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PD-32

Total No. of Pages : 12

Ph.D. Entrance Examination, 2025
ENGINEERING AND TECHNOLOGY
Electronics and Telecommunication Engineering
Sub. Code : 58836

Day and Date : Tuesday, 09-09-2025

Total Marks : 100

Time : 01.00 p.m. to 3.00 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. How can the objectivity of the research be enhanced?
A) Through its impartiality B) Through its reliability
C) Through its validity D) All of these
2. We use Factorial Analysis:
A) To know the relationship between two variables
B) To test the Hypothesis
C) To know the difference between two variables
D) To know the difference among the many variables
3. Research can be conducted by a person who:
A) has studied research methodology
B) holds a postgraduate degree
C) possesses thinking and reasoning ability
D) is a hard worker

4. What are the main purposes of data analysis?
 - I) Description
 - II) Construction of Measurement Scale
 - III) Generating empirical relationships
 - IV) Explanation and prediction Codes
 - A) I, II and III
 - B) II, III and IV
 - C) I, III and IV
 - D) All of the above

5. Which of the following is not a method of data collection is not used in the case study?
 - A) Correlational method
 - B) Interviews and surveys
 - C) Participant and non-participant observation
 - D) Secondary data

6. It is the last step in the data collecting and compilation process, and it serves as the entry point for statistical analysis and interpretation, it is known as?
 - A) Preparing of the Report
 - B) Hypothesis Testing
 - C) Documentation
 - D) Tabulation

7. Research can be classified as:
 - A) Basic, Applied and Action Research
 - B) Quantitative and Qualitative Research
 - C) Philosophical, Historical, Survey and Experimental Research
 - D) All the above

8. A formal document that presents the research objectives, design of achieving these objectives, and the expected outcomes/deliverables of the study is called
 - A) Research design
 - B) Research proposal
 - C) Research hypothesis
 - D) Research report

9. Field study is related to
- A) Real life situations
 - B) Laboratory situations
 - C) Experimental situations
 - D) None of these
10. Primary data can be collected through
- A) experiment
 - B) Survey
 - C) Both of these
 - D) None of these
11. The data which are collected from the place of origin is known as
- 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 main characteristic of scientific research is:
- A) empirical
 - B) theoretical
 - C) experimental
 - D) all of the above
14. What is the major attribute of Correlation Analysis?
- A) Association among variables
 - B) Difference among variables
 - C) Regression among variables.
 - D) Variations among variables
15. 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

16. 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
17. Which one among the following phrases does not correspond to the meaning of research as a process?
- A) Problem Solving
 - B) Trial and Error
 - C) Objective Observation
 - D) Systematic Activity
18. 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.
19. Research and Development become the index of development of the country. Which of the following reasons are true with regards to this statement?
- A) R&D targets human development
 - B) R&D can enhance people's standard of living in the country
 - C) R&D reflects the actual economic and social conditions being prevailed in the country
 - D) All the above

20. What is the main aim of interdisciplinary research?
- A) To over simplify the problem of research
 - B) To bring out the holistic approach to research
 - C) To create a new trend in research methodology
 - D) To reduce the emphasis on a single subject in the research domain
21. "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.
22. Which technique is generally followed when the population is finite?
- A) Area Sampling Technique
 - B) Purposive Sampling Technique
 - C) Systematic Sampling Technique
 - D) None of the above
23. is concerned with discovering and testing certain variables with respect to their association or disassociation
- A) Exploratory
 - B) Descriptive
 - C) Diagnostic
 - D) Descriptive and diagnostic
24. In the process of conducting research "Formulation of Hypothesis" is followed by
- A) Statement of Objectives
 - B) Analysis of Data
 - C) Selection of Research Tools
 - D) Collection of Data
25. We use Factorial Analysis:
- A) To know the relationship between two variables
 - B) To test the Hypothesis
 - C) To know the difference between two variables
 - D) To know the difference among the many variables

SUBJECT SPECIFIC

26. In a 8085 system, a PUSH operation requires more clock cycles than a POP operation, which one of the following options is the correct reason for this?
- A) For POP, the data transceivers remain in the same direction as for instruction fetch (memory to processor), whereas for PUSH their direction has to be reversed
 - B) Memory write operations are slower than memory read operations in an 8085 bases system.
 - C) The stack pointer needs to be pre-determined before writing registers in a PUSH, whereas a POP operation uses the address already in the stack pointer.
 - D) Order of register has to be interchanged for a PUSH operation, whereas POP uses their natural order.
27. A digital communication system uses a repetition code for channel encoding/decoding. During transmission, each bit is repeated three times (0 is transmitted as 000, and 1 is transmitted as 111). It is assumed that the source puts out symbols independently and with equal probability. The decoder operates as follows: In a block of three received bits, if the number of zeros exceeds the number of ones, the decoder decides in favor of a 0, and if the number of ones exceeds the number of zeros, the decoder decides in favor of a 1, Assuming a binary symmetric channel with crossover probability $p = 0.1$, the average probability of error is
- A) 0.028
 - B) 0.045
 - C) 0.068
 - D) 0.079

