



PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed. Use Blue/Black ball point pen for attempting the questions.
- All questions are compulsory. No negative marking for wrong answers.
- To attempt a question, make a tick mark (✓) at the right option/answer.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

Engineering

Discipline

Electrical Engineering

Name

Father's Name

Roll No.

Date: **15-01-2011**

Signature of Candidate

Signature of Invigilator

- Q1. Kirchoff's laws fail in case of
- (a) linear networks having both ac and d.c. supply
 - (b) non-linear networks having d.c. supply
 - (c) dual networks having ac supply only
 - (d) distributed parameter networks having d.c. supply

Q2. The voltage across a pure capacitor of $50 \mu\text{F}$ is given by $v(t) = 50 \sin \omega t$ volts. The current $i(t)$ for this single circuit element will be

- (a) $2.5 \omega \sin \omega t$ mA
- (b) $2.5 \omega \cos \omega t$ mA
- (c) $\cos \omega t$ mA
- (d) $\sin \omega t$ mA

- Q3. Norton's theorem result in
- (a) a current source with an impedance in parallel
 - (b) a current source alone
 - (c) a voltage source alone
 - (d) a voltage source with an impedance in series

Q4. Find the theorem which is best suited for application to the any given circuit

- (a) Thevenin's theorem
- (b) Norton's theorem
- (c) Milliman's theorem
- (d) Superposition theorem

Q5. For a series a.c. R-L-C circuit, R is 2.5Ω , L is 1H, C is 1F and V_m applied is 220V at 50Hz, find current I_m at resonance is

- (a) 88 A
- (b) 110 A
- (c) 115 A
- (d) 120 A

Q6. If a balanced Y-connected load having impedance $4 + j3 \Omega$ is connected to a 3-phase 180V supply, the line current drawn by the load is given by

- (a) 24 A
- (b) 34 A
- (c) 36 A
- (d) 38 A

Q7. If L_1 is 0.5 H, L_2 is 0.2H and M is 0.5 H, the value of coupling coefficient is given by

- (a) 0.5
- (b) 0.6
- (c) 0.7
- (d) 0.8

Q8. If $v_a = V_m \sin \omega t$, $v_b = V_m \sin(\omega t - 120^\circ)$ and $v_c = V_m \sin(\omega t + 120^\circ)$. $v_a + v_b + v_c$ is given by

- (a) 0
- (b) $\sqrt{3} V_m$
- (c) V_m
- (d) $3 V_m$

Q9. In a 4-phase circuit, the phase angle between successive phases is given by

- (a) 30 degree
- (b) 60 degree
- (c) 90 degree
- (d) 120 degree

Q10. A network N' is a dual of a network N if

- (a) both of them have same mesh equations
- (b) both of them have same node equations
- (c) mesh equations of one of them are node equations of the other
- (d) none of above

- Q11. Half wave rectifier type ac meters are used as voltmeters. They cannot be used as ammeters because
- the pointer would oscillate with ac
 - the ac current would be too small to read
 - the pointer would show zero deflection
 - the ac current would be excessive
- Q12. A voltmeter uses a meter with $I_{fs} = 1$ mA. Its sensitivity is
- 500 Ω/V
 - 1000 Ω/V
 - 5000 V/Ω
 - 500 V/Ω
- Q13. The Q-meter works on the principle of a
- series resonant circuit
 - parallel resonant circuit
 - self-inductance
 - mutual inductance
- Q14. Ampere is one of the
- base units
 - derived unit
 - supplementary units
 - none of above
- Q15. In a gravity controlled instrument, the deflection angle is proportional to
- square of the measurand
 - sine-inverse of the measurand
 - measurand
 - sine of the measurand
- Q16. Frequency is measured by
- De Sauty's bridge
 - Wein's bridge
 - Anderson's bridge
 - Campbell's bridge
- Q17. Megger is an instrument to measure
- very low resistance
 - Q of coil
 - Insulation resistance
 - Inductance of coil
- Q18. For fast response, the meters should have
- critical damping
 - no-damping
 - a damping coefficient of about 0.1
 - a damping coefficient of about 0.7
- Q19. Piezo-electric crystal can be used to measure
- flow
 - temperature
 - velocity
 - acceleration
- Q20. A.C./D.C. VTVM is a
- dynamometer type instruments
 - moving iron instrument
 - moving-coil instrument
 - both moving-coil/ moving iron instruments
- Q21. Wheatstone bridge is analogous to
- simple lever system
 - cantilever
 - gear train
 - none of the above
- Q22. Which bridge is used to measure inductance of a low Q-inductance?
- Maxwell's bridge
 - Anderson's bridge
 - Kelvin's double bridge
 - Hay's bridge
- Q23. The resistance can be measured most accurately by
- multi-meter
 - voltmeter-ammeter method
 - bridge method
 - megger
- Q24. Thermocouple used in radio micrometer and thermo-galvanometer is
- copper-constantan couple
 - copper-iron couple
 - iron-copper couple
 - antimony-bismuth couple
- Q25. The resistivity of material is 1.78×10^8 ohm-m. This material is
- conductor
 - insulator
 - semi-conductor
 - all of above
- Q26. Which is of the following is the poorest conductor of electricity?
- copper
 - manganin
 - nichrome
 - aluminium
- Q27. Nichrome is used for
- Over head line wires
 - heater coils
 - lamp filaments
 - all of above

