

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

M.Phil./Ph.D. Entrance Examination, July- 2022
ELECTRONICS AND TELECOMMUNICATION ENGG.

Day and Date : Saturday, 16- 07 - 2022**Total Marks : 100****Time : 2.00 p.m. to 4.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
 - 2) Each question carries 2 mark.
 - 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) 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
- 2) What are the conditions in which Type-I error occurs?
 - A) The null hypotheses get accepted even if it is false
 - B) The null hypotheses get rejected even if it is true
 - C) Both the null hypotheses as well as alternative hypotheses are rejected
 - D) None of the above

P.T.O.

- 3) The F-test:
- A) Is essentially a two-tailed test.
 - B) Is essentially a one-tailed test.
 - C) Can be one-tailed as well as two-tailed depending on the hypotheses.
 - D) Can never be one tailed test.
- 4) “Controlled Group” is a term used in_____.
- A) Survey research
 - B) Historical research
 - C) Experimental research
 - D) Descriptive research
- 5) _____ research is also known as basic research because it is related with a particular project and problem.
- A) Pure
 - B) Exploratory
 - C) applied
 - D) action
- 6) Secondary data analysis is another form of _____ research.
- A) situational
 - B) causal
 - C) descriptive
 - D) exploratory
- 7) _____ includes letters, questionnaires, tests or other tools used in collecting the data.
- A) Appendix
 - B) glossary
 - C) literature cited
 - D) bibliography
- 8) In order to pursue the research, which of the following is priorly required?
- A) Developing a research design
 - B) Formulating a research question
 - C) Deciding about the data analysis procedure
 - D) Formulating a research hypothesis

- 9) 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
- 10) What is the best-suited name for a process that doesn't necessitate experimental research?
- A) Manipulation
 - B) Controlling
 - C) Content analysis
 - D) Observation
- 11) If the assumed hypothesis is tested for rejection considering it to be true is called?
- A) Null Hypothesis
 - B) Statistical Hypothesis
 - C) Simple Hypothesis
 - D) Composite Hypothesis
- 12) Which of these distributions is used for a testing hypothesis?
- A) Normal Distribution
 - B) Chi-Squared Distribution
 - C) Gamma Distribution
 - D) Poisson Distribution
- 13) Conducting surveys is the most common method of generating
- A) Primary Data
 - B) Secondary Data
 - C) Qualitative Data
 - D) None of the Above
- 14) One of the most critical stages in the survey research process is
- A) Research design
 - B) Questionnaire design
 - C) Interview design
 - D) Survey design

- 15) The most important role played by a good Conclusion is:
- A) It generates the aspects for future research
 - B) It does not summarise the research.
 - C) It is not a blue-print of the research.
 - D) It does not pave way for new research.
- 16) What abbreviation is used to mention more than four authors of a research work to be cited?
- A) at al.
 - B) et all.
 - C) et al.
 - D) ot all.
- 17) Incomplete, mislead or inconsistent knowledge can be satisfied by-
- A) Diagnostic research
 - B) Comparative research
 - C) Remedial research
 - D) Explanatory research
- 18) A research which is used as a key to unlock present questions and to guide future actions by a systematic and chronological study of past events is known as —
- A) Historical Research
 - B) Experimental Research
 - C) Diagnostic Research
 - D) Explanatory Research
- 19) The conceptual framework and background of research which will become the source for formulation of the hypothesis is known as:
- A) Methodology
 - B) Review of literature
 - C) Data analysis
 - D) None of the above

M/P ENT - 25

- 20) A researcher divides a heterogeneous population into homogeneous groups. And then draws samples from each group. Which sampling technique is the researcher using?
- A) Cluster sampling
 - B) Stratified sampling
 - C) Non-probability sampling
 - D) Quota sampling
- 21) Why are sampling traits important in sampling?
- A) They help us in deciding the sample size.
 - B) They help us to differentiate between useless units and useful units.
 - C) They form the basis of the research questions.
 - D) They are the deciding factor in inclusion of a unit in the sample.
- 22) _____ is a process of thinking which helps a researcher to come to decision relating to law.
- A) Legal reasoning
 - B) Legal research
 - C) Legal methods
 - D) Jurisprudence
- 23) A Hypothesis contributes to the development of
- A) Theory
 - B) Generalization
 - C) Evaluation
 - D) Concept
- 24) A good research proposal will always
- A) Provide with respondents name and address.
 - B) Focus on addressing the research objectives.
 - C) Consider all possible research that had previously been done on the topic
 - D) Discuss all unnecessary data

25) The research participants are described in detail in which section of the research proposal?

- | | |
|------------------|-------------------------|
| A) Introduction | B) Research Methodology |
| C) Data Analysis | D) Conclusion |

SUBJECT SPECIFIC

26) In a binary random variable X takes the value $+2$ or -2 . The probability $P(X = +2) = \alpha$. The value of α (rounded off to one decimal place), for which the entropy of X is maximum, is —

- | | |
|--------|--------|
| A) 0.7 | B) 0.6 |
| C) 0.5 | D) 0.4 |

27) P , Q , and R are the decimal integers corresponding to the 4-bit binary number 1100 considered in signed magnitude, 1's complement and 2's complement representations, respectively. The 6-bit 2's complement representation of $(P + Q + R)$ is

- | | |
|-----------|-----------|
| A) 111101 | B) 110101 |
| C) 110010 | D) 111001 |

28) A rectangular waveguide of width w and height h has cut-off frequencies for TE_{10} and TE_{11} modes in the ratio 1:2. The aspect ratio w/h , rounded off to two decimal places, is _____.

