most important area
    d. on all the activities

30. The key to motivating today's diverse workforce lies in
    a. Innovation
    b. Creativity
    c. Goal Setting
    d. Adaptability

31. _____refers to a management philosophy that requires employees to continuously set and relentlessly meet ever high quality, cost delivery and availability goals
    a. Performance Appraisal
    b. Performance Management
    c. Management By Objective
    d. Continuous Improvement

32. In order to bring about effective organizational change, changes in technology need to be accompanied by making changes in_____
    a. Strategies
    b. Structure
    c. Staff
    d. Style

33. Which one of the following cannot be consider as an important dimension on which nations culture differ?
    a. Individualism Vs Collectivism
    b. Power Distance
    c. Uncertainty Avoidance
    d. Economic development

34. Which of the following statements is not part of theory 'X' assumptions?
    a. Decisions are made in participative manner
    b. Employees inherently dislike work
    c. Employees must be coerced to achieve goals
    d. Employees tend to avoid responsibilities

35. A way of analyzing leadership style where leaders are classified on a grid with TWO dimensions is called:
    a. Managerial grid
    b. Two-way theory
    c. Great man theory
    d. Trait theory

36. Budget 2021-22 proposals to rest on six pillars. Which of the following is not among them?
    a. Agricultural Development
    b. Minimum Government, Maximum Governance

c. Innovation and R&D
d. Inclusive Development for Aspirational India

37. FM Nirmala Sitharaman proposes to setup an ARC for NPA Management. What does 'R' refer to in ARC?
a. Recapitalization
b. Retail
c. Reconstruction
d. Reforms

38. FM Nirmala Sitharaman announced to protect whom from double taxation in Union Budget 2021?
a. Indian Citizens
b. Foreigners
c. NRIs
d. All of the above

39. Vivad Se Vishwas Scheme for
a. NPA
b. To settle Capital dispute
c. To settle Tax dispute
d. None of these

40. Under the pillar of Inclusive Development for Aspirational India, the budget speech announced
I. Agriculture and allied sectors
II. Farmers Welfare
III. Migrant Workers
IV. Financial Inclusion
V. Financial Capital
Select CORRECT code given below
a. I, II, III, IV
b. I, II, III IV, V
c. I, II, III, V
d. I, III, IV, V

41 Imagine you are working in an educational institution, where people are of equal status. Which method of communication is best suited and normally employed in such a context?
a. Horizontal Communication
b. Vertical Communication
c. Corporate Communication
d. Cross Communication

42. Which among the following should not be avoided for effective communication?
a. Noise
b. Planning
c. Semantic problems
d. Wrong assumptions

43. FOGINDEX is used to measure:
a. Clarity of message
b. Courtesy of message
c. Readability of message
d. All the above.

44. Mental turbulence refers to:
a. Inability to understand
b. Confusion in the mind of receiver
c. Confusion in the mind of sender
d. Inability to speak

45. Denotations and Connotations are ---------- barriers in communication process.

a. Physical barriers
b. Semantic barriers
c. Encoding barriers
d. Technical barriers

46. Who has defined personnel management as a field of management which has to do with planning and controlling various operative functions of procuring, developing, maintaining and labour force?
    a. Harold Koontz
    b. Glueck
    c. Michael Jucius
    d. Flippo
47. Statement I: Career path is the process by which one selects career goals and the path to these goals.
    Statement II: Career Planning is the sequential pattern of jobs that forms one career.
    a. Statement I is correct but Statement II is incorrect
    b. Statement II is correct but Statement I is incorrect
    c. Statement I and II are correct
    d. Statement I and II are incorrect
48. A team of learners working online in a real-time mode using the Internet is known as
    a. individualized self-paced e-learning online
    b. individualized self-paced e-learning offline
    c. group-based e-learning synchronously
    d. group-based e-learning asynchronously
49. Statement I- Human resource planning is an objectivity approach but it is not time oriented.
    Statement 2- Human resource planning is required at all level of management but it is not a responsibility of management.
    a. Statement I is correct
    b. Statement II is correct
    c. Statements I and II are correct
    d. Statements I and II are incorrect
50. Trade unions and employee association, Industrial relation, employee participation and empowerment are procurement functions of a manager which comes under_____
    a. Integration function
    b. Procurement function
    c. Development function
    d. Behavioural function

PART (B)

(Domain Specific)

Mathematics

1. The value of limit $\lim_{n\to\infty} \frac{1-\cos x}{x^2}$ is:
   a. ¼
   b. ½
   c. 1
   d. 2
2. The differential equation $\frac{d^2y}{dx^2} + x^2(\frac{dy}{dx})^3 + (\sin x)^2 = 0$ is:
   a. second order, linear, homogenous
   b. third order,non- linear, homogenous
   c. third order, linear, Non- homogenous
   d. second order, Non- linear, Non- homogenous
3. The minimum value of function $y = x^2$ in the interval [1, 5] is
   a. 0
   b. 1
   c. 25
   d. Undefined
4. Eigen values of a real symmetric matrix are always
   a. Positive
   b. Negative
   c. Real
   d. Complex
5. The particular integral for the differential equation $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = \sin 2x$ is:
   a. 1/7(sin2x)
   b. 1/65(8$cos2x$ + $sin2x$)
   c. -1\7(2$cos2x$ + $sin2x$)
   d. -1/65(4$cos2x$ + $sin2x$)
6. At x = 0, the function f(x) = x^3 + 1 has
   a. A maximum value
   b. A minimum value
   c. A singularity
   d. A point of inflection
7. The partial differential equation $\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = \frac{\partial u^2}{\partial x^2}$ is a
   a. Linear equation of order 2
   b. Non-linear equation of order 1
   c. Linear equation of order 1
   d. Non-linear equation of order 2
8. Given that the determinant of the matrix A= $\begin{bmatrix} 1 & 3 & 0 \\ 2 & 4 & 6 \\ -1 & 0 & 2 \end{bmatrix}$ is -11, then the determinant of the matrix A= $\begin{bmatrix} 2 & 6 & 0 \\ 4 & 8 & 12 \\ -2 & 0 & 4 \end{bmatrix}$ is

a. -96
b. -24
c. 24
d. 96

9. For a given set of linear equations:

X+3y-z=4; 2x+y+2z=10; 3x-y+bz=a,
The value of a and b for the equations to have a unique solution will be respectively:

a. Any value of a, b ≠ 5
b. A ≠ 16 or b ≠ 3, a ≠ 16, or b ≠ 3
c. A ≠ 10 or b ≠ 2
d. A ≠ 10,or b = 5

