



ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ

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.
- All questions are compulsory. No negative marking for wrong answers.
- 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 / Branch

ELECTRICAL ENGINEERING

Name

Father's Name

Roll No.

Date: **19-11-2011**

Signature of Candidate

Signature of Invigilator

Q. 1 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

Q. 2 The motor generally used in household food mixers is

- (a) shaded pole motor
- (b) universal motor
- (c) capacitor start motor
- (d) split capacitor motor

Q. 3 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

Q. 4 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

Q. 5 When a function is described as:

$$u(t) = \begin{cases} 0 & \text{for } t < 0 \\ 1 & \text{for } t > 0 \end{cases} \text{ it is termed}$$

- (a) ramp function
- (b) impulse function
- (c) step function
- (d) none of these

Q. 6. Low resistance is measured by

- (a) Maxwell's bridge
- (b) Anderson's bridge
- (c) Kelvin's double bridge
- (d) Hay's bridge

Q. 7. Which of the following wave has least form factor?

- (a) rectangular wave
- (b) triangular wave
- (c) square wave
- (d) sine wave

Q. 8. The error of an instrument is generally given as a percentage of

- (a) mean value
- (b) R.M.S. value
- (c) full-scale value
- (d) measured value

Q. 9. A Zener diode is operated in the following mode as a voltage stabilizer:

- (a) reverse bias
- (b) forward bias
- (c) beyond the breakdown region
- (d) reverse bias around the knee of breakdown region

Q. 10 When an inverter is placed between two inputs of an J-K flip-flop, the resulting flip-flop is?:

- (a) J-K flip-flop
- (b) D flip-flop
- (c) T flip-flop
- (d) Master slave J-K flip-flop

Q. 11 A four-pole, 50Hz induction motor runs at a speed of 1440 rpm. The frequency of rotor current is

- (a) 3Hz
- (b) 2.5Hz
- (c) 2Hz
- (d) 1Hz

Q. 12. 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

Q. 13 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

Q. 14 Which of the following characteristics are attributed to an ideal independent voltage source?

- (a) independent of magnitude of current supplied
- (b) independent of the direction of flow of current
- (c) can absorb or deliver energy continuously at constant voltage
- (d) all of these

Q. 15 Two resistances, each of 10Ω and 20Ω , are connected in parallel across a dc voltage source. The current through the 10Ω resistance is

- (a) equal to the current supplied by the voltage source
- (b) equal to the current through the 20Ω resistance
- (c) 50% of the current through the 20Ω resistance
- (d) 200% of the current through the 20Ω resistance

Q. 16 Which of the following is not a unit of conductance?

- (a) Mho
- (b) Siemens
- (c) Volt per ampere
- (d) Ampere per volt

Q. 17 Three capacitors, each of C microfarad are first connected in series and then in parallel. The equivalent capacitance

- (a) is greater in the series combination
- (b) is greater in the parallel combination
- (c) is the same in the two combinations
- (d) none of these

Q. 18 Two resistances of 5Ω and 20Ω are connected in parallel. The parallel combination is connected in series with a 1Ω resistance and this series parallel combination is connected across a dc source of 100V. The current through the 5Ω resistance is

- (a) 16 A
- (b) 4 A
- (c) 20 a
- (d) None of these

Q. 19 Each branch of a star-connected load has a resistance of 30Ω . The resistance of each branch of an equivalent delta connection will be

- (a) 9Ω
- (b) 90Ω
- (c) 900Ω
- (d) none of these

Q. 20 The length of a conductor is doubled and its area of cross-section is also doubled, then the resistance

- (a) increases four times
- (b) remains unchanged
- (c) decreases to four times
- (d) decreases to half

Q. 21 The temperature coefficient of resistance is negative in case of

- (a) insulators
- (b) conductors
- (c) electrolytes
- (d) insulators and electrolytes

Q. 22 When air is replaced by a dielectric medium of dielectric constant K, the maximum capacity of the condenser

- (a) decrease k times
- (b) increase k times
- (c) remains unchanged
- (d) increases by k^2 times

Q. 23 Capacitance of a parallel plate capacitor decreases by

- (a) increasing the area of plates
- (b) increasing the distance between the plates
- (c) placing dielectric between the plates
- (d) decreasing the distance between the plates.