Q28. Silicon steel is used in electrical machines because it has

- (a) low hysteresis loss
- (b) low retentivity
- (c) low coercitivity
- (d) all of above

Q29. Hard steel is suitable for making permanent magnets because

- (a) its hysteresis loop has large area
- (b) its mechanical strength is high
- (c) it has good residual magnetism
- (d) all of above

Q30. The relative permittivity of a ferromagnetic material is

- (a) one
- (b) less than one
- (c) more than one thousand
- (d) more than ten lac

Q31. High permeability magnetic material helps

- (a) to confine the flux within the magnetic circuit
- (b) to allow the flux to leak
- (c) in producing more current
- (d) none of these

Q32. The aim of shielding an instrument

- (a) to prevent its damage due to moisture
- (b) to reduce the effect of stray magnetic fields on its reading
- (c) to increase the range of the instruments
- (d) none of above.

Q33. Two resistances of $5\ \Omega$ and $20\ \Omega$ are connected in parallel. The parallel combination is connected in series with a $1\ \Omega$ resistance and this series parallel combination is connected across a d.c. source of $100\ \text{V}$. The current through the $5\ \Omega$ resistance is

- (a) $16\ \text{A}$
- (b) $4\ \text{A}$
- (c) $20\ \text{A}$
- (d) none of these

Q34. An e.m.f. of $8\ \text{volts}$ is induced in a coil of inductance $4\ \text{H}$. The rate of change of current must be

- (a) $32\ \text{A/s}$
- (b) $0.5\ \text{A/s}$
- (c) $2\ \text{A/s}$
- (d) $12\ \text{A/s}$

Q35. The self inductances of two coils are $4\ \text{mH}$ and $9\ \text{mH}$. If the coefficient of coupling is 0.5 , the mutual inductance between the coils is:

- (a) $12\ \text{mH}$
- (b) $3\ \text{mH}$
- (c) $6.5\ \text{mH}$
- (d) $6\ \text{mH}$

Q36. The test(s) needed to be performed to determine the leakage reactance of a transformer are

- (a) Open Circuit test
- (b) Short-circuit test
- (c) both open- and short-circuit tests
- (d) test by an impedance bridge

Q37. A $200/100\ \text{V}$ transformer has a pu impedance of 0.05 . The voltage needed to be applied on the HV side to circulate full-load current during short-circuit test is

- (a) $5\ \text{V}$
- (b) $10\ \text{V}$
- (c) $100\ \text{V}$
- (d) $200\ \text{V}$

Q38. A Δ/Y transformer has a phase-to-phase voltage transformation ratio of a (delta phase)/ 1 (star phase). The line to line voltage ratio Y/Δ is given by

- (a) $a/\sqrt{3}$
- (b) $a\sqrt{3}/1$
- (c) $\sqrt{3}/a$
- (d) $a/1$

Q39. A four-pole, $50\ \text{Hz}$ induction motor runs at a speed of $1440\ \text{rpm}$. The frequency of rotor current is

- (a) $3\ \text{Hz}$
- (b) $2.5\ \text{Hz}$
- (c) $2\ \text{Hz}$
- (d) $1\ \text{Hz}$

Q40. The maximum efficiency in a rotating machine is achieved at

- (a) a load when the variable loss equals the constant loss,
- (b) full load
- (c) half full load
- (d) no load

Q41. In a d.c. machine armature reaction, the ampere-turns are

- (a) fixed in space
- (b) along the axis of the main pole
- (c) along the brush axis
- (d) at 90° to the brush axis