10. The argument of the complex number $z = \frac{1+i}{1-i}$ is

a. π
b. $\pi/2$
c. $-\pi/2$
d. $2\,\pi$

11. The sum of the Eigen values of the matrix A= $\begin{bmatrix} 3 & 6 & 7 \\ 5 & 4 & 2 \\ 7 & 9 & 1 \end{bmatrix}$ is:

a. 7
b. 8
c. 9
d. 10

12. The value of the integral $\int_{-\infty}^{\infty} \frac{\sin x}{x^2+2x+1}\,dx$:

a. -π sin (1)/e
b. -π cos (1)/e
c. sin (1)/e
d. cos (1)/e

13. Let z be a complex variable. For a counter-clockwise integration around a unit circle C, centred at origin $\oint \frac{1}{z-4}dz = A\pi i$, Then value of A is

a. 2/5
b. ½
c. 2
d. 4/5

14. The partial differential Equation $\frac{\partial \mathrm{u}}{\partial \mathrm{t}} = \frac{\partial^2 u}{\partial x^2}$ is known as the:

a.Wave equation
b. Heat Equation
c. Laplace Equation
d. Elasticity Equation

15. A parametric curve defined by $x = \cos\frac{\pi y}{2}$, $y = \sin\frac{\pi y}{2}$ in the range of $0 \leq u \leq 1$ is rotated about the X – axis by 360 degrees. Area of the surface generated is

a. π
b. $-\pi$
c. 2π
d. 4π

16. Divergence of the vector field $x^2z\hat{\imath} + xy\hat{\jmath} - yz^2\hat{k}$ at (1, -1, 1) is
    a. 0
    b. 3
    c. 5
    d. 6
17. $\lim_{n\to\infty} \frac{x-\sin x}{1-\cos x}$ is equals to:
    e. 0
    f. 1
    g. 3
    h. Not defined
18. Evaluate $\oint \frac{2z}{(z+1)^4} dz$, where C is a circle centered at origin, |z|=3.
    a. $\frac{8}{3}\pi i.e^{-2}$
    b. $\frac{4}{3}\pi i.e^{-2}$
    c. $2\pi i.e^{-2}$
    d. $2\pi i.e^{2}$
19. Find the directional derivative of $f(x,y) = e^x.\sin y$ at the point P(0, 4) in the direction v=(1, -1)
    a. 0
    b. 1
    c. 2
    d. $\sqrt{2}$
20. The product of two complex numbers 1 + i and 2 - 5i is
    a. 7 - 3i
    b. 3 - 4i
    c. -3 - 4i
    d. 7 + 3i
21. Evaluate the integral: $\oint \frac{\cos \pi z}{(z-1)} dz$, where C is the circle |z|=3,
    a. $2\pi i$
    b. $-2\pi i$
    c. $6\pi^2 i$
    d. $-6\pi^2 i$
22. The series expansion for the function sin x is:
    a. $x - \frac{x^3}{3!} + \frac{x^5}{5!}$-…
    b. $x - \frac{x^3}{3!} - \frac{x^5}{5!}$-
    c. $x + \frac{x^3}{3!} + \frac{x^5}{5!}$-…
    d. $1 - \frac{x^3}{3!} + \frac{x^5}{5!}$-
23. A factory produces 15% defective items from a batch. Find the probability that exactly 2 of the chosen items are defective out of the 10 picked.
    a. 0.022
    b. 0.335
    c. 0.276
    d. 0.428
24. The Blasius equation f'''+(1/2)ff'' = 0
    a. Second order nonlinear ordinary differential equation
    b. Third order nonlinear ordinary differential equation
    c. Third order linear ordinary differential equation
    d. Mixed order nonlinear ordinary differential equation

25. An anti-aircraft gun can take a maximum of 4 shots at an enemy plane moving away from it. The probabilities of hitting the plane at the first, second, third and fourth shot are 0.4, 0.3, 0.2 and 0.1 respectively. The probability that the gun hits the plane is
    a. 0.76
    b. 0.4096
    c. 0.6976
    d. None of these

26. The value of $\oint (x^2y.\,dx - xy^2dy)$, where C is the $x^2 + y^2 = 4$ going counter-clockwise:
    a. 2π
    b. -4π
    c. -8π
    d. π

27. For what values of x , the function $y = \frac{x}{1+x\tan x}$ has maximum value:
    a. tanx
    b. 0
    c. cotx
    d. cosx

28. A variable has Poisson distribution with mean m. The probability that the variable takes any of the values 0 or 2 is
    a. $e^{-m}\left(1+m+\frac{m^2}{2}\right)$
    b. $e^{m}(1+m)^{\frac{-3}{2}}$
    c. $e^{3/2}\left(1+m^2\right)^{-3/2}$
    d. $e^{-m}\left(1+\frac{m^2}{2}\right)$

29. Let γ be the correlation coefficient between x and y and b_{yx}, b_{xy} be the regression coefficients of y on x and x on y respectively then
    a. $\gamma = b_{xy} + b_{yx}$
    b. $\gamma = b_{xy} \times b_{yx}$
    c. $\gamma = \sqrt{b_{xy} \times b_{yx}}$
    d. $\left(b_{xy} + b_{yx}\right)/2$

30. For the function of a complex variable w = lnz(where, w= u+iv and z=x+iy), the u=constant, lines get mapped in Z-plane as
    a. Set of confocal hyperbolas
    b. Set of confocal ellipses
    c. Set of radial straight lines
    d. Set of concentric circles

31. A jar contains black and white marbles. Two marbles are chosen without replacement. The probability of selecting a black marble and then a white marble is 0.34, and the probability of selecting a black marble on the first draw is 0.47. What is the probability of selecting a white marble on the second draw, given that the first marble drawn was black?
    a. 72%
    b. 28%
    c. 36%
    d. 40%

32. In a binomial distribution, the mean is 4 and variance is 3. Then the mode is
    a. 5

b. 6
c. 4
d. None

33. Let the eigen values of A be 1, −1, 1. Then what is the determinant of $A^{99} + I$ if A is diagonal matrix
    a. 2
    b. 6
    c. 100
    d. 0
34. The value of $\frac{1}{2\pi i}\int \frac{\cos \pi z}{z^2-1}$ dz around a rectangle with vertices at 2±i , -2±i is
    a. 6
    b. 2ie
    c. 8
    d. 0

35. The Eigen values of symmetric matrix are all
    a. Complex with non-zero positive imaginary part
    b. Complex with non-zero negative imaginary part
    c. Real
    d. Pure imaginary

