

Entrance Test for Ph.D. Programme-2018

Time: 120 Minutes

Max Marks: 100

Discipline: Electrical Engineering

Set: A

Test ID: 09

Name:.....

Father Name:

Roll Number: **Date:**/...../.....

Roll Number in words:.....

Signature of Candidate:

Signature of Invigilator:

INSTRUCTIONS FOR CANDIDATES

1. Do not open seal before start of Exam.
2. Carefully fill all your details in top portion of this question paper. Don't leave any column blank.
3. Use blue/black ball point pen to fill details on question paper. Write only in capital letters.
4. Carefully fill all your details in top portion of OMR answer sheet. Also put your signatures at bottom portion of OMR.
5. **Use only black ball point pen to fill details & darken circles on OMR sheet. Using pencil is strictly prohibited.**
6. **Carefully fill your Roll No, Test ID, Category, Paper Set and other required details on the OMR sheet.**
7. Question paper consists of two sections. Section-I is of Research Methodology and Section-II is Subject specific. Each section contains 50 multiple choice questions. Total 100 questions of one mark each.
8. **Maximum marks are 100.**
9. **Time allowed is 120 minutes.**
10. **Qualifying marks shall be 50% for General Category and 45% for Reserved Categories.**
11. All questions are compulsory. No negative marking for wrong answers.
12. There are four alternative answers for each question out of which only one is correct.
13. You have to darken the circle of right answer on OMR answer sheet.
14. Questions left blank or attempted with two or more options/answers will not be evaluated.
15. Also read carefully the instructions on OMR answer sheet before attempting the questions.
16. Use of calculator is not allowed.
17. Log tables may be provided for calculation work, if required.
18. OMR sheet should not be folded or crushed. Don't put any stray marks on the sheet.
19. Circles on **OMR sheet** should be darkened completely. Incomplete/half filled circles will not be evaluated.
20. Do not use marker or white fluid on the OMR sheet.
21. **The medium of the examination is English only.**
22. No extra sheet will be provided for the rough work. Use the space inside the question paper pages for rough work.
23. Carrying mobile phones, electronic gadgets, notes or extra papers in examination hall is strictly prohibited.
24. Indulging in any form of unfair means, canvassing, impersonation or misbehaviour with examination staff will result in disqualification of your candidature.

Section-I
Research Methodology

1. Who authored the book "Methods in Social Research"?
 - A) Wilkinson
 - B) C R Kothari
 - C) Kerlinger
 - D) Goode and Halt
2. Social Science deals with
 - A) Objects
 - B) Human beings
 - C) Living things
 - D) Non-living things
3. "The Romance of Research" is authored by
 - A) Redmen and Mory
 - B) P. V. Young
 - C) Robert C. Meir
 - D) Harold Dazier
4. Which of the following is an example of primary data?
 - A) Book
 - B) Journal
 - C) Newspaper
 - D) Census Report
5. ICSSR stands for
 - A) Indian Council for Survey and Research
 - B) Indian Council for Strategic Research
 - C) Indian Council for Social Science Research
 - D) Inter National Council for Social Science Research

6. JRF stands for
- A) Junior Research Functions
 - B) Junior Research Fellowship
 - C) Junior Fellowship
 - D) None of the above
7. In the formulation of problem, which of the following we need to give?
- A) Title
 - B) Index
 - C) Bibliography
 - D) Concepts
8. Analogies are sources of
- A) Data
 - B) Concept
 - C) Research
 - D) Hypothesis
9. When a hypothesis is stated negatively, it is called
- A) Relational Hypothesis
 - B) Situational Hypothesis
 - C) Null Hypothesis
 - D) Casual Hypothesis
10. In a survey, there is an enumerator and
- A) Guide
 - B) Respondent
 - C) Supervisor
 - D) Messenger
11. A short summary of Technical Paper is called
- A) Article
 - B) Research Abstract