- Q42. At low values of slip the torque in an induction motor is
- (a) directly proportional to the slip
 - (b) inversely proportional to the slip
 - (c) directly proportional to the square of slip
 - (d) inversely proportional to the square of the slip
- Q43. The starting current of an induction motor is five times the full-load current while its full-load slip is 4%. The ratio of the starting torque to the full-load torque is
- (a) 0.6
 - (b) 0.8
 - (c) 1.0
 - (d) 1.2
- Q44. The motor generally used in household food mixers is
- (a) shaded pole motor
 - (b) universal motor
 - (c) capacitor start motor
 - (d) split capacitor motor
- Q45. The motor used in ceiling fans is
- (a) split phase motor
 - (b) capacitor start motor
 - (c) capacitor start and capacitor run motor
 - (d) shaded pole motor
- Q46. The speed/load characteristics of a universal motor is same as that of
- (a) d.c. series motor
 - (b) d.c. shunt motor
 - (c) ac series motor.
 - (d) none of these
- Q47. The ratio of the diameters of an ACSR conductor and a copper conductor for the same resistance per unit length is
- (a) equal to 1
 - (b) greater than 1
 - (c) less than 1
 - (d) equal to -1
- Q48. For a standard conductor, the ratio of GMR to actual radius is
- (a) equal to 1
 - (b) equal to 0.7788
 - (c) less than 0.7788
 - (d) more than 1
- Q49. As the frequency is increased, the skin effect
- (a) decreases
 - (b) increases
 - (c) remains same
 - (d) none of above
- Q50. The regulation of a line at full load 0.8 power factor lagging is 11%. The regulation at full load 0.8 power factor leading can be
- (a) about 3%
 - (b) about 11%
 - (c) about 15%
 - (d) about 20%
- Q51. The SIL for a single circuit 220 kV line is around
- (a) 121 MW
 - (b) 90 MW
 - (c) 220 MW
 - (d) none of above
- Q52. The surge impedance of a single circuit high voltage line is of the order of
- (a) 400 ohms
 - (b) 300 ohms
 - (c) 500 ohms
 - (d) none of above
- Q53. In actual practice, string efficiency is improved by
- (a) capacitance grading
 - (b) static Shielding
 - (c) reduction in shunt capacitance relative to capacitance of each unit
 - (d) All of above
- Q54. The corona loss in a 50Hz system is 0.2 kW per phase per km. At a frequency of 60Hz, the corona loss would be
- (a) 0.17 kW/phase/kW
 - (b) 0.22 kW/phase/kW
 - (c) 0.24 kW/phase/kW
 - (d) none of above
- Q55. In case the voltage is increased n times, the size of the conductor would be
- (a) increased by n times
 - (b) reduced by $\frac{1}{n}$
 - (c) increased by n^2 times
 - (d) reduced by $\frac{1}{n^2}$
- Q56. The use of capacitor in power system is
- (a) to improve voltage regulation
 - (b) to improve the power factor of the supply
 - (c) to alter the characteristic of the load
 - (d) all of these
- Q57. HRC fuses provide best protection against
- (a) open-circuits
 - (b) short-circuits
 - (c) over load
 - (d) reverse current