36. The value of $\lim_{x\to o} x \sin\frac{1}{x}$ is equals to:

    a. 1
    b. 0
    c. ½
    d. -1

37. If $f'(x) = 1/(2 - x^2)$, then what would be the sum of lower and upper bound of f(1), if f(0)=1 and f(x) be defined for [0,1].
    a. 1
    b. 2
    c. 0
    d. 3.5
38. The distance between origin and a point nearest to the curve $z^2 = 5 - xy$
    a. 2
    b. 1
    c. $\sqrt{5}$
    d. $\sqrt{3}$
39. The partial differential equation $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} = 0$ is of
    a. Degree 1 and order 2
    b. Degree 1 and order 1
    c. Degree 2 and order 1
    d. Degree 2 and order 2
40. The value of integral $\int_1^3 \frac{1}{x}\, dx$ when evaluated using Simpson rule on two equal intervals with length 1, is:
    a. 1
    b. 1.2
    c. 1.11
    d. 1.21

41. A calculator has accuracy up to 8 digits after decimal place. The value of integral $\int_1^3 \sin x \ dx$, when evaluated using this calculator by Trapezoidal method with 8 equal intervals, to 5 significant digits is
    a. 0.00000
    b. 1.00000
    c. 0.00500
    d. 0.00025

42. Let X and Y be two independent random variables. Which one of the relations between expectation (E), variance (Var) and covariance (Cov) given below is false:
    a. E(XY) = E(X) E(Y)
    b. Cov(X, Y) = 0
    c. Var (X + Y) = Var (X) + Var(Y)
    d. $E(X^2Y^2) = (E(X))^2 (E(Y))^2$
43. Consider the function f(x) = |x| in the interval $-1 \leq x \leq 1$. At the point x =0, f(x) is
    a. Continuous and differentiable
    b. Non – continuous and differentiable
    c. Continuous and non – differentiable
    d. Neither continuous nor differentiable
44. Which of the following integrals is unbounded?
    a. $\int_0^{\pi/4} \tan(x) dx$
    c. $\int_0^{\infty} xe^{-x} dx$
    b. $\int_0^{\infty} \frac{1}{1+x^2} dx$
    d. $\int_0^{1} \frac{1}{1-x} dx$
45. If A=$\begin{bmatrix} 8 & 4 \\ -2 & 2 \end{bmatrix}$, then the value of $A^4 - 2A^2 + 76I$ is
    a. 50A – 170I
    b. 500A – 1776I
    c. 300A-470I
    d. None of these
46. A Binomial probability distribution is characterized by B (4, 1/4), then what is the value of P ($x \geq 2$)
    a. 67/256
    b. 33/128
    c. 13/356
    d. None of these
47. If u = sinhx cosy, then the analytic function f(z) = u + vi is:
    a. $cosh^{-1}z + iC$
    b. $coshz + iC$
    c. sinhz+iC
    d. $sinh^{-1}z + iC$

48. The minimum value of the function $x^3 + y^3 + z^3$ such that $x^2 + y^2 + z^2 = 3$ is
    a. 3
    b. -3
    c. 1/3
    d. -1/3
49. The solution of Differential Equation $y'' - 2y' + 5y = 4\delta(t)$, where $\delta(t)$, is a unit impulse function, y(0)=0
    a. $2e^t cos2t$
    b. $2e^t sin2t$
    c. $4e^t sint$
    d. $4e^t cost$
50. The length of the curve $y = \log(\cos(x))$ between $x = -\pi/4$ and $x = \pi/4$

a. $log\sqrt{2}$
b. $2\ log\sqrt{2}$
c. log (2.419)
d. 2 log (2.419)

PART (B)

(Domain Specific)

Physics

1. The dimensional formula of Planck's constant is:

   A) ML^2T^{-2}
   B) ML^2T^{-1}
   C) MLT^{-1}
   D) ML^2T

2. Which of the following is a vector identity?

   A) $\nabla\cdot(A\times B) = B\cdot(\nabla\times A) - A\cdot(\nabla\times B)$
   B) $\nabla\times(A\cdot B) = A\times(\nabla\cdot B) + B\times(\nabla\cdot A)$
   C) $\nabla(A\cdot B) = (A\cdot\nabla)B + (B\cdot\nabla)A$
   D) $\nabla\times(\nabla\times A) = \nabla(\nabla\cdot A) - \nabla^2 A$

3. The eigenvalues of a Hermitian matrix are always:

   A) Real
   B) Complex
   C) Imaginary
   D) Negative

4. Cayley-Hamilton theorem states:

   A) Any square matrix satisfies its own characteristic equation
   B) Only diagonal matrices satisfy their own characteristic polynomial
   C) Only Hermitian matrices have eigenvalues
   D) Determinant of a matrix is equal to trace of its inverse

5. Bessel functions are solutions to:

   A) $x^2y'' + xy' + (x^2 - n^2)y = 0$
   B) $x^2y'' - xy' + (x^2 - n^2)y = 0$
   C) $y'' + xy = 0$
   D) $y'' + y = 0$

6. The Fourier transform of a delta function $\delta(x)$ is:

   A) 0
   B) 1
   C) ∞
   D) e^x

7. A system is in equilibrium if:

   A) Total energy is maximum
   B) Net force is non-zero
   C) Acceleration is constant
   D) Net force is zero

8. In central force motion, the shape of orbit under inverse-square law can be:

   A) Circle
   B) Ellipse
   C) Hyperbola
   D) All of the above

9. The reduced mass μ of two bodies m_1 and m_2 is:

   A) $m_1 + m_2$
   B) $m_1m_2/(m_1 + m_2)$
   C) $(m_1 - m_2)/m_1$
   D) $\sqrt{(m_1m_2)}$

10. Moment of inertia tensor is:

    A) A scalar
    B) A vector
    C) A rank-2 tensor
    D) A diagonal matrix always

11. Pseudo forces arise in:

    A) Inertial frames
    B) Non-inertial frames
    C) Vacuum
    D) Newtonian mechanics only

12. Variational principle gives:

    A) Maximum action
    B) Minimum action
    C) Stationary action
    D) Constant action

13. Gauss's law in differential form is:

    A) $\nabla \cdot E = \rho/\varepsilon_0$
    B) $\nabla \times E = -\partial B/\partial t$
    C) $\nabla \times B = \mu_0 J$
    D) $\nabla \cdot B = 0$