- C) Publication
 - D) Guide
12. Ph.D. stands for
- A) Doctor of Philosophy
 - B) Degree in Philosophy
 - C) Doctor of Psychology
 - D) None of the above
13. Failure to acknowledge the borrowed material; is called (Take and use of others as one's own)
- A) Acknowledgement
 - B) Foot Notes
 - C) Index
 - D) Plagiarism
14. Data related to the Human beings are called
- A) Territorial data
 - B) Organisational data
 - C) Peripheral data
 - D) Demographic data
15. Schedule is filled by which of the following?
- A) Respondent
 - B) Enumerator
 - C) Everybody
 - D) None of the above
16. Questions in which only two alternatives are possible are called
- A) Multiple choice questions
 - B) Dichotomous Questions
 - C) Open ended questions
 - D) Structured questions

17. Assigning numerals or other symbols to the categories or response is called
- A) Editing
 - B) Coding
 - C) Transcription
 - D) Tabulation
18. Tippet table refers to
- A) Table of random digits
 - B) Table used in sampling methods
 - C) Table used in statistical investigations
 - D) All of the above
19. Research and development become the index of development of country. Which of the following reasons are true with regards to the statement?
- A) Because R&D reflect the true economic and social conditions prevailing in a country.
 - B) Because R&D targets the human development.
 - C) Because R&D can improve the standard of living of the people in a country.
 - D) All of the above.
20. The word "Anusandhan" implies
- A) Attaining an aim
 - B) Goal orientation
 - C) Following an aim
 - D) Praying to achieve an aim
21. A Researcher wants to study the relationship of family size to income. He classifies his population into different income slabs and then takes a random sample from each slab in order. Which technique of sampling is he working with?
- A) Cluster sampling
 - B) Random sampling

C) Stratified Random sampling

D) Systematic sampling

For Q. 22-23. The following table gives the sales of batteries manufactured by a company over the years.

Number of different batteries sold (in thousands)

Year	Types of Batteries					
	4AH	7AH	32AH	35AH	55AH	Total
1992	75	144	114	102	108	543
1993	90	126	102	84	126	528
1994	96	114	75	105	135	525
1995	105	90	150	90	75	510
1996	90	75	135	75	90	465
1997	105	60	165	45	120	495
1998	115	85	160	100	145	605

22. What was the approximate percentage increase in the sales of 55AH batteries in 1998 compared to that in 1992?

A) 28%

B) 31%

C) 33%

D) 34%

23. The percentage of 4AH batteries sold to the total number of batteries sold was maximum in the year?

A) 1994

B) 1995

C) 1996

- D) 1997
24. Look the series: 22, 21, 23, 22, 24, 23,
- A) 22
 - B) 24
 - C) 25
 - D) 26
25. Which word does not belong to others?
- A) Dodge
 - B) Flee
 - C) Duck
 - D) Avoid
26. Which of the following is not an essential element of report writing?
- A) Research Methodology
 - B) Reference
 - C) Conclusion
 - D) None of the above
27. Which of the following is non-probability sampling?
- A) Snowball
 - B) Random
 - C) Cluster
 - D) Stratified
28. In group interview, there are
- A) One interviewer and one interviewee
 - B) More than one interviewer and one interviewee
 - C) One interviewer and more than one interviewee
 - D) More than one interviewer and more than one interviewee
29. Uniting various qualitative methods with quantitative methods can be called as
- A) Coalesce

- B) Triangulation
 - C) Bipartite
 - D) Impassive
30. Books and records are the primary sources of data in:
- A) clinical research
 - B) historical research
 - C) laboratory research
 - D) participatory research
31. The important pre-requisites of a researcher in sciences, social sciences and humanities are
- A) laboratory skills, records, supervisor, topic
 - B) Supervisor, topic, critical analysis, patience
 - C) archives, supervisor, topic, flexibility in thinking
 - D) topic, supervisor, good temperament, pre-conceived notions
32. A college wants to give training in use of Statistical Package for Social Sciences (SPSS) to researchers. For this the college should organize
- A) Lecture
 - B) Seminar
 - C) Workshop
 - D) Conference
33. Which One of the following is not a quality of researcher?
- A) Keeness in enquiry
 - B) He must be of alert mind
 - C) His assertion to outstrip the evidence
 - D) Unison with that of which he is in search
34. Null means?
- A) One
 - B) Two