Q. 24 Magnetomotive force (m.m.f.) is analogous to

- (a) electric current in electric circuit
- (b) current density in conductor
- (c) electromotive force
- (d) Voltage

Q. 25 The magnetic field strength of an electromagnet can be increased by

- (a) increasing current in solenoid
- (b) increasing number of turns of solenoid
- (c) both (a) and (b)
- (d) None of above

- Q. 26 The reluctance of a material is defined as
- opposition offered to the magnetic field by it
 - its ability to conduct magnetic flux
 - opposition offered to the (low of current through the solenoid
 - none of above

Q. 27 What is the phase angle of a series RLC circuit at resonance?

- Zero
- 30°
- 45°
- 90°

Q. 28 In a series RLC circuit, if C is increased, what happens to the resonant frequency?

- it increases
- it decreases
- it remains the same
- it is zero.

Q. 29 What values of L and C should be used in a tank circuit to obtain a resonant frequency of 8 KHz? The bandwidth must be 800 Hz. The winding resistance of the coil is 10Ω.

- 1.99 mH, 0.2μF
- 1.99 mH, 10μF
- 2mH, 1μF
- 10H, 0.2μF

Q. 30 The reactance of a 1μF capacitor connected to d.c. supply is:

- 1 ohm
- Infinite
- 0
- 10⁶ ohm

Q. 31 An a.c. network has two sources. The application of superposition theorem gives the currents due to the two sources, through a branch as 5∠45° A and 5∠90° A. The total current in the branch is:

- 10 A
- 2.32∠30°
- 9.24∠67.5°
- 0

Q. 32 The value of α in a transistor is

- 1
- less than 1 but greater than 0.9
- about 0.5
- 10

Q. 33 A choke coil having resistance R ohms and of L Henry is shunted by a capacitor of C Farads. The dynamic impedance of the resonant circuit be

- $\frac{C}{LR}$
- $\frac{L}{RC}$
- $\frac{R}{LC}$
- $\frac{1}{RLC}$

Q. 34 A network contains linear resistors and ideal voltage sources. If values of all the resistors are doubled, then voltage across each resistor is

- halved
- doubled
- increased by four times
- not changed

Q. 35 The graph of an electrical network has N nodes and B branches. The number of links, L with respect to the choice of tree, is given by

- B + N
- B - N + 1
- N - B + 1
- N - 2B - 1

Q. 36 A network is said to be linear if and only if response is proportional to the excitation function

- principle of superposition applies
- principle of homogeneity applies
- principles of superposition and homogeneity only

Q. 37 A capacitor used for power factor correction in single –phase circuit

- decreases power factor
- decreases line current
- decreases line current and power factor
- decreases line current and increases power factor

Q. 38 Two port networks are connected in cascade. The combination is to be represented as a single two-port network. The parameters of the network are obtained as by multiplying the individual

- z - parameter matrix
- h - parameter matrix
- y - parameter matrix
- ABCD parameter matrix

Q. 39 A passive two-port network is in a steady-state. Compared to its input, the steady state output can never offer

- higher voltage
- lower impedance
- greater power
- better regulation

Q. 40 A two-port network is symmetrical if

- $z_{11}z_{22} - z_{12}z_{21} = 1$
- $AD - BC = 1$
- $h_{11}h_{22} - h_{12}h_{21} = 1$
- $y_{11}y_{22} - y_{12}y_{21} = 1$

Q. 41 In a synchronous machine, the induced emf phasor

- leads the flux phasor by 90°.
- is in phase with flux phasor.
- lags behind the flux phasor by 90°.
- is in phase opposition to flux phasor.

Q. 42 In a motoring synchronous machine as observed from stator, the armature mmf phasor

- lags behind the armature current phasor by 90°
- leads the armature current phasor by 90°
- is in phase with the armature current phasor.
- is in phase opposition to the armature current phasor.