14. Laplace's equation is given by:

    A) $\nabla^2 V = 0$
    B) $\nabla \cdot E = \rho$

C) $\nabla^2 V = -\rho/\varepsilon_0$
D) $\nabla \cdot B = 0$

15. The magnetic field due to a steady current is governed by:

A) Ampère's law
B) Gauss's law
C) Coulomb's law
D) Faraday's law

16. The vector potential A is related to B as:

A) $B = \nabla \times A$
B) $B = \nabla \cdot A$
C) $A = \nabla \times B$
D) $B = -\partial A/\partial t$

17. Faraday's law of induction in differential form is:

A) $\nabla \times E = -\partial B/\partial t$
B) $\nabla \times B = \mu_0 J$
C) $\nabla \cdot E = \rho/\varepsilon_0$
D) $\nabla \cdot B = 0$

18. A plane electromagnetic wave propagating in vacuum has:

A) $E \perp B \perp k$
B) $E \parallel B$
C) $E \parallel k$
D) E and B are static

19. Which phenomenon best demonstrates wave-particle duality?

A) Photoelectric effect
B) Zeeman effect
C) Spectral lines
D) Radioactivity

20. The time-independent Schrödinger equation is:

A) $\hat{H}\psi = E\psi$
B) $\partial\psi/\partial t = \hat{H}\psi$
C) $\hat{H} = p^2/2m + V$
D) $\nabla^2\psi = 0$

21. The energy eigenvalues for a particle in a 1D box of length L are proportional to:

A) n
B) n^2
C) $\sqrt{n}$
D) 1/n

22. Tunnelling through a potential barrier is explained by:

A) Classical mechanics
B) Schrödinger equation
C) Bohr model
D) Newton's law

23. Which of the following operators corresponds to momentum in quantum mechanics? A) $-i\hbar\partial/\partial x$
B) $i\hbar\partial/\partial x$
C) $\partial/\partial x$
D) x
24. In quantum mechanics, the commutator [x, p] equals:

A) 0
B) iħ
C) -iħ
D) $\hbar^2$

25. The partition function Z is defined as:
A) $Z = \Sigma\ e^{(E/kT)}$
B) $Z = \Sigma\ e^{(-E/kT)}$
C) $Z = \int E\ dT$
D) $Z = kT\ \ln(E)$
26. In classical statistical mechanics, particles are:
A) Indistinguishable
B) Always fermions
C) Distinguishable
D) Massless
27. Entropy in statistical mechanics is defined as:
A) $S = k\ \ln(\Omega)$
B) $S = kT$
C) $S = E/T$
D) $S = k\ \ln(T)$
28. Bose-Einstein condensation occurs when:
A) Particles occupy excited states only
B) Fermions pair into bosons
C) A macroscopic number of particles occupy the ground state
D) Energy is maximized

29. The grand canonical ensemble allows:
A) Fixed energy and particle number
B) Variable energy but fixed particle number
C) Variable energy and particle number
D) Only temperature to vary

30. The average energy $\langle E \rangle$ in the canonical ensemble is:
A) $\langle E \rangle = -\partial \ln Z/\partial T$
B) $\langle E \rangle = kT$
C) $\langle E \rangle = \partial Z/\partial T$
D) $\langle E \rangle = -\partial \ln Z/\partial \beta$

31. A MOSFET is controlled by:
A) Current at gate
B) Voltage at gate
C) Current at source
D) Current at drain

32. LEDs emit light due to:
    A) Hole injection
    B) Carrier recombination
    C) Tunneling effect
    D) Avalanche breakdown

33. A solar cell works on the principle of:
    A) Stimulated emission
    B) Thermionic emission
    C) Photovoltaic effect
    D) Photoelectric effect

34. In digital electronics, a **comparator** is used to:
    A) Store data
    B) Convert analog to digital
    C) Compare two voltage levels
    D) Multiply signals

35. The primary function of an A/D converter is to:
    A) Amplify signals
    B) Store analog data
    C) Convert analog signal to digital data
    D) Filter noise

36. Which component is used to **store one bit** of data?
    A) Counter
    B) Register
    C) Flip-Flop
    D) Comparator

37. The number of Bravais lattices in three dimensions is:
    A) 7
    B) 14
    C) 21
    D) 28

38. Reciprocal lattice is used to describe:
    A) Space-time geometry
    B) Wave propagation in vacuum
    C) Crystal diffraction patterns
    D) Magnetic properties

39. The specific heat of a crystal at low temperature follows:
    A) T
    B) T^2
    C) T^3
    D) Constant

40. The electronic contribution to the specific heat in metals is:
    A) Independent of temperature
    B) Linear in temperature
    C) Quadratic in temperature
    D) Exponential in temperature

41. The Hall effect is used to determine:
    A) Type of carrier

B) Temperature
C) Energy gap
D) Resistivity

42. In the Drude model, electrons are treated as:
A) Interacting particles
B) Non-interacting gas
C) Stationary particles
D) Harmonic oscillators

43. A Type-I superconductor exhibits:
A) Incomplete Meissner effect
B) Partial resistance
C) Complete expulsion of magnetic field below Tc
D) No superconductivity at all

44. Binding energy per nucleon is maximum for:
A) Hydrogen
B) Uranium
C) Iron
D) Helium

45. The deuteron has:
A) No bound state
B) Only a bound singlet state
C) Only a bound triplet state
D) Both singlet and triplet states bound

46. Evidence for nuclear shell structure is provided by:
A) Beta decay
B) Gamma decay
C) Magic numbers
D) Fission

47. The spin and parity of the ground state of deuteron is:
A) 0^+
B) 1^+
C) 1^-
D) 0^-

48. Alpha decay conserves:
A) Only mass number
B) Energy and momentum
C) Charge only
D) None of these

49. The quark content of a proton is:
A) uud
B) udd
C) ddu
D) uuu

50. The Gell-Mann–Nishijima formula relates:
A) Mass and spin

B) Isospin and hypercharge
C) Charge and color
D) Energy and parity

PART (B)

(Domain Specific)
Mechanical Engineering

1. Which of the following is an expendable mold casting process?
   a) Die casting
   b) Centrifugal casting
   c) Investment casting
   d) Permanent mold casting

2. In powder metallurgy, the process of compacting powder is called:
   a) Infiltration
   b) Sintering
   c) Blending
   d) Pressing

3. Which plastic forming process uses vacuum pressure?
   a) Injection molding
   b) Blow molding
   c) Vacuum forming
   d) Compression molding

4. In oxy-acetylene welding, the neutral flame has:
   a) Excess oxygen
   b) Equal oxygen and acetylene
   c) Excess acetylene
   d) No oxygen