28. A long-channel NMOS transistor is biased in the linear region V_{DS} 50 mV and is used as a resistance. Which one of the following statements is NOT correct?
- A) If the device width W is increased, the resistance decreases
 - B) If the threshold voltage is reduced, the resistance decrease
 - C) If the device length L is increased, the resistance increases
 - D) If V_{GS} is increased, the resistance increases
29. Which one of the following statements is correct about an ac-coupled common-emitter amplifier operating in the mid-band region?
- A) The device parasitic capacitances behave like open circuits, whereas coupling and bypass capacitances behave like short circuits.
 - B) The device parasitic capacitances, coupling capacitances and bypass capacitances behave like open circuits.
 - C) The device parasitic capacitances, coupling capacitances and bypass capacitances behave like short circuits.
 - D) The device parasitic capacitances behave like short circuits, whereas coupling and bypass capacitances behave like open circuits.
30. Consider an air-filled rectangular waveguide with dimensions $a=2.286\text{cm}$ and $b=1.016\text{cm}$. At 10GHz operating frequency, the value of the propagation constant (per meter) of the corresponding propagation mode is
- A) 158.07
 - B) 245.7
 - C) 365.4
 - D) 785.2
31. The bit error probability of a memoryless binary symmetric channel is 105. If 105 bits are sent over this channel, then the probability that not more than one bit will be in error is
- A) 0.735
 - B) 0.452
 - C) 0.387
 - D) 0.125

32. n-type silicon is obtained by doping silicon with
- A) Germanium
 - B) Aluminium
 - C) Boron
 - D) Phosphorus
33. 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
34. 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
35. The number of distinct Boolean expressions of 4 variables is
- A) 16
 - B) 256
 - C) 1023
 - D) 65536
36. 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
37. The Fourier transform of a conjugate symmetric function is always
- A) Imaginary
 - B) conjugate anti-symmetric
 - C) real
 - D) conjugate symmetric

38. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor
 - A) 6
 - B) 8
 - C) 16
 - D) 12
39. Without any additional circuitry, an 8:1 MUX can be used to obtain
 - A) some but not all Boolean functions of 3 variables
 - B) all functions of 3 variables but non of 4 variables
 - C) all functions of 3 variables and some but not all of 4 variables
 - D) all functions of 4 variables
40. The concentration of minority carriers in an extrinsic semiconductor under equilibrium is
 - A) Directly proportional to doping concentration
 - B) Inversely proportional to the doping concentration
 - C) Directly proportional to the intrinsic concentration
 - D) Inversely proportional to the intrinsic concentration
41. 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
42. For a Hertz dipole antenna, the half power beam width (HPBW) in the E-plane is
 - A) 360°
 - B) 180°
 - C) 90°
 - D) 45°

43. One end of a loss-less transmission line having the characteristic impedance of 75 Ω and length of 1 cm is short-circuited. At 3 GHz, the input impedance at the other end of transmission line is
- A) 0
 - B) Resistive
 - C) Capacitive
 - D) Inductive
44. An analog signal is band-limited to 4kHz, sampled at the Nyquist rate and the samples are quantized into 4 levels. The quantized levels are assumed to be independent and equally probable. If we transmit two quantized samples per second, the information rate is bits/second.
- A) 1
 - B) 2
 - C) 3
 - D) 4
45. Drift current in the semiconductors depends upon
- A) only the electric field
 - B) only the carrier concentration gradient
 - C) both the electric field and the carrier concentration
 - D) both the electric field and the carrier concentration gradient
46. The Ebers Moll model of a BJT is valid
- A) only in active mode
 - B) only in active and saturation modes
 - C) only in active and cut-off modes
 - D) in active, saturation and cut-off modes

47. A continuous-time speech signal $x(t)$ is sampled at a rate of 8 kHz and the samples are subsequently grouped in blocks, each of size N. The DFT of each block is to be computed in real time using the radix-2 decimation-in-frequency FFT algorithm. If the processor performs all operations sequentially, and takes 20 μ s for computing each complex multiplication (including multiplications by 1 and -1) and the time required for addition/subtraction is negligible, then the maximum value of N is
- A) 8 B) 5
C) 4 D) 6
48. 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
49. At a given probability of error, binary coherent FSK is inferior to binary coherent PSK by
- A) 6 dB B) 3 dB
C) 2 dB D) 0 dB
50. The action of JFET in its equivalent circuit can best be represented as a
- A) Current controlled current source
B) Current controlled voltage source
C) Voltage controlled voltage source
D) Voltage controlled current source



- Rough Work -