- | | |
|----------|----------|
| A) 1.732 | B) 2.405 |
| C) 3.245 | D) 6.254 |

29) The clock frequency of an 8085 microprocessor is 5 MHz. If the time required to execute an instruction is 1.4 then the number of T-states needed for executing the instruction is,

- | | |
|------|------|
| A) 1 | B) 6 |
| C) 7 | D) 8 |

- 30) The Miller effect in the context of a Common Emitter amplifier explains
- A) an increase in the low-frequency cutoff frequency
 - B) an increase in the high-frequency cutoff frequency
 - C) a decrease in the low-frequency cutoff frequency
 - D) a decrease in the high-frequency cutoff frequency
- 31) A good transconductance amplifier should have
- A) high input resistance and low output resistance
 - B) low input resistance and high output resistance
 - C) high input and output resistances
 - D) low input and output resistance
- 32) The following FIVE instructions were executed on an 8085 microprocessor.
- MVI A, 33H
MVI B, 78H
ADD B
CMA
ANI 32H
- The Accumulator value immediately after the execution of the fifth instruction is
- A) 00H
 - B) 10H
 - C) 11H
 - D) 32H
- 33) A connection is made consisting of resistance A in series with a parallel combination of resistances B and C. Three resistors of value are provided. Consider all possible permutations of the given resistors into the positions A, B, C, and identify the configurations with maximum possible overall resistance, and also the ones with minimum possible overall resistance. The ratio of maximum to minimum values of the resistances (up to second decimal place) is _____ .
- A) 4.14
 - B) 4.41
 - C) 2.14
 - D) 3.14

M/P ENT - 25

- 34) The second moment of a Poisson-distributed random variable is 2. The mean of the random variable is
- A) 1 B) 2
C) 3 D) 5
- 35) 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
- 36) Consider a four bit D to A converter. The analog value corresponding to digital signals of values 0000 and 0001 are 0V and 0.0625V respectively. The analog value (in Volts) corresponding to the digital signal 1111 is _____.
- A) 0.9375 B) 0.8256
C) 0.7654 D) 0.5243
- 37) A sinusoidal signal of amplitude A is quantized by a uniform quantizer. Assume that the signal utilizes all the representation levels of the quantizer. If the signal to quantization noise ratio is 31.8 dB, the number of levels in the quantizer is _____.
- A) 64 B) 32
C) 128 D) 16
- 38) The directivity of an antenna array can be increased by adding more antenna elements, as a larger number of elements
- A) Improves the radiation efficiency
B) Increases the effective area of the antenna
C) Results in a better impedance matching
D) Allows more power to be transmitted by the antenna

M/P ENT - 25

- 39) If the base width in a bipolar junction transistor is doubled, which one of the following statements will be TRUE?
- A) Current gain will increase
 - B) Unity gain frequency will increase
 - C) Emitter base junction capacitance will increase
 - D) Early voltage will increase
- 40) A good current buffer has
- A) Low input impedance and low output impedance
 - B) Low input impedance and high output impedance
 - C) High input impedance and low output impedance
 - D) High input impedance and high output impedance
- 41) The capacity of a Binary Symmetric Channel (BSC) with cross-over probability 0.5 is _____.
- A) 1
 - B) 2
 - C) 4
 - D) 0
- 42) For a parallel plate transmission line, let v be the speed of propagation and Z be the characteristic impedance. Neglecting fringe effects, a reduction of the spacing between the plates by a factor of two results in
- A) halving of v and no change in Z
 - B) no change in v and halving of Z
 - C) no change in both v and Z
 - D) halving of both v and Z
- 43) In CMOS technology, shallow P-well or N-well regions can be formed using
- A) low pressure chemical vapour deposition
 - B) low energy sputtering
 - C) low temperature dry oxidation
 - D) low energy ion-implantation

M/P ENT - 25

- 44) The number of bytes required to represent the decimal number 1856357 in packed BCD (Binary Coded Decimal) form is _____.
A) 4
B) 5
C) 6
D) 7
- 45) The trigonometric Fourier series of an even function does not have the
A) dc term
B) cosine terms
C) sine terms
D) odd harmonic terms
- 46) In a forward biased pn junction diode, the sequence of events that best describes the mechanism of current flow is
A) injection, and subsequent diffusion and recombination of minority carriers
B) injection, and subsequent drift and generation of minority carriers
C) extraction, and subsequent diffusion and generation of minority carriers
D) extraction, and subsequent drift and recombination of minority carriers
- 47) If the emitter resistance in a common-emitter voltage amplifier is not bypassed, it will
A) Reduce both the voltage gain and the input impedance
B) Reduce the voltage gain and increase the input impedance
C) Increase the voltage gain and reduce the input impedance
D) Increase both the voltage gain and the input impedance
- 48) For a given sample-and-hold circuit, if the value of the hold capacitor is increased, then
A) Droop rate decreases and acquisition time decreases
B) Droop rate decreases and acquisition time increases
C) Droop rate increases and acquisition time decreases
D) Droop rate increases and acquisition time increases

- 49) If calls arrive at a telephone exchange such that the time of arrival of any call is independent of the time of arrival of earlier or future calls, the probability distribution function of the total number of calls in a fixed time interval will be
- A) Poisson
 - B) Gaussian
 - C) Exponential
 - D) Gamma
- 50) An M-level PSK modulation scheme is used to transmit independent binary digits over a band-pass channel with bandwidth 100 kHz. The bit rate is 200 kbps and the system characteristic is a raised-cosine spectrum with 100% excess bandwidth. The minimum value of M is_____.
- A) 16
 - B) 32
 - C) 64
 - D) 128



Rough Work