5. Which of the following is a non-conventional machining process?
   a) Turning
   b) EDM
   c) Drilling
   d) Milling

6. The coordination number of atoms in FCC structure is:
   a) 6
   b) 8
   c) 12
   d) 14

7. Pearlite is a mixture of:
   a) Ferrite and cementite

b) Austenite and ferrite
c) Cementite and austenite
d) Martensite and ferrite

8. Heat treatment used to soften hardened steel is:
   a) Annealing
   b) Quenching
   c) Hardening
   d) Normalizing

9. A ductile material shows:
   a) High hardness
   b) High plastic deformation
   c) High thermal conductivity
   d) Low toughness

10. In non-destructive testing, dye penetrant method is suitable for:
    a) Surface cracks
    b) Internal voids
    c) Volume defects
    d) Subsurface porosity

11. The objective of forecasting is to:
    a) Improve safety
    b) Reduce cost
    c) Estimate future demand
    d) Minimize labor

12. Work study is a combination of:
    a) Inventory and job design
    b) Work measurement and method study
    c) Scheduling and forecasting
    d) Layout planning and capacity planning

13. In product layout, machines are arranged:
    a) Based on process sequence
    b) Randomly
    c) Department-wise
    d) As per worker preference

14. EOQ stands for:
    a) Economic Order Quantity
    b) Estimated Operating Quantity
    c) Economical Operating Quotient
    d) Economic Output Quantity

15. Control charts are used in:
    a) Inventory planning
    b) Quality control
    c) Work measurement
    d) Product layout

16. Factor of safety is defined as:
    a) Yield stress / Ultimate stress
    b) Ultimate stress / Working stress

c) Working stress / Yield stress
d) Yield stress / Working stress

17. Soderberg criterion is related to:
    a) Static loading
    b) Dynamic loading
    c) Fatigue failure
    d) Elastic deformation

18. In riveted joints, efficiency is defined as:
    a) Load on rivet / Load on plate
    b) Strength of joint / Strength of solid plate
    c) Shear strength / Tensile strength
    d) Joint length / Plate length

19. Bearings that support axial loads only are:
    a) Thrust bearings
    b) Ball bearings
    c) Roller bearings
    d) Journal bearings

20. Gear tooth failure due to surface wear is called:
    a) Pitting
    b) Scoring
    c) Spalling
    d) Scuffing

21. Grashof's law is used to determine:
    a) Motion of slider
    b) Type of cam profile
    c) Type of mechanism
    d) Number of links

22. D'Alembert's principle converts dynamics into:
    a) Statics
    b) Vibrations
    c) Thermodynamics
    d) Fluid dynamics

23. A governor is used to control:
    a) Temperature
    b) Vibration
    c) Speed
    d) Torque

24. In free vibration, the system vibrates:
    a) Without external force
    b) With constant force
    c) With damping
    d) With variable force

25. The ratio of damping to critical damping is called:
    a) Damping coefficient
    b) Damping ratio

c) Natural frequency
d) Logarithmic decrement

26. Poisson's ratio is the ratio of:
    a) Shear strain / Shear stress
    b) Lateral strain / Longitudinal strain
    c) Axial stress / Lateral stress
    d) Shear stress / Shear modulus

27. Bending stress in beams varies:
    a) Uniformly
    b) Parabolically
    c) Linearly
    d) Non-linearly

28. Torsion occurs due to:
    a) Axial load
    b) Bending moment
    c) Twisting moment
    d) Transverse load

29. Euler's formula is used for:
    a) Thick shell design
    b) Stress calculation
    c) Column buckling
    d) Curved beams

30. Thick shells are analyzed using:
    a) Rankine formula
    b) Lame's equations
    c) Hooke's law
    d) Bernoulli's equation

31. First law of thermodynamics is a statement of:
    a) Energy conservation
    b) Entropy generation
    c) Heat loss
    d) Irreversibility

32. Entropy is a measure of:
    a) Energy
    b) Volume
    c) Randomness
    d) Temperature

33. Heat engines work on the principle of:
    a) First law only
    b) Second law only
    c) Both first and second laws
    d) Third law only

34. Zeroth law defines:
    a) Pressure difference
    b) Energy conservation
    c) Thermal equilibrium
    d) Heat addition

35. Irreversibility in a process leads to:
    a) More efficiency
    b) Less work output
    c) Higher temperature
    d) Better control

36. Otto cycle is used in:
    a) Diesel engines
    b) Gas turbines
    c) Petrol engines
    d) Steam turbines

37. The most efficient cycle for a given temperature range is:
    a) Diesel
    b) Otto
    c) Carnot
    d) Brayton

38. COP in refrigeration is defined as:
    a) Work/Input
    b) Heat rejected / Work done
    c) Refrigeration effect / Work input
    d) Heat input / Work output

39. Superheating in boilers increases:
    a) Pressure
    b) Efficiency
    c) Fuel consumption
    d) Condensation

40. Steam turbine is a:
    a) Reciprocating machine
    b) Impulse device
    c) Rotodynamic device
    d) Expansion engine

41. Bernoulli's equation is applicable to:
    a) Viscous flows
    b) Compressible flows
    c) Incompressible, frictionless flows
    d) Unsteady flows

42. The unit of dynamic viscosity is:
    a) Ns/m^2
    b) N/m^2
    c) m^2/s
    d) Pa

43. Reynolds number is used to predict:
    a) Turbulence
    b) Pressure drop
    c) Flow rate
    d) Energy loss

44. Centrifugal pump is a:
    a) Positive displacement pump
    b) Dynamic pump
    c) Reciprocating pump
    d) Screw pump

45. Cavitation occurs due to:
    a) High pressure
    b) High velocity
    c) Low pressure
    d) High temperature

46. Fourier's law is applicable to:
    a) Radiation
    b) Free convection
    c) Heat conduction
    d) Mass transfer

47. In forced convection, heat transfer coefficient depends on:
    a) Gravity
    b) Density
    c) Velocity
    d) Temperature only

48. Stefan–Boltzmann law deals with:
    a) Conduction
    b) Convection
    c) Radiation
    d) Evaporation

49. In a counter-flow heat exchanger, the temperature difference is:
    a) Uniform
    b) Maximum at inlet
    c) Constant
    d) Less effective

50. Heat exchanger effectiveness is defined as:
    a) Heat transfer rate / Maximum possible heat transfer
    b) Heat capacity ratio
    c) NTU ratio
    d) Inlet temp / outlet temp

PART (B)

(Domain Specific)

Chemistry

1. The wavefunction of a particle in a 1D box is zero:
a) At the center
b) At the boundaries
c) Everywhere
d) Inside the box

