Shivaji University, Kolhapur
Ph.D. Entrance Examination, February- 2024
ENGINEERING AND TECHNOLOGY
Electronics Engineering
Sub. Code : 58747

Day and Date : Tuesday, 06-02-2024   **Total Marks : 100**
Time : 01:00 pm to 03:00 pm

Instructions:

1) All questions are compulsory.

2) Each question carries 2 marks.

3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.

4) Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.

5) Follow the instructions given on OMR Sheet.

6) Rough work shall be done on the sheet provided at the end of question paper.

7) Only non programmable calculators are allowed.

RESEARCH METHODOLOGY

1.   Books and records are the primary sources of data in:

   A. Clinical research

   B. Historical research

   C. Laboratory research

   D. Participatory research

2.   Stratified sampling is used when the population is_____

   A. Heterogenous   B. Homogeneous

   C. Very large   D. Too small

3.   Judgemental sampling is also called as

    A. Purposive sampling

    B. Convenience sampling

    C. Extensive sampling

    D. Cluster sampling

4.   All cause non sampling errors except

    A. Faulty tools of measurement

    B. Defect in data collection

    C. Non response

    D. Inadequate sample

5.   The research studies that explore the effect of one thing on another and more specifically, the effect of one variable on another are known as

    A. Causal research

    B. Applied research

    C. Conclusive research

    D. Exploratory research

6.   Which of these is not a step in the problem identification process?

    A. Discussion with subject experts

    B. Review of existing literature

    C. Theoretical foundation and model building

    D. Management decision making

7. In an experimental design, the dependent variable is....

A. The one that is not manipulated and in which any changes are observed

B. The one that is manipulated in order to observe any effects on the other

C. A measure of the extent to which personal values affect research

D. An ambiguous concept whose meaning depends on how it is defined.

8. The importance of measurement in quantitative research is that

A. it allows us to delineate fine differences between people or cases

B. It provides consistent device or yardstick

C. It allows for precise estimates of the degree of relationship between concepts

D. All of these

9. Reliability is the fundamental quality of a research which also reflects

A. Superiority   B. Purity of data

C. Verifiability   D. Validity

10. The last page of the research report is.

A. Appendix   B. Bibliography

C. Index   D. Title page

11. Source of data collected and compiled by others is called

A. Primary data

B. Secondary data

C. Both primary and secondary

D. None of these

12. The essential qualities of a researcher are

    A. Spirit of free enquiry

    B. Reliance on observation and evidence

    C. Systematization or theorizing of knowledge

    D. All the above

13. The research that is especially carried out to test and validate the study hypotheses is termed

    A. Fundamental research

    B. Applied research

    C. Conclusive research

    D. Exploratory research

14. The method by which a sample is chosen.

    A. Unit   B. Design

    C. Random   D. Census

15. Which of the following type of research mainly focusing the relationships between variables without controlling or manipulating any of them?

    A. Longitudinal survey

    B. Pooled surveys

    C. Correlational survey

    D. Cross-sectional survey

16. It is type of survey method used to collects data to make inferences about a population of interest (universe) at one point in time, it is known as

    A. Longitudinal survey   B. Correlational survey

    C. Pooled surveys   D. Cross-sectional survey

17. The primary goal of applied research is to?

    A. Solve or provide answers to practical problems

    B. Testing theories and hypotheses

    C. Addressing research issues in partnership with local people

    D. Primary goal is gaining knowledge, with no aim of using it

18. Review of literature means?

    A. Documentation of referenced material

    B. Overview of the previously published works on specific topic

    C. Formation of a theoretical framework

    D. Elucidating and testing hypothesis

19. Which of the following type of interview facilitate a free and uninhibited response from the respondents?

    A. Unstructured interview   B. Structured interview

    C. Panel interview   D. Semi structured interview

20. Quantitative content analysis is an approach that aims to?

    A. Objectively and systematically measure the content of a text

    B. Subjective interpretation of the content of text data

    C. Systematic arrangement of documents

    D. Interpretative analysis and classification of data

21. Which of the following is an advantage of qualitative interviewing relative to participant observation?

    A. It allows you to find out about issues that are resistant to observation

    B. It is more biased and value-laden.

    C. It is more likely to create reactive effects

    D. None of the above

22. Which of the following is not a type of research question?

    A. A hypothesis

    B. Predicting an outcome

    C. Evaluating a phenomenon

    D. Developing good practice

23. _____ includes surveys & fact finding enquiries of different kinds.

    A. Descriptive   B. Analytical

    C. Applied   D. None

24. Which of the following research is also known as collaborative research?

    A. Analytical Research

    B. Applied research

    C. Action research

    D. Descriptive research

25. Find out an example for probability sampling?

    A. Convenience or accidental Sampling

    B. Purposive or judgmental sampling

    C. Quota sampling

    D. Stratified random sampling

SUBJECT SPECIFIC

26. The first six points of the 8-point DFT of a real valued sequence are 5, 1-j3,0,3-j4, 0 and 3+j4. The last two points of the DIT are respectively

    A. 0, 1-j3   B. 0, 1+j3

    C. 1+j3, 5   D. 1-j3, 5

27. Assuming high SNR and that all signals are equally probable, the additional average transmitted signal energy required by the 8-PSK signal to achieve the same error probability as the 4-PSK signal is

