

Seat
No.

PD-05

Total No. of Pages : 12

Shivaji University, Kolhapur
Ph.D. Entrance Examination, February- 2024
Engineering and Technology
Electronics and Telecommunication Engineering
Sub. Code : 58836

Day and Date : Tuesday, 06-02-2024

Total Marks : 100

Time : 10:00 am to 12:00 noon

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. What is the name of the conceptual framework in which the research is carried out?

A. Synopsis of Research

B. Research hypothesis

C. Research design

D. Research paradigm
2. A research problem is feasible only when _____

A. It is new and adds something to knowledge

B. It has utility and relevance

C. It is researchable

D. All of the above

3. In order to pursue the research, which of the following is priorly required?
- A. Formulating a research question
 - B. Deciding about the data analysis procedure
 - C. Formulating a research hypothesis
 - D. Developing a research design
4. A technique of Building up a list or a sample of a special population by using an initial set of members as informants is called
- A. Quota sampling
 - B. Convenience Sampling
 - C. Snow ball Sampling
 - D. Purposive sampling
5. Example for fact finding study is
- A. Pure Research
 - B. Survey
 - C. Action Research
 - D. Long term Research
6. _____ comprises defining & redefining problems, formulating hypothesis or suggested solution.
- A. Primary data
 - B. Secondary data.
 - C. Research
 - D. None
7. The essential qualitics of a researcher are _____
- A. Spirit of free inquiry
 - B. Reliance on observation and evidence
 - C. Systematization or theorizing of knowledge
 - D. All the above
8. Primary purpose of _____ is to provide insight unexplored areas.
- A. Descriptive research design
 - B. Diagnostic research design
 - C. Exploratory research design
 - D. Experimental research design

9. Aspects one should keep in mind while gathering secondary data-
- A. Reliability of the collection authority
 - B. Reliability of the source
 - C. Purpose of the research
 - D. All of the above
10. What do you mean by synopsis of a research project?
- A. The blue print of research
 - B. Extracts from the research observations
 - C. A plan of the research
 - D. Summary of the findings of the research
11. Hypothesis relate generally or specifically
- A. Variables to variables
 - B. Constant to variables.
 - C. Variables to constant
 - D. Constant to constant
12. The research that applies the laws at the time of field study to draw more and more clear ideas about the problem is:
- A. Applied research
 - B. Action research
 - C. Experimental research
 - D. None of these
13. A research problem is not feasible only when
- A. It consists of independent and dependent variables
 - B. It is researchable
 - C. It has utility and relevance
 - D. It is new and adds something to knowledge

14. When a research problem is related to heterogeneous population, the most suitable sampling method
- A. Cluster Sampling
 - B. Stratified Sampling
 - C. Convenient Sampling
 - D. Lottery Method
15. Manipulation is always a part of
- A. Historical research
 - B. Fundamental research
 - C. Descriptive research
 - D. Experimental research
16. What is the term for the systematic examination and interpretation of existing research studies on a specific topic
- A. Literature review
 - B. Content analysis
 - C. Case study analysis
 - D. Meta-analysis
17. In data collection, what is meant by "data validation"?
- A. Checking the accuracy and reliability of collected data
 - B. Analyzing the data to draw conclusions
 - C. Organizing the data into meaningful patterns
 - D. Storing the data for future reference
18. Which data collection method involves gathering information from a predefined list of questions asked to individuals or a group?
- A. Questionnaire
 - B. Interview
 - C. Observation
 - D. Experiment
19. Which section of a research report typically presents a detailed overview of the research methods and techniques used?
- A. Methodology
 - B. Introduction
 - C. Results
 - D. Discussion

20. What does the term "research ethics" encompass in the context of formulating a research problem?
- A. Adhering to ethical principles and guidelines in the conduct of research
 - B. Identifying the most economically feasible research problem
 - C. Establishing the timeline for the research study
 - D. Ensuring the research problem is relevant to a global audience
21. What does the term "research gap" signify in the context of formulating a research problem?
- A. A specific area or aspect of knowledge that has not been sufficiently addressed in existing literature
 - B. The time gap between conducting literature reviews
 - C. The time it takes to complete a research project
 - D. The gap between research objectives and outcomes.
22. What does the "research design" section in a research proposal primarily focus on?
- A. Describing the overall strategy and structure of the research study
 - B. Providing an overview of the theoretical framework
 - C. Detailing the data analysis techniques
 - D. Outlining the limitations of the study
23. Which statistical measure is used to measure the central tendency of a data set?
- A. Median
 - B. Range
 - C. Variance
 - D. Correlation coefficient

24. In data analysis, what is the purpose of inferential statistics?
- A. To make predictions and inferences about a population based on a sample
 - B. To describe the characteristics of a sample
 - C. To summarize data using measures of central tendency
 - D. To visualize data using graphs and charts
25. Which data analysis technique is used to identify significant differences between groups in a dataset?
- A. Analysis of Variance (ANOVA)
 - B. Factor analysis
 - C. Chi-squared test
 - D. T-test

SUBJECT SPECIFIC

26. The second moment of a Poisson-distributed random variables is 2. The mean of the random variable is _____
- A. 1
 - B. 2
 - C. 3
 - D. 4
27. A continuous-time sinusoid of frequency 33 Hz is multiplied with a periodic Dirac impulse train of frequency 46 Hz. The resulting signal is passed through an ideal analog low-pass filter with a cutoff frequency of 23Hz. The functional frequency (in Hz) of the output is_____.
- A. 13
 - B. 25
 - C. 23
 - D. 45

28. Consider the following statements for a metal oxide semiconductor field effect transistor (MOSFET):

P: As channel length reduces, OFF-state current increases

Q: As channel length reduces, output resistance increases

R: As channel length reduces, threshold voltage remains constant

S: As channel reduces, ON current increases.