2. The entropy change for the isothermal expansion of an ideal gas is:
a) Zero
b) Negative
c) Positive
d) Undefined

3. For a first-order reaction, the half-life is:
a) Dependent on concentration
b) Independent of concentration
c) Inversely proportional to rate constant
d) Directly proportional to initial concentration

4. The unit of rate constant for a third-order reaction is:
a) $mol^{-2}\ L^2\ s^{-1}$
b) s^{-1}
c) $mol^{-1}\ L\ s^{-1}$
d) $L^2\ mol^{-2}\ s^{-1}$

5. The Debye-Hückel limiting law applies to:
a) Gases only
b) Concentrated solutions
c) Dilute electrolyte solutions
d) Solids

6. The energy difference between two rotational levels is proportional to:
a) J
b) J + 1
c) J(J+1)
d) $(J+1)^2$

7. In statistical thermodynamics, the partition function represents:
a) Internal energy
b) Entropy
c) Molecular distribution
d) Sum over states

8. A reversible adiabatic process in an ideal gas follows:
a) PV = constant
b) TV = constant
c) PV^γ = constant
d) T/P = constant

9. Conductance of a solution increases with:
a) Dilution
b) Temperature
c) Decreasing ion mobility
d) Increasing viscosity

10. For a reversible cell, the relation between ΔG and EMF is:
a) $\Delta G = -nFE$
b) $\Delta G = nFE$
c) $\Delta G = -RT \ln K$
d) $\Delta G = Q - W$

11. The selection rule for IR spectroscopy is:

a) $\Delta J = \pm 1$
b) $\Delta v = \pm 1$
c) Dipole moment change
d) Spin change

12. Which molecule is IR inactive?
a) CO
b) O_2
c) HCl
d) H_2O

13. In UV spectroscopy, $\pi \rightarrow \pi^*$ transitions occur in:

a) Alkanes
b) Alkenes
c) Alkynes
d) Alkanols

14. NMR chemical shift is measured in:

a) Hz
b) ppm
c) cm^{-1}
d) Tesla

15. The number of vibrational modes in CO_2 is:

a) 3
b) 4
c) 5
d) 6

16. Surface tension increases with:

a) Increase in temperature
b) Decrease in temperature
c) Stirring
d) Addition of detergent

17. The point group of water (H_2O) is:

a) C_2v
b) D_2h
c) C_3v
d) Td

18. The oxidation state of Mn in $KMnO_4$ is:

a) +4
b) +5
c) +6
d) +7

19. Ligand field stabilization energy is maximum in:

a) d^0
b) d^3
c) d^5 (high spin)

d) d^6 (low spin)

20. In crystal field theory, the d-orbitals split in octahedral field into:

a) eg and t2g
b) t2g and a1g
c) eg and a1g
d) t1g and eg

21. The geometry of $[Ni(CO)_4]$ is:

a) Square planar
b) Tetrahedral
c) Octahedral
d) Trigonal bipyramidal

22. The effective magnetic moment for d^5 high spin is:

a) 1.73 BM
b) 3.87 BM
c) 5.92 BM
d) 2.82 BM

23. Which acid is strongest?

a) HCl
b) HBr
c) HI
d) HF

24. The lanthanide contraction is due to:

a) Poor shielding by 4f orbitals
b) Relativistic effects
c) d-block contraction
d) Increase in nuclear charge

25. Zeise's salt contains:

a) Alkene complex
b) Alkyne complex
c) Arene complex
d) Carbonyl complex

26. Nitrogenase enzyme contains:

a) Fe and Mo
b) Cu and Zn
c) Fe and Cu
d) Co and Ni

27. Trans effect is maximum in:

a) NH_3
b) Cl^-
c) NO_2^-
d) CN^-

28. The hybridization of P in PCl_5 is:

a) sp^2
b) sp^3
c) sp^3d
d) sp^3d^2

29. Which point group has no symmetry elements other than identity?

a) C_1
b) C_2
c) Cs
d) Ci

30. The nuclear reaction responsible for energy in the sun is:

a) Fission
b) Fusion
c) Radioactive decay
d) Beta decay

31. Which compound is used in oxygen transport in blood?

a) Hemocyanin
b) Myoglobin
c) Hemoglobin
d) Chlorophyll

32. The color in transition metal complexes is due to:

a) d-d transitions
b) π-π* transitions
c) σ-σ* transitions
d) n-π* transitions

33. The crystal system of NaCl is:

a) Cubic
b) Hexagonal
c) Orthorhombic
d) Tetragonal

34. The product of ozonolysis of alkenes is:

a) Alcohol
b) Aldehyde/ketone
c) Carboxylic acid
d) Alkane

35. A reaction involving retention of configuration is:

a) SN1
b) SN2
c) E2
d) SN1 with backside attack

36. An example of a pericyclic reaction is:

a) Diels-Alder
b) SN2

c) E1
d) Friedel-Crafts

37. The intermediate in Hofmann rearrangement is:

a) Carbocation
b) Carbene
c) Nitrene
d) Radical

38. In E2 elimination, anti-periplanar geometry is:

a) Required
b) Not required
c) Optional
d) Impossible

39. The IUPAC name of CH_3CH_2COOH is:

a) Acetic acid
b) Propanoic acid
c) Butanoic acid
d) Methanoic acid

40. Which of the following has highest nucleophilicity?

a) F^-
b) Cl^-
c) Br^-
d) I^-

41. Electrophilic substitution is characteristic of:

a) Alkanes
b) Alkenes
c) Arenes
d) Alcohols

42. Which reagent converts alcohol to alkyl chloride?

a) H_2O_2
b) PCl_5
c) $KMnO_4$
d) $NaBH_4$

43. In NMR, splitting pattern depends on:

a) Number of protons on same carbon
b) Equivalent protons
c) Neighboring nonequivalent protons
d) Number of lone pairs

44. Which compound gives positive Tollens' test?

a) Alcohol
b) Ketone
c) Aldehyde
d) Carboxylic acid

45. The product of benzene + CH_3Cl in presence of $AlCl_3$ is:

a) Toluene
b) Benzaldehyde
c) Benzoic acid
d) Chlorobenzene

46. A meso compound has:

a) Optical activity
b) Achirality
c) Plane of symmetry
d) Both b and c

47. Which biomolecule contains amide linkage?

a) DNA
b) Protein
c) Carbohydrate
d) Lipid

48. Supramolecular chemistry deals with:

a) Covalent interactions
b) Weak non-covalent forces
c) Nuclear reactions
d) Enzyme kinetics