   A. 11.90 dB
   B. 8.73 dB.

   C. 6.79 dB
   D. 5.33 dB

28. In a baseband communications link, frequencies upto 3500 Hz are used for signalling. Using a raised cosine pulse with 75% excess bandwidth and for no inter-symbol. interference, the maximum possible signalling rate in symbols per second is

   A. 1750
   B. 2625

   C. 4000
   D. 5250

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

   A. 4
   B. 6

   C. 8
   D. 10

30. A source alphabet consists of N symbols with the probability of the first two symbols being the same. A source encoder increases the probability of the first symbol by a small amount ε and decreases that of the second by ε. After encoding, the entropy of the source

   A. increases

   B. remains the same

   C. increases only if N = 2

   D. decreases

31. Two independent random variables X and Y are uniformly distributed in the interval [-1,1]. The probability that max [X, Y] is less than 1/2 is

   A. 3/4
   B. 9/16

   C. 1/4
   D. 2/3

32. A transmission line with a characteristic impedance of 100 Ω is used to match a 50 Ω section to a 200 Ω section. If the matching is to be done both at 429 MHz and 1GHz, the length of the transmission line can be approximately

   A. 82.5 cm   B. 1.05 m

   C. 1.58 m   D. 1.75 m

33. A fair coin is tossed till a head appears for the first time. The probability that the number of required tosses is odd, is

   A. 1/3   B. 1/2

   C. 2/3   D. 3/4

34. A series RLC circuit has a resonance frequency of 1 kHz and a quality factor Q= 100. If each of R L. and C is doubled from its original value, the new Q of the circuit is

   A. 25   B. 50

   C. 100   D. 200

35. n-type silicon is obtained by doping silicon with

   A. Germanium   B. Aluminium

   C. Boron   D. Phosphorus

36. The Bandgap of silicon at 300 K is

   A. 1.36 Ev   B. 1.10 eV

   C. 0.80 eV   D. 0.67 Ev

37. Choose proper substitutes for X and Y to make the following statement correct Tunnel diode and Avalanche photo diode are operated in X bias ad Y bias respectively

   A. X: reverse, Y: reverse

   B. X: reverse, Y: forward

   C. X: forward, Y: reverse

   D. X: forward, Y: forward

38. For an n⁻ channel enhancement type MOSFET, if the source is connected at a higher potential than that of the bulk (i.e. $V_{SB} > 0$), the threshold voltage V_T of the MOSFET will

A. remain unchanged
B. decrease

C. change polarity
D. increase

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

Configuration	Input resistance
CB: Common Base	LO: Low
CC: Common Collector	MO: Moderate
CE: Common Emitter	HI: High

A. CB-LO, CC-MO, CE-HI
B. CB-LO, CC-HI, CE-MO

C. CB-MO, CC-HI, CE-LO
D. CB-HI, CC-LO, CE-MO

40. Generally, the gain of a transistor amplifier falls at high frequencies due to the

A. internal capacitances of the device

B. coupling capacitor at the input

C. skin effect

D. coupling capacitor at the output

41. In a microprocessor, the service routine for a certain interrupt starts from a fixed location of memory which cannot be externally set, but the interrupt can be delayed or rejected Such an interrupt is

A. non-maskable and non-vectored

B. maskable and non-vectored

C. non-maskable and vectored

D. maskable and vectored

42. Consider the following two statements about the internal conditions in a n⁻ channel MOSFET operating in the active region.

S1: The inversion charge decreases from source to drain

S2: The channel potential increases from source to drain.

Which of the following is correct?

A. Only S2 is true

B. Both S1 and S2 are false

C. Both S1 and S2 are true, but S2 is not a reason for S1

D. Both S1 and S2 are true, and S2 is a reason for S1

43. Which of the following is NOT associated with a p-n junction?

A. Junction Capacitance

B. Charge Storage Capacitance

C. Depletion Capacitance

D. Channel Length Modulations

44. A silicon wafer has 100 nm of oxide on it and is furnace at a temperature above 1000°C for further oxidation in dry oxygen. The oxidation rate

A. is independent of current oxide thickness and temperature

B. is independent of current oxide thickness but depends on temperature

C. slows down as the oxide grows

D. is zero as the existing oxide prevents further oxidation

45. In a transconductance amplifier, it is desirable to have

A. a large input resistance and a large output resistance

B. a large input resistance and a small output resistance

C. a small input resistance and a large output resistance

D. a small input resistance and a small output resistance

46. The Boolean function Y = AB + CD is to be realized using only 2 - input NAND gates. The minimum number of gates required is

A. 2   B. 3

C. 4   D. 5

47. An examination consists of two papers, Paper 1 and Paper 2. The probability of failing in Paper 1 is 0.3 and that in Paper 2 is 0.2. Given that a student has failed in Paper 2, the probability of failing in Paper 1 is 0.6. The probability of a student failing in both the papers is

A. 0.5   B. 0.18

C. 0.12   D. 0.06

48. A Hilbert transformer is a

A. non-linear system

B. non-causal system

C. time-varying system

D. low-pass system

49. In delta modulation, the slope overload distortion can be reduced by

A. decreasing the step size

B. decreasing the granular noise

C. decreasing the sampling rate

D. increasing the step size

50. A transmission line is feeding 1 watt of power to a horn antenna having a gain of 10 dB. The antenna is matched to the transmission line. The total power radiated by the horn antenna into the free space is

A. 10 Watts   B. 1 Watts

C. 0.1 Watts   D. 0.01 Watt

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