- Q58. Ground wire is used to
 (a) give the support to the tower
 (b) to connect a circuit conductor
 (c) to avoid overloading
 (d) to give good regulation
- Q59. Current reactors are used
 (a) to improve power factor
 (b) to improve the efficiency
 (c) to improve the voltage regulation
 (d) to bring down the fault level within the capacity.
- Q60. Impedance relay can be used for
 (a) earth fault only
 (b) phase fault only
 (c) both phase and earth fault
 (d) none of these
- Q61. The medium employed for extinction of arc in air break circuit breaker is
 (a) SF₆
 (b) oil
 (c) air
 (d) water
- Q62. Which of the circuit breakers take minimum time for installation?
 (a) Air blast
 (b) Minimum oil
 (c) Bulk oil
 (d) Sulphur hexafluoride
- Q63. In an RLC series circuit $R=5\Omega$, $X_L=10\Omega$ and $X_C=15\Omega$. If this circuit is fed from a voltage $e = 100\sin(314t)$ the RMS current will be
 (a) 10 A
 (b) 14.14A
 (c) 2.1A
 (d) 3.33 A
- Q64. In a series RL circuit the resistance is 10 ohms and reactance is also 10 ohms. The power factor of the circuit is
 (a) 1
 (b) 0.707 Lagging
 (c) 0.707 leading
 (d) zero
- Q65. The impedance of an RL circuit is 10 ohms at a frequency of 50Hz. At a frequency of 60Hz, the impedance will be:
 (a) 12 ohms
 (b) greater than 10 ohms
 (c) greater than 12 ohms
 (d) none of above
- Q66. A series RLC circuit has a resonance frequency of 1000 Hz, if the inductance is made four times, the resonance frequency will be:
 (a) 1000 Hz
 (b) 500 Hz
 (c) 707 Hz
 (d) 4000 Hz
- Q67. The direction of current in an a.c. circuit:
 (a) is always in one direction.
 (b) cannot be determined
 (c) varies from instant to instant
 (d) is from positive to negative
- Q68. If a coil has an inductance of 0.2 H, its inductive reactance at 50 Hz frequency is :
 (a) 62.8 ohms
 (b) 62.8 siemens
 (c) 628 ohms
 (d) 0.2 ohms
- Q69. If a coil has an inductive reactance of 10 ohms, its susceptance is:
 (a) 0.1ohms
 (b) 1 Siemens
 (c) 1.1 Siemens
 (d) 10 Siemens
- Q70. The power consumed by a pure inductance connected to an a.c. source is:
 (a) Zero
 (b) very high
 (c) very low
 (d) infinite
- Q71. The objective of a research is
 (a) Theoretical
 (b) Factual
 (c) Practical
 (d) all of above
- Q72. Experimental research deals with
 (a) Variables
 (b) Controls
 (c) Scientific inference
 (d) all of above
- Q73. Generally scientist's observations related to experimentation and testing are based on
 (a) Scientific principles
 (b) house and rules
 (c) self imagination
 (d) self experience

- Q74 If you are repeating the mistake again and again then you are called a/an
- (a) excellent researcher
 - (b) excellent forgetter
 - (c) foolish person
 - (d) normal person
- Q75 The principles formulated by the fundamental research are used in
- (a) applied research
 - (b) philosophical research
 - (c) action research
 - (d) none of these
- Q76 The problem can be stated as
- (a) posing a question
 - (b) making a declarative statement
 - (c) both of above
 - (d) none of above
- Q77 Defining a problem means
- (a) raising a boundary wall around the problem
 - (b) fencing of the problem
 - (c) drawing a perimeter around the problem
 - (d) all of above
- Q78 Synopsis of a research is
- (a) Blue print of research
 - (b) Summing of research
 - (c) Extract of research
 - (d) a plan of research
- Q79 A good synopsis is considered as
- (a) a half way research
 - (b) a complete research
 - (c) a partial research
 - (d) a beginning of research
- Q80 The advantage of the synopsis is
- (a) It clearly shows the way of research
 - (b) It visualizes the various difficulties related with different steps of research.
 - (c) It helps in planning various steps of the research
 - (d) all of above
- Q81 What is sampling?
- (a) A fractional part of the respondent
 - (b) A fragment of phenomenon that might advance over knowledge
 - (c) both of above
 - (d) none of above
- Q82 The levels of organizing a workshop may be
- (a) regional
 - (b) National
 - (c) International
 - (d) Any one of above
- Q83 Seminar involves
- (a) higher order of cognition
 - (b) higher order of co-ordination
 - (c) higher order of organization
 - (d) None of above
- Q84 Literal meaning of symposium is
- (a) intellectual entertainment
 - (b) mental recreation
 - (c) urges for creativity
 - (d) motivational urge
- Q85 The research papers are written in order to
- (a) gain name and fame
 - (b) communicate the research
 - (c) get promotions
 - (d) None of above
- Q86 The research papers are generally prepared by
- (a) the research scholar
 - (b) the research supervisor
 - (c) the scientists
 - (d) None of above
- Q87 The process of writing a research paper is
- (a) Scientific
 - (b) Unscientific
 - (c) Original
 - (d) None of above
- Q88 "Acknowledgment" in a research thesis is written because
- (a) It is the effort on the part of researcher to repay the academic debts
 - (b) It is the custom to recognize the other's contribution in your work
 - (c) It is an obligatory in nature in order to forget the bad taste in mouth during its completion
 - (d) All of the above
- Q89 The title page of research thesis should be
- (a) Brief and meaningful
 - (b) Scientific and logical
 - (c) Aesthetic and attractive
 - (d) all of the above
- Q90 Which of the journal is not related to Electrical Engineering?
- (a) IEEE Transactions on Power Systems
 - (b) ASME
 - (c) Electric Power Research System
 - (d) IET Generation Transmission and Distribution