49. Polymerization of ethene gives:

a) PVC
b) Teflon
c) Polyethylene
d) Nylon

50. Green chemistry focuses on:

a) Increasing pollution
b) Hazardous reagents
c) Sustainable synthesis
d) Fossil fuels

PART (B)

(Domain Specific)

Law

1. _____is no longer a criminal offence as Supreme Court Scraps Section 497 of IPC.

a. Adultery
b. Bribery
c. Dacoity

d. Petty Theft

2. The 'Right of Private Defence' of property is not available against the offence of:

a. Criminal trespass

b. Mischief

c. Theft

d. Criminal misappropriation

3. Marrying again during the lifetime of a husband or wife is dealt under:

a. Section 493 of IPC

b. Section 495 of IPC

c. Section 496 of IPC

d. Section 494 of IPC

4. 'A' knows 'Y' is suffering from a particular disease in which he can die if given a simple blow. 'A' causes a simple blow to 'Y' with an intention to cause bodily injury. 'Y' dies. 'A' is guilty of:

a. Grievous hurt

b. Murder

c. Culpable homicide not amounting to murder

d. Simple hurt

5. Which of the following separates 'Robbery' from 'Dacoity'?

a. Time

b. Property

c. Place

d. Number

6. Which of the following punishment have been abolished under the Indian Penal Code, 1860?

a. Death Penalty

b. Whipping

c. Detention in reformatories

d. Both (B) and (C)

7. Committing affray is dealt under:

a. Section 159 of IPC
b. Section 160 of IPC
c. Section 161 of IPC
d. Section 162 of IPC

8. *'Actus reus nisi mens rea'* means:
a. An act is not criminal unless the mind is guilty
b. Act which is harmful to anyone is a criminal act
c. Intention and object are two different things
d. None of the above

9. The 'Doctrine of Necessity' has been elaborately considered in the landmark decision of:
a. R. v. McNaghten, (1843) 8 Eng Rep 718
b. Basdev v. State of PEPSU, AIR 1956 SC 488
c. R. v. Dudley and Stephens, (1884) 14 QBD 273
d. Bimbadar Pradhan v. State of Orissa, AIR 1956 SC 469.

10. Habeas Corpus is associated with which of the given part of the Indian Constitution?
a. Preamble
b. Fundamental Rights
c. Directive Principles of State Policy
d. Fundamental Duties

11. The "Doctrine of Basic Structure" was evolved in which of the given case?
a. Madhav Jiwaji Rao Scindia case
b. Kesavananda Bharti case
c. Champakam Dorairajan case
d. Golaknath case

12. Under whose advice the President of India declares Emergency under Article352?
a. Chief Ministers of all states
b. Prime Minister
c. Union Cabinet
d. Council of Ministers

13. In India sovereignty lies with
a. The Constitution
b. The Supreme Court
c. The Parliament
d. The People

14. The appropriate writ issued by Supreme Court to quash the appointment of a person to a public office is
a. Certiorari

b. Mandamus
c. Prohibition
d. Quo-Warranto

15. The maximum interval between the two sessions of each House of Parliament is

a. Three months
b. Four months
c. Five months
d. Six months

16. Which of the following qualification is not essential for a person to become the Vice-President?

a. He must be an Indian
b. He must be qualified to be a member of the Rajya Sabha.
c. He must not be less than 35 years.
d. He must be a graduate.

17. The Governor of a State is appointed by the President on the advice of the

a. Prime Minister
b. Vice- President
c. Chief Minister
d. Chief Justice

18. Which Article of the Indian Constitution directs the State to take steps to separate the judiciary from the executive in the public services of the State?

a. Article 58
b. Article 44
c. Article 52
d. Article 50

19. Which of the given schedules of the Indian Constitution includes the Provision regarding Anti-Defection Law?

a. Sixth schedule
b. Seventh schedule
c. Tenth schedule
d. Eleventh schedule

20. The number of schedules in the Constitution of India is

a. Eight
b. Nine
c. Eleven
d. Twelve

21. The Principle/s of Natural Law Theory-

a. Universal order governing all men

b. Inalienable rights of an individual

c. Both (A) and (B)

d. None of the above

22. Who said that "International Law is the vanishing point of jurisprudence."

a. Holland

b. Holmes

c. Hart

d. Henry Maine

23. The term '*Volkgiest' means*-

a. Spirit of the People

b. Health of the People

c. Group of the people

d. Ideas of the people

24. Jurisprudence is the science of the first Principles of Civil Law-

a. Gray

b. Holmes

c. Salmond

d. Blackstone

25. According to John Austin the subject matter of jurisprudence is _____law.

a. Positive Law

b. Negative Law

c. Both A and B

d. Metaphysical

26. Delegated Legislation is a _____legislation.

a. Supreme

b. Kind

c. Proper

d. None of the above

27. Who wrote the book 'Leviathan'?

a. Johan Austin

b. H.L.A Hart

c. Hobbes

d. Grey

28. Which Section of the Indian Contract Act, 1872 deals with agreements in restraint of legal proceedings:

a. Section 30
b. Section 27
c. Section 29
d. None of the above

29. The maximum 'Qui Facit par alium facit' par se means

a. No one shall be a judge in his own cause
b. He who does through another does it himself
c. Contract shall be performed as it is
d. Consideration is the essential part of the contract

30. 'Voidable Contract' means?

a. The contract is initially valid but becomes void at the option of one party
b. Contract is valid but not enforceable
c. Contract is enforceable but not valid
d. None of the above

31. The relationship between Partner is of the nature of:

a. Employer and employee
b. Mutual agency
c. Independent contractor
d. Company and share holder

32. Doctrine of 'Indoor management' is related o which of the following document

a. Memorandum of association
b. Articles of association
c. Annual statement of account
d. Document of incorporation

33. The nature of 'Insurance Contract' is of:

a. Bailment
b. Pledge
c. Indemnity
d. Guarantee

34. In a limited liability partnership- the liability of the pattern is limited to:

a. The assets of the firm
b. Liability of the firms
c. The share of individual partner in the firm
d. Partner has Unlimited liability

35. The maximum age for a State Commission member should be:

a. 60

b. 35

c. 67

d. 70

36. In which forum is it compulsory to have a female member?

a. National Commission

b. State Commission

c. District Commission

d. All of the above

37. Under Section 18 of the Indian Contract Act, 1872, misrepresentation falls under:

a. A statement of fact, which is false, would be misrepresentation if the maker believes it to be true, but which is not justified by the information he possesses
b. Any breach of duty which gains an advantage to the person committing it by misleading another to his prejudice, there being no intention to deceive
c. Causing a party to an agreement to make a mistake as to the substance of the thing which is the subject of the agreement, even though done innocently
d. All of them