Q. 43 Short circuit ratio of a synchronous machine is defined as the ratio of

- field current required to produce rated voltage on full-load and field current required to produce rated current on SC.
- field current required to produce rated voltage on OC and field current required to produce rated current on SC.
- field current required to produce rated voltage on SC and field current required to produce rated current on SC.
- field current required to produce rated voltage on full-load and field current required to produce rated voltage on SC.

Q. 44 Why are pole tips in a dc machine chamfered?

- To improve commutation characteristics
- To reduce armature reaction effect
- To achieve nearly sinusoidal air-gap flux density distribution
- To increase induced emf per coil.

Q. 45 What counters commutation in a dc machine?

- coil leakage inductance
- armature reaction
- Brush resistance
- interpoles

Q. 46 A 10 V battery with an internal resistance of 1Ω is connected across a non-linear load whose characteristic is given by $7i = v^2 + 2v$. The current delivered by battery is

- 2.5A
- 5A
- 6A
- 7A

Q. 47 If a capacitor is energized by a symmetrical square wave current source, then the steady state voltage across capacitor will be a

- square wave
- triangular wave
- step function
- impulse function

Q. 48 Two incandescent light bulbs of 40W and 60W rating are connected in series across the mains. Then

- the light bulbs together consume 100W
- the light bulbs together consume 50W
- the 40 W light bulb glows brighter
- the 60 W light bulb glows brighter

Q. 49 Five cells are connected in series in a row and then four such rows are connected in parallel to feed the current to a resistive load of 1.25Ω . Each cell has emf 1.5V with internal resistance of 0.2Ω . The current through the load will be

- 3.33 A
- 23.33A
- 5A
- 1A

Q.50 Four resistances 80Ω , 50Ω , 25Ω and R are connected in parallel. Current through 25Ω resistance is 4A. Total current of supply is 10A. The value of resistance R will be

- 66.66 Ω
- 40.25 Ω
- 36.36 Ω
- 76.56 Ω

Q. 51 Currents i_1 , i_2 and i_3 meet at a junction (node) in a circuit. All currents are marked as entering the node. If $i_1 = -6 \sin \omega t$ mA and $i_2 = 8 \cos \omega t$ mA, then i_3 will be

- $10 \cos (\omega t + 36.87^\circ)$ mA
- $14 \cos (\omega t + 36.87^\circ)$ mA
- $-10 \cos (\omega t + 36.87^\circ)$ mA
- $-14 \cos (\omega t + 36.87^\circ)$ mA

Q. 52 The voltage phasor of a circuit is $10\angle 15^\circ$ V and the current phasor is $2\angle 45^\circ$ A. The active and reactive powers in the circuit are

- 10W and 17.32 V Ar
- 5 W and 8.66 V Ar
- 20W and 60 V Ar
- 28.28W and 14.14 V Ar

Q. 53 A capacitor used for power factor correction in single-phase circuit

- decreases the power factor
- decreases the line current
- decreases both the line current and the power factor
- decreases the line current and increases the power factor

Q. 54 The circulating current in a parallel LC circuit at any resonant frequency is

- directly proportional to frequency
- inversely proportional to frequency
- independent of frequency
- none of above

Q. 55 Two perfectly coupled coils each of one Henry self inductance are connected in parallel so as to oppose each other. The overall inductance in Henry is

- 2
- 1
- 0.5
- zero

Q. 56 An alternator is delivering power to a balanced load at unity power factor. The phase angle between the line voltage and the line current is

- 90°
- 60°
- 30°
- 0°

Q. 57 When two wattmeter method of measurement of power is used to measure power in a balanced three phase circuit. If the wattmeter reading is zero, the

- (a) power consumed in the circuit is zero.
- (b) power factor of the circuit is zero.
- (c) power factor is unity
- (d) power factor is 0.5

Q. 58 A network has 10 nodes and 17 branches in all. The number of independent node pair voltage would be

- (a) 9
- (b) 7
- (c) 10
- (d) 45

Q. 59 A two-port network is defined by the relations

$$I_1 = 2V_1 + V_2 \text{ and } I_2 = 2V_1 + 3V_2 \text{ then } Z_{12} \text{ is}$$