- C) Zero
 - D) None of the above
35. The depth of any research can be judged by:
- A) title of the research
 - B) duration of the research
 - C) objectives of the research
 - D) total expenditure on the research
36. Fundamental research reflects the ability to:
- A) Expound new principles
 - B) Synthesize new ideals
 - C) Evaluate the existing material concerning research
 - D) Study the existing literature regarding various topics
37. A ratio represents the relation between
- A) Part and Part
 - B) Part and Whole
 - C) Whole and Whole
 - D) All of the above
38. Circle graphs are used to show:
- A) How one part is related to other parts?
 - B) How various sections share in the whole?
 - C) How one whole is related to other whole?
 - D) How various parts are related to the whole?
39. Field-work based research is classified as:
- A) Historical
 - B) Empirical
 - C) Biographical
 - D) Experimental

40. Statistical measure based upon the entire population is called parameter while measure based upon a sample is known as:
- A) Inference
 - B) Statistics
 - C) Sample parameter
 - D) None of these
41. The importance of the correlation co-efficient lies in the fact that:
- A) It is one of the most valid measure of statistics.
 - B) It is a non-parametric method of statistical analysis.
 - C) There is a linear relationship between the correlated variables.
 - D) It allows one to determine the degree or strength of the association between two variables.
42. Which one of the following is the most comprehensive source of population data?
- A) Census
 - B) National Sample Surveys
 - C) Demographic Health Surveys
 - D) National Family Health Surveys
43. Which correlation co-efficient best explains the relationship between creativity and intelligence?
- A) 0.3
 - B) 0.5
 - C) 0.6
 - D) 1.0
44. Normal Probability Curve should be
- A) Zero skewed
 - B) Positively skewed
 - C) Negatively skewed
 - D) Leptokurtic skewed

45. A doctor studies the relative effectiveness of two drugs of dengue fever. His research would be classified as
- A) Case Study
 - B) Ethnography
 - C) Descriptive Survey
 - D) Experimental Research
46. Newton gave three basic laws of motion. This research is categorized as
- A) Sample Survey
 - B) Applied Research
 - C) Descriptive Research
 - D) Fundamental Research
47. When two or more successive footnotes refer to the same work which one of the following expressions is used?
- A) et.al
 - B) op.cit
 - C) loc.cit
 - D) ibid
48. Nine year olds are taller than seven year olds. This is an example of a reference drawn from
- A) Vertical study
 - B) Time series study
 - C) Experimental study
 - D) Cross-sectional study
49. Which one of the following belongs to the category of good 'research ethics'?
- A) Publishing the same paper in two research journals without telling the editors
 - B) Trimming outliers from a data set without discussing your reasons in a research paper

- C) Conducting a review of the literature that acknowledges the contributions of other people in the relevant field or relevant prior work
 - D) Including a colleague as an author on a research paper in return for a favor even though the colleague did not make a serious contribution to the paper
50. Which of the following are the basic rules of APA style of referencing format?
- A) Alphabetically index reference list
 - B) Invert authors' names (last name first)
 - C) Italicize titles of longer works such as books and journals
 - D) All of the above