Which of the above statements are INCORRECT?

A. P and Q

B. P and S

C. Q and R

D. R and S

29. 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.

30. 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. 0.056
- C. 0.042
- D. 0.063.

31. An ideal band-pass channel 500 Hz-2000 Hz is deployed for communication. A modem is designed to transmit bits at the rate of 4800 bits/s using 16-QAM. The roll-off factor of a pulse with a raised cosine spectrum that utilizes the entire frequency band is _____

- A. 0.35
- B. 0.25
- C. 0.45
- D. 0.55

32. A speech signal is sampled at 8 kHz and encoded into PCM format using 8 bits/sample. The PCM data is transmitted through a baseband channel via 4-level PAM. The minimum bandwidth (in kHz) required for transmission is

- A. 18
- B. 17
- C. 16
- D. 15

33. 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.

34. The circuit which satisfies Reciprocity Theorem is called?
- A. Short circuit
 - B. Open circuit
 - C. Linear circuit
 - D. Non-linear circuit
35. Which of the following is the correct sequence of operations in a microprocessor?
- A. Opcode fetch, memory read, memory write, I/O read, I/O write
 - B. Opcode fetch, memory write, memory read, I/O read, I/O write
 - C. I/O read, opcode fetch, memory read, memory write, I/O write
 - D. I/O read, opcode fetch, memory write, memory read, I/O write
36. The Ampere law is based on which theorem?
- A. Green's theorem.
 - B. Gauss divergence theorem
 - C. Stoke's theorem
 - D. Maxwell theorem
37. The waveguides are used in a transmission line for
- A. Increasing transmission coefficient
 - B. Increasing reflection coefficient
 - C. Decreasing transmission coefficient
 - D. Decreasing reflection coefficient
38. In a semiconductor, if fermi energy level lies in conduction band, then the semiconductor is known as.
- A. Degenerative n-type
 - B. Non-degenerative n-type
 - C. Degenerative p-type
 - D. Non-degenerative n-type

39. For an intrinsic semiconductor at $T = 0\text{ K}$, which of the following statement is true.
- All energy states in the conduction band is filled with electrons and valence is empty
 - All energy states in conduction and valence bands are filled with electrons
 - All energy states in the conduction and valence band are filled with holes
 - All energy states in the valence band are filled with electrons and conduction band is empty
40. A symbol stream contains alternate QPSK and 16-QAM symbols. If symbols from this stream are transmitted at the rate of 1 mega-symbols per second, the raw (uncoded) data rate is _____mega-bits per second (rounded off to one decimal place).
- 1.99 to 2.01
 - 2.99 to 3.01
 - 3.99 to 4.01
 - 4.99 to 5.01
41. A 10-bit D/A converter is calibrated over the full range from 0 to 10V. If the input to the D/A converter is 13A (in hex), the output (rounded off to three decimal places) is _____ V.
- 1.066
 - 2.066
 - 3.066
 - 4.066
42. A transmission line of length $3\lambda/4$ and having a characteristic impedance of 50 Ω is terminated with a load of 400 Ω . The impedance (rounded off to two decimal places) seen at the input end of the transmission line is _____ Ω
- 5.25
 - 6.25
 - 7.25
 - 8.25
43. In an 8085 microprocessor, the number of address lines required to access a 16K byte memory bank is _____
- 12
 - 13
 - 14
 - 15

44. A linear Hamming code is used to map 4-bit messages to 7-bit codewords. The encoder mapping is linear. If the message 0001 is mapped to the codeword 0000111, and the message 0011 is mapped to the codeword 1100110, then the message 0010 is mapped to
 - A. 1100001
 - B. 1111000
 - C. 0010011
 - D. 1111111
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. A stationary closed Lissajous pattern on an oscilloscope has 3 horizontal tangencies and 2 vertical tangencies for a horizontal input with frequency 3 kHz. The frequency of the vertical input is
 - A. 1.5 kHz
 - B. 2 kHz
 - C. 3 kHz
 - D. 4.5 kHz
47. Which of the following statements is incorrect?
 - A. Lead compensator is used to reduce the settling time.
 - B. Lag compensator is used to reduce the steady state error.
 - C. Lead compensator may increase the order of a system.
 - D. Lag compensator always stabilizes an unstable system
48. A sinusoidal message signal is converted to a PCM signal using a uniform quantizer. The required signal-to-quantization noise ratio (SQNR) at the output of the quantizer is 40dB. The minimum number of bits per sample needed to achieve the desired SQNR is
 - A. 7
 - B. 8
 - C. 9
 - D. 6