- (a) -2Ω
- (b) -1Ω
- (c) -0.5Ω
- (d) -0.25Ω

Q. 60 In a parallel RLC circuit, if $L = 4H$, $C = 0.25F$ and $R = 4\Omega$, then the value of Q at resonance will be

- (a) 1
- (b) 10
- (c) 20
- (d) 40

Q. 61 the surge impedance of 50 miles long underground cable is 50 ohms. For a 25 miles length it will be

- (a) 25 ohms
- (b) 50 ohms
- (c) 100 ohms
- (d) None of these

Q. 62 For a load flow solution the quantities normally specified at a voltage controlled bus are

- (a) P and Q
- (b) P and magnitude of V
- (c) Q and magnitude of V
- (d) P and δ

Q. 63 For reducing tower footing resistance it is better to use:

- (a) Chemical and ground rods only
- (b) Chemical and counterpoise only
- (c) Ground rods and counterpoise only
- (d) Chemical, ground rods and counterpoise

Q. 64 The positive, negative and zero sequence impedances of a solidly grounded system under steady state condition always follows the relations:

- (a) $Z_1 > Z_2 > Z_0$
- (b) $Z_1 < Z_2 < Z_0$
- (c) $Z_0 < Z_1 < Z_2 >$
- (d) None of above

Q. 65 Mho relay is normally used for protection of:

- (a) Long length transmission lines
- (b) Medium length transmission lines
- (c) Short length transmission lines
- (d) No length criterion

Q. 66 The good effect of corona on overhead lines is to

- (a) increase the line carrying capacity due to conducting ionized air envelop around the conductor
- (b) increase the power factor due to corona loss
- (c) reduce the steepness of surge fronts
- (d) reduce the radio interference from the conductor

Q. 67 If the current is 2000 amps, the relay setting 50% and C.T. ratio is 40/5, then the plug setting multipliers will be:

- (a) 25 amps
- (b) 15 amps
- (c) 50 amps
- (d) None of the above

Q. 68 The p.u. impedance value of an alternator corresponding to base values 13.2bkV and 30 MVA is 0.2 p.u. The p.u. value for the base value 13.8kV and 50 MVA.

- (a) 0.306 p.u.
- (b) 0.33 p.u.
- (c) 0.318 p.u.
- (d) 0.328 p.u.

Q. 69 Ferranti effect on long overhead lines is experienced when it is:

- (a) Lightly loaded
- (b) on full load at unity p.f.
- (c) on full load at 0.8 lag
- (d) In all these cases

Q. 70 For an existing a.c. transmission line the string efficiency is 80%. Now if d.c. voltage is supplied for the same set up, the string efficiency will be:

- (a) 80%
- (b) More than 80%
- (c) Less than 80%
- (d) 100%

Q. 71 The objective of a research is

- (a) Theoretical
- (b) Factual
- (c) Practical
- (d) all of above

Q. 72 Experimental research deals with

- (a) Variables
- (b) Controls
- (c) Scientific inference
- (d) all of above

Q. 73 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

Q. 74 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

- Q. 75 The principles formulated by the fundamental research are used in
- (a) applied research
 - (b) philosophical research
 - (c) action research
 - (d) none of these
- Q. 76 The problem can be stated as
- (a) posing a question
 - (b) making a declarative statement
 - (c) both of above
 - (d) none of above
- Q. 77 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
- Q. 78 Synopsis of a research is
- (a) Blue print of research
 - (b) Summing of research
 - (c) Extract of research
 - (d) a plan of research
- Q. 79 A good synopsis is considered as
- (a) a half way research
 - (b) a complete research
 - (c) a partial research
 - (d) a beginning of research
- Q. 80 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
- Q. 81 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
- Q. 82 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
- Q. 88 “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
- Q. 89 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
- Q. 90 Which of the journal is not related to Electrical Engineering?
- (a) IEEE Transactions on Power Systems
 - (b) ASME
 - (c) Electric Power Research System
 - (d) Electric Power Components and Systems