

Seat No.	
-------------	--

PD-19

Total No. of Pages : 12

Ph.D. Entrance Examination 2024
ENGINEERING AND TECHNOLOGY
Electronics Engineering
Subject Code : 58747

Day and Date : Tuesday 12-11-2024

Total Marks : 100

Time : 04.00 p.m. to 06.00 p.m.

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. Which of the following is the Objective of the Research?
 - A. To become familiar with a phenomenon
 - B. To test a hypothesis of a causal relationship between variables
 - C. To determine the frequency with which something occurs or with it is associated with something else.
 - D. All of the above
2. A null hypothesis is
 - A. a default hypothesis that a quantity to be measured is zero (null)
 - B. hypothesis that assigns value of zero to the variable
 - C. hypothesis of zero significance
 - D. None of the above

3. Which of the following is a non-probability sampling method?
 - A. Simple random sampling
 - B. Systematic sampling
 - C. Cluster sampling
 - D. Quota sampling
4. In order to study the relationship of family size to income a researcher classifies his population into different income slabs and then takes a random sample from each slab. Which technique of sampling does he adopt
 - A. Cluster sampling
 - B. Random sampling
 - C. Stratified random sampling
 - D. Systematic sampling
5. Which of the following is the goal of evaluation research?
 - A. Situation-based decision making
 - B. People-based decision making
 - C. Data-based decision making
 - D. Trend-based decision making
6. Which one among the following statement is true in the context of the testing of hypotheses?
 - A. It is only the alternative hypotheses that can be tested.
 - B. It is only the null hypotheses that can be tested.
 - C. Both the alternative and the null hypotheses can be tested.
 - D. Both the alternative and the null hypotheses cannot be tested.
7. The research is always
 - A. Verifying the old knowledge
 - B. Exploring the new knowledge
 - C. Both 'A' and 'B'
 - D. None of the above

8. Formulation of hypothesis may NOT be required in:
- A. Survey method
 - B. Historical studies
 - C. Normative studies
 - D. Experimental studies
9. For the population with finite size which of the following sampling method is generally preferred?
- A. Cluster sampling
 - B. Area sampling
 - C. Preposive sampling
 - D. Systematic sampling
10. The word "Research" means
- A. To know
 - B. To move
 - C. To get
 - D. To innovate
11. Evaluation research is concerned with
- A. What are we doing?
 - B. Why are we doing?
 - C. How well are we doing?
 - D. None of the above
12. Which one among the following statements is false in the context of participatory research?
- A. It is a collective process of inquiry
 - B. It recognizes knowledge as power
 - C. Its sole purpose is the production of knowledge
 - D. It emphasizes people as experts
13. A researcher uses statistical techniques in his problem to confirm
- A. Whether worthwhile inferences could be drawn
 - B. Whether the data could be quantified
 - C. Whether appropriate statistical techniques are available
 - D. Whether analysis of data would be possible

14. In research reporting, the "Discussion" section is focused on:
- A. Interpreting the results and comparing them to existing literature
 - B. Presenting the raw data and figures
 - C. Describing the research methods used in the study
 - D. Summarizing the study's objectives
15. What should be included in the "Appendix" section of a research report?
- A. Supplementary materials that provide more detailed information
 - B. Summary of the study's key findings
 - C. List of references and citations
 - D. Main research methods and techniques
16. Which of the following is an advantage of using interviews as a data collection method?
- A. Provides in-depth information and insights
 - B. Allows for large sample sizes
 - C. Reduces researcher bias
 - D. Provides quantifiable data
17. A research tool that asks respondents to rank a list of items in order of preference is known as a:
- A. Ranking scale
 - B. Guttman scale
 - C. Thurstone scale
 - D. Semantic differential scale
18. A researcher chooses participants based on their availability and willingness to participate. What type of sampling is this?
- A. Convenience sampling
 - B. Purposive sampling
 - C. Stratified sampling
 - D. Snowball sampling

19. The main aim of the scientific method in the research field is to
- A. Confirm triangulation
 - B. Eliminate spurious relations
 - C. Improve data interpretation
 - D. Introduce new variables
20. What is counterbalancing in experimental research?
- A. Randomly assigning participants to groups
 - B. Manipulating the order of conditions to control for order effects
 - C. Matching participants based on specific characteristics
 - D. Providing detailed instructions to participants
21. Which of the following is a key characteristic of experimental research?
- A. Observational analysis
 - B. Manipulation of variables
 - C. Surveys and questionnaires
 - D. Literature review
22. What does the "research questions" section in a research proposal aim to achieve?
- A. To identify the key inquiries that the research study will address
 - B. To outline the data collection methods and instruments
 - C. To describe the expected results of the research study
 - D. To provide an overview of the theoretical framework
23. Which of the following is a qualitative data analysis technique?
- A. ANOVA (Analysis of Variance)
 - B. Content analysis
 - C. Chi-square test
 - D. Regression analysis
24. Which of the following is a potential limitation of qualitative research?
- A. Difficulty in interpreting findings
 - B. Limited depth of understanding
 - C. Overemphasis on researcher subjectivity
 - D. High cost of data collection

25. Which of the following is a characteristic of a qualitative research question?

- A. It is usually closed-ended
- B. It focuses on a single variable
- C. It is broad and exploratory
- D. It demands statistical analysis