38. Which of the following is an essential ingredient to establish strict liability of the defendant?

a. Non-natural use of land

b. Escape of dangerous thing

c. Negligence of the defendant

d. Only (a) and (b)

39. The liability of a master for acts of his servant in law of torts in called:

a. Vicarious liability

b. Absolute liability

c. Tortious liability

d. None of the above

40. The principle 'facts speak for themselves' is expressed by the maximum

a. Res Ipsa Loquitor

b. Novus Actus

c. Ubi jus ibi remedium

d. None of the above

41. Negligence involves:

a. Crime

b. Carelessness

c. Assault

d. Trespass

42. Term person is derived from *Latin* term *'persona'* which means

a. Mask
b. Animals
c. Living thing
d. Human being

43. Ownership is the _____recognition of claim.

a. De jure
b. De facto
c. Ipso facto
d. Per se

44. The communication of a proposal is complete when it comes to:

a. The knowledge of that person
b. The object of the offer
c. The intention with which offer is made
d. The facts underlying the offer

45. Which one of the following statements is true?

a. Offer and acceptance are revocable
b. Offer and acceptance are irrevocable
c. An offer can be revoked but acceptance cannot
d. An offer cannot be revoked but acceptance can be revoked.

46. A contingent contract is:

a. Void
b. Voidable
c. Valid
d. Illegal

47. The State Commission shall have jurisdiction under Consumer Protection Act to entertain complaints where the value of the goods or services paid as consideration exceeds _____ but does not exceed _____rupees.

a. Exceeds 50 lakh but does not exceed two crore rupees
b. Exceeds 60 lakh but does not exceed 1 crore rupees
c. Exceeds 70 lakh but does not exceed 3 crore
d. None of the above

48. A loud bass beat that can be heard through an apartment wall (from another apartment) at midnight can be classified as:

a. Trespass
b. Nuisance
c. Interference with contractual relations
d. None of the above

49. The expression “Privity of contract” means:

a. A Contract is a private document
b. The contacts may be expressed in some usual and reasonable manner.
c. A Contract is Contract between the parties only
d. Only private documents can be contracts

50. When was ‘Article 370’ of the Constitution removed?

a. 5th August 2019
b. 5th August 2020
c. 5th September 2019
d. 5th December 2018

Answer Keys

PART (A)

(Research Methodology and Quantitative Aptitude)

1	c	11	b	21	c	31	d	41	a
2	b	12	c	22	c	32	c	42	a
3	a	13	c	23	b	33	a	43	b
4	d	14	d	24	d	34	d	44	d
5	a	15	b	25	d	35	c	45	c
6	c	16	d	26	b	36	d	46	b
7	d	17	c	27	c	37	c	47	d
8	d	18	c	28	c	38	d	48	c
9	b	19	c	29	a	39	c	49	c
10	a	20	a	30	a	40	b	50	b

PART (B)

Computer Science & Engineering/Computer Application

1	c	11	a	21	c	31	b	41	b
2	c	12	d	22	c	32	c	42	b
3	a	13	a	23	b	33	a	43	b
4	a	14	a	24	c	34	a	44	d
5	d	15	c	25	b	35	c	45	c
6	d	16	d	26	b	36	d	46	c
7	b	17	a	27	a	37	c	47	c
8	d	18	d	28	a	38	d	48	c
9	d	19	d	29	b	39	a	49	c
10	a	20	b	30	a	40	c	50	a

Electronics & Communication Engineering

1	a	11	a	21	c	31	d	41	d
2	b	12	a	22	d	32	a	42	d
3	c	13	a	23	b	33	b	43	d
4	c	14	c	24	d	34	b	44	d
5	d	15	b	25	a	35	c	45	c
6	c	16	c	26	d	36	d	46	c
7	a	17	d	27	c	37	b	47	b
8	b	18	a	28	b	38	b	48	c
9	a	19	d	29	d	39	a	49	c
10	c	20	b	30	c	40	a	50	b

Management

1	c	11	d	21	d	31	d	41	a
2	c	12	d	22	c	32	b	42	b
3	a	13	a	23	d	33	d	43	c
4	b	14	a	24	c	34	a	44	b
5	d	15	a	25	a	35	a	45	b
6	b	16	c	26	d	36	a	46	c
7	c	17	c	27	a	37	c	47	d
8	b	18	d	28	c	38	c	48	c
9	a	19	c	29	d	39	c	49	d
10	c	20	b	30	c	40	a	50	a

Mathematics

1	b	11	b	21	b	31	a	41	a
2	d	12	a	22	b	32	c	42	d
3	b	13	a	23	c	33	d	43	c
4	c	14	b	24	b	34	d	44	d
5	b	15	c	25	c	35	c	45	d
6	d	16	c	26	c	36	b	46	a
7	d	17	a	27	a	37	d	47	c
8	a	18	a	28	c	38	c	48	b
9	a	19	a	29	c	39	a	49	b
10	c	20	a	30	d	40	d	50	d

PHYSICS

1	B	11	B	21	B	31	B	41	A
2	D	12	C	22	B	32	B	42	B
3	A	13	A	23	A	33	C	43	C
4	A	14	A	24	B	34	C	44	C
5	A	15	A	25	B	35	C	45	C
6	B	16	A	26	C	36	C	46	C
7	D	17	A	27	A	37	B	47	B
8	D	18	A	28	C	38	C	48	B
9	B	19	A	29	C	39	C	49	A
10	C	20	A	30	D	40	B	50	B

CHEMISTRY

1	B	11	C	21	B	31	C	41	C
2	C	12	B	22	C	32	A	42	B
3	B	13	B	23	C	33	A	43	C
4	D	14	B	24	A	34	B	44	C
5	C	15	B	25	A	35	A	45	A
6	C	16	B	26	A	36	A	46	D
7	D	17	A	27	D	37	C	47	B
8	C	18	D	28	C	38	A	48	B
9	B	19	D	29	A	39	B	49	C
10	A	20	A	30	B	40	D	50	C

MECHANICAL ENGINEERING

1	c	11	c	21	c	31	a	41	c
2	d	12	b	22	a	32	c	42	a
3	c	13	a	23	c	33	c	43	a
4	b	14	a	24	a	34	c	44	b
5	b	15	b	25	b	35	b	45	c
6	c	16	b	26	b	36	c	46	c
7	a	17	c	27	c	37	c	47	c
8	a	18	b	28	c	38	c	48	c
9	b	19	a	29	c	39	b	49	b
10	a	20	a	30	b	40	c	50	a

LAW

1		11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	