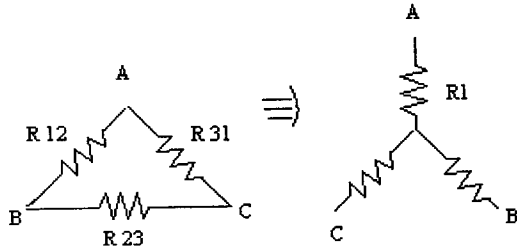
Section-II
Electrical Engineering

51. Inductances of unsymmetrical transmission line are unequal and have imaginary part due to:
- A. Mutual inductances
 - B. Unsymmetrical spacing
 - C. both A and B
 - D. None
52. The inductance of phase 'a' of double circuit line with vertical configurations is: A. $(\frac{1}{2})L_a$
B. $2L_a$
C. L_a
D. $L_a/3$
53. Bundled conductors line have advantages of a) reduced corona loss b) low reactance C) larger loading capability d) increases surge impedance loading
- A. a only
 - B. b and c only
 - C. all A, B, C, D
 - D. A and B only
54. Higher frequency transmission can cause skin effect to:
- A. decrease
 - B. increase
 - C. no change
 - D. None
55. Capacitance of a transmission line in the presence of earth :
- A. Decrease
 - B. Increase
 - C. No change
 - D. None
56. String efficiency of string of insulators for DC line is :
A 100%

- B. 50%
 - C. 40%
 - D. 30%
57. Galloping of conductors have frequency of the order of:
- A. 1.5 cycles/sec
 - B. 3 cycles/sec
 - C. 5 cycles /sec
 - D. 7 cycles/sec
58. The cost of insulators beyond 50 kV is proportional to V^x , the x is:
- A. >2
 - B. <2
 - C. <0.5
 - D. =1
59. Corona loss in hilly area is more than in plain region due to:
- A. high pressure
 - B. low pressure
 - C. dust
 - D. temperature
60. If δ is the loss angle of the cable, its power factor is:
- A. $\sin\delta$
 - B. $\cos\delta$
 - C. independent of δ
 - D. None
61. In a 4 pole DC machine with lap winding, then lap winding replaced wave winding with the same number of turns, the induced emf will
- A. increase
 - B. Decrease
 - C. remain the same

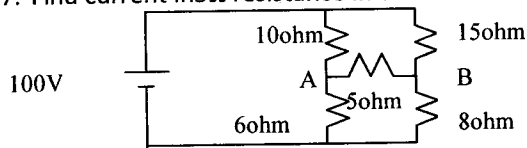
- D. become half
62. In DC generator, the polarity of interpole is
- A. The polarity of the next main pole
 - B. The polarity of the main pole immediately following the interpole
 - C. The polarity of main pole opposite to the interpole
 - D. same as the polarity of the pole
63. The number of the conductors of the compensating winding in a DC machine
- A. is always more than the number of armature conductor per pole
 - B. is always less than the number of armature conductor per pole
 - C. may be more or less than the number of armature conductor per pole
 - D. is always one.
64. A shunt generator can self excite
- A. only if resistance of the field winding is less than a critical value
 - B. only if resistance of the field winding is more than a critical value
 - C. irrespective of the value of the resistance in the field circuit
 - D. only if the field is open circuited
65. Swinburne test can be used only for
- A. Series motors
 - B. shunt motors
 - C. series and shunt motors
 - D. Shunt and compound motors

66. What will be the value of R1 for the following transformation



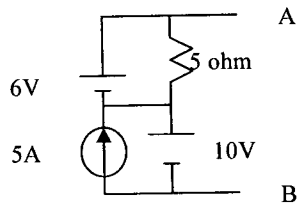
- A. $\frac{R_{23}}{R_{12} + R_{23} + R_{31}}$ B. $\frac{R_{12}R_{23}}{R_{12} + R_{23} + R_{31}}$
 C. $\frac{R_{23}R_{31}}{R_{12} + R_{23} + R_{31}}$ D. $\frac{R_{12}R_{31}}{R_{12} + R_{23} + R_{31}}$