SUBJECT SPECIFIC

26. If the differential voltage gain and the common mode voltage gain of a differential amplifier are 48 dB and 2 dB respectively, then common mode rejection ratio is

- A. 23 dB
- B. 25 dB
- C. 46 dB
- D. 50 dB

27. The impurity commonly used for realizing the base region of a silicon n-p-n transistor is

- A. Gallium
- B. Indium
- C. Boron
- D. Phosphorus

28. The effect of current shunt feedback in an amplifier is to

- A. increase the input resistance and decrease the output resistance
- B. increases both input and output resistance
- C. decrease both input and output resistance
- D. decrease the input resistance and increase the output resistance

29. The primary reason for the widespread use of Silicon in semiconductor device technology is

- A. abundance of Silicon on the surface of the Earth.
- B. larger bandgap of Silicon in comparison to Germanium.
- C. favourable properties of Silicon - dioxide (SiO_2)
- D. lower melting point

30. For a Hertz dipole antenna, the half power beam width (HPBW) in the E-plane is
 - A. 360°
 - B. 180°
 - C. 90°
 - D. 45°
31. The first and the last critical frequencies (singularities) of a driving point impedance function of a passive network having two kinds of elements, are a pole and a zero respectively. The above property will be satisfied by
 - A. RL network only
 - B. RC network only
 - C. LC network only
 - D. RC as well as RL networks
32. $X = 01110$ and $Y = 11001$ are two 5-bit binary numbers represented in two's complement format. The sum of X and Y represented in two's complement format using 6 bits is
 - A. 100111
 - B. 0010000
 - C. 000111
 - D. 101001
33. If the signal to quantization noise ratio required in uniformly quantizing the signal is 43.5 dB, the step of the quantization is approximately
 - A. 0.033 V
 - B. 0.05 V
 - C. 0.0667 V
 - D. 0.10 V
34. What are the minimum numbers of NOT gates and 2 input OR gates required to design the logic of the driver for this 7-Segment display
 - A. 3 NOT and 4 OR
 - B. 2 NOT and 4 OR
 - C. 1 NOT and 3 OR
 - D. 2 NOT and 3 OR
35. Thin gate oxide in a CMOS process is preferably grown using
 - A. wet oxidation
 - B. dry oxidation
 - C. epitaxial oxidation
 - D. ion implantation

36. In an 8085 microprocessor, the instruction CMP B has been executed while the content of the accumulator is less than that of register B. As a result
- A. Carry flag will be set but Zero flag will be reset
 - B. Carry flag will be rest but Zero flag will be set
 - C. Both Carry flag and Zero flag will be reset
 - D. Both Carry flag and Zero flag will be set
37. An ideal op-amp is an ideal
- A. voltage controlled current source
 - B. voltage controlled voltage source
 - C. current controlled current source
 - D. current controlled voltage source
38. Voltage series feedback (also called series-shunt feedback) results in
- A. increase in both input and output impedances
 - B. decrease in both input and output impedances
 - C. increase in input impedance and decrease in output impedance
 - D. decrease in input impedance and increase in output impedance
39. The minimum number of comparators required to build an 8-bits flash ADC is
- A. 8
 - B. 63
 - C. 255
 - D. 256
40. A PD controller is used to compensate a system. Compared to the uncompensated system, the compensated system has
- A. a higher type number
 - B. reduced damping
 - C. higher noise amplification
 - D. larger transient overshoot

41. The input to a coherent detector is DSB-SC signal plus noise. The noise at the detector output is
- A. the in-phase component
 - B. the quadrature component
 - C. Zero
 - D. the envelope
42. The cascade amplifier is a multistage configuration of
- A. CC-CB
 - B. CE-CB
 - C. CB-CC
 - D. CE-CC
43. Which of the following analog modulation scheme requires the minimum transmitted power and minimum channel bandwidth ?
- A. VSB
 - B. DSB-SC
 - C. SSB
 - D. AM
44. 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
45. The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of the effective base-width caused by
- A. Electron hole recombination at the base
 - B. The reverse biasing of the base - collector junction
 - C. The forward biasing of emitter-base junction
 - D. The early removal of stored base charge during saturation-to-cut off switching
46. The noise at the input to an ideal frequency detector is white. The detector is operating above threshold. The power spectral density of the noise at the output is
- A. raised cosine
 - B. flat
 - C. Parabolic
 - D. Gaussian

48. Match the following and choose the correct combination.

- E. Continuous and aperiodic signal
- F. Continuous and periodic signal
- G. Discrete and aperiodic signal
- H. Discrete and periodic signal

1. Fourier representation is continuous and aperiodic
2. Fourier representation is discrete and aperiodic
3. Fourier representation is continuous and periodic
4. Fourier representation is discrete and periodic

A. E-3, F-2, G-4, H-1

B. E-1, F-3, G-2, H-4

C. E-1, F-2, G-3, H-4

D. E-2, F-1, G-4, H-3

- A. broadband FM B. SSB with carrier
C. DSB-SC D. SSB without carrier

50. Three identical amplifiers with each one having a voltage gain of 50, input resistance of $1\text{ k}\Omega$ and output resistance of $250\ \Omega$ are cascaded. The open circuit voltage gain of the combined amplifier is

A. 49 dB

B. 51 dB

C. 98 dB

D. 102 dB



- Rough -