67. Find current in 5Ω resistance in the circuit shown in figure.



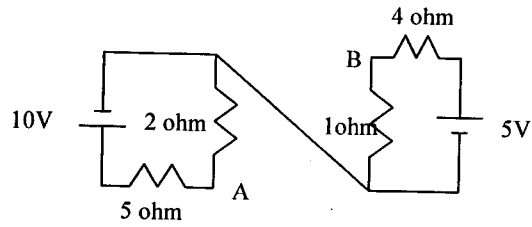
- A. 0.193A
 B. 0.213A
 C. 0.243A
 D. 0.313A

68. Find R_{AB} using Thevenin's Theorem shown in Figure.



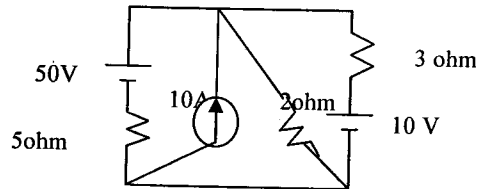
- A. Zero Ohm
 B. 5 Ohm
 C. 10 ohm
 D. None

69. Determine V_{AB} using Thevenin's Theorem



- A. 2.85 V
- B. 1.85 V
- C. 1.75 V
- D. 3.85V

70. Find current delivered by 50 V source



- A. 5.50 A
- B. 5.47 A
- C. 6.54 A
- D. 6.47 A

71. Laplace transform of $1/s^3(s^2-1)$ is

- A. $-1-t^2/2+\cosht$
- B. $1-t^2/2+\cosht$
- C. $-1+t^2/2+\cosht.$
- D. $-1-t^2/2-\cosht$

72. A unit step response of a system is given as $c(t) = \frac{5}{2} + 5t - \frac{5}{2}e^{-2t}$, the transfer function $C(s)/R(s)$ is given as:

- A. $\frac{10(s+1)}{s(s+2)}$
- B. $\frac{15(s+1)}{s(s+2)}$

C. $\frac{5(s+1)}{s(s+2)}$

D. $\frac{10(s-1)}{s(s+2)}$

73. A unity feedback system is characterized by an open loop transfer function $G(s) = \frac{K}{s(s+10)}$, for damping ration of 0.5, the values of K is:

- A. 100
- B. 120
- C. 10
- D. 50

74. A servo system for position control has the closed loop transfer function $\frac{6}{s^2 + 2s + 6}$, the percentage overshoot if the input is moved to a new position is

- A. 24.4%
- B. 23.4%
- D. 25.3%
- D. 14.4%

75. A certain feedback system is described by the following transfer function

$$G(s) = \frac{12}{s^2 + 4s + 16}, H(s) = Ks, \text{ for damping factor of system } = 0.8, \text{ the overshoot of the system is}$$

- A. 1.4%
- B. 1.5%
- C. 5.1%
- D. 4.1 %

76. The open loop transfer function of unity feedback system is $\frac{K}{s(s+3)(s^2 + s + 1)}$, for a sustained oscillations, the value of K is

- A. 39/16
- B. 93/61
- C. 16/39

D. 61/93.

77. An amplifier having an output resistance of 4 ohm gives an open circuit output voltage of 6V (rms). The maximum power that it can deliver to the load is:
A. 1.5W
B. 2.25W
C. 2.4 W
D. 9 W.
78. An active load is used in the collector of the differential amplifier of an op-amp to:
A. increase the output resistance
B. increase the differential gain A_d
C. increase the maximum peak to peak output voltage
D. eliminates the load resistance from the circuit.
79. The slew rate of an op-amp is 0.5V/micro sec. The maximum frequency of a sinusoidal input of 2V rms that can be handled without excessive distortion is:
A. 3 kHz
B. 30 kHz
C. 200 kHz
D. 2 Mhz.
80. High power efficiency of the push-pull amplifier is due to the fact that:
A. each transistor conducts on different cycles of the input
B. transistors are placed in CE configuration
C. there is no quiescent collector current
D. low forward biasing voltage is required.
81. In CMOS inverter, the power dissipation is:
A. low only when V_{in} is low
B. low only when V_{in} is high
C. high during dynamic operation
D. low during dynamic operation.
82. Z-transform of the time function $\sum_{k=0}^{\infty} \delta(n-k)$ is:
A. $\frac{z-1}{z}$
B. $\frac{z}{(z-1)^2}$
C. $\frac{z}{(z-1)}$
D. $\frac{(z-1)^2}{z}$.
83. Fourier transform of $u_0(T_1-t)+u_0(T_1+t)$ is
A. $\cos(\omega T_1)$
B. $2\cos(\omega T_1)$
C. $2\sin(\omega T_1)$
D. $2j\sin(\omega T_1)$.
84. The impulse response of a filter matched to rectangular pulse is:

- A. an attenuator
 - B. a low pass filter
 - C. a high pass filter
 - D. an equalizer.
85. Inverse Z-transform of $z/(z+2)$ is:
- A. $(-1)^k \cdot 2^k$
 - B. 2^k
 - C. $2^k/k$
 - D. $(-1)^k/2^k$
86. The Z-transform of $n\pi/2$ is:
- A. $\frac{z^2}{z^2+1}$
 - B. $\frac{z^2}{z+1}$
 - C. $\frac{z}{z^2-1}$
 - D. $\frac{z^2}{z-1}$
87. The region of convergence of the Z-transform of a unit step function is:
- A. $|z| > 1$
 - B. $|z| < 1$
 - C. Real part of $z > 0$
 - D. real part of $z < 0$.
88. Which of the following combinations of 3-phase transformers can operate successfully in parallel
- A. Δ -Y and Y- Δ
 - B. Y-Y and Δ -Y
 - C. Δ - Δ
 - D. Δ - Δ and Y- Δ
89. Fractional pitch windings results in
- A. higher terminal voltage
 - B. better voltage waveform and savings in material
 - C. higher efficiency
 - D. higher power factor
90. An AC winding has two slots per pole per phase. The slot harmonics will be
- A. 5th and 7th
 - B. 11th and 13th
 - C. 17th and 19th

- D. 23rd and 25th
91. A salient pole machines have
- A. Large number of poles and small length-to-diameter ratio
 - B. small number of poles and small length-to- diameter ratio
 - C. Large number of poles and high length-to-diameter ratio
 - D. Any of the above
92. Under short conditions, the power factor of the synchronous machine is
- A. 1
 - B. about 0.8 lag
 - C. almost zero lagging
 - D. about 0.5 lag
93. In modern large size synchronous machines, the Z_s is about
- A. 0.2 p.u.
 - B. 0.5 p.u.
 - C. 1.0 p.u.
 - D. 0.05 p.u.
94. In a single phase power factor meter, the controlling torque is:
- A. provided by the spring control
 - B. provided by the gravity control
 - C. provided by the stiffness of the suspension
 - D. not required.
95. Which of the following transducers can be used for the measurements of the pressures as high as 100,000 atmosphere:
- A. Mcleod gauge
 - B. Pirani gauge
 - C. Bridgman gauge
 - D. Knudsen gauge.
96. Which of the following transducers are classified as active transducer?
- A. Metallic strain gauges
 - B. Capacitive microphone
 - C. LVDT
 - D. Piezoelectric transducer.
97. A spring controlled moving iron voltmeter draws a currant of 1 mA for full scale value of 100 V. If it draws a current of 0.5mA, the meter reading is:
- A. 25 V
 - B. 50 V

C. 100V

D. 200V

98. Applying DeMorgan's theorem to the expression \overline{ABC} , we get

A. $\overline{A+B+C}$

B. $A+B+C$

C. $A+\overline{B}+C\overline{C}$

D. $A(B+C)$

99. How many flip-flops are required to make a MOD-32 binary counter?

A. 3

B. 45

C. 5

D. 6

100. The eigen value of the matrix $\begin{matrix} a & 1 \\ a & 1 \end{matrix}$

A. $(a+1), 0$

B. $a, 0$

C. $(a-1), 0$

D. $0, 0$