Examination: **Ph.D Electrical and Electronics Engineering**

SECTION 1 - SECTION 1

Question No.1

HVDC transmission is preferred to EHVAC because

- VAr compensation is not required for HVDC systems
- harmonic problem is avoided
- system stability can be improved
- HVDC terminal equipments are expensive

Question No.2

Class E-Commutation is also known as

- Electronic Commutation
- Elevated Commutation
- External Pulse Commutation
- Extra point Commutation

Question No.3

The device which exhibits negative resistance characteristics is

- UJT
- Thyristor
- Diode
- SCR

Question No.4

The trace and determinant of a 2 x 2 matrix are known to be -2 and -35 respectively. Its eigen values are

- -30 and -5
- -7 and 5
- -35 and -1
- 17.5 and -2

Question No.5

Surge current is

- A current appears with short interval of transient current during short circuit
- a current with less amplitude
- A current appears with long interval of transient current during short circuit
- a current with high frequency

Question No.6

The input of an A.C. circuit having power factor of 0.8 lagging is 40 kVA The power drawn by the circuit is

- 64 kW
- 22 kW
- 12 kW
- 32 kW

Question No.7

Three phase squirrel cage induction motor has a starting current of seven times the full load current and full load slip of 5%. If a star-delta starter is used to start this induction motor, the per unit starting torque will be

- 0.816
- 1.616
- 1.225
- 0.607

Question No.8

The following is true

- a bounded signal always possess finite energy
- a bounded signal is always finite
- a bounded signal is always zero outside the interval [-t0, t0] for some t0
- a finite signal is always bounded

Question No.9

In three phase Inverter the Phase voltages are

- 180 degree out of phase with each other
- 120 degree out of phase with each other
- 140 degree out of phase with each other
- 160 degree out of phase with each other

Question No.10

A single phase inverter has square wave output voltage. What is the percentage of the fifth harmonic component in relation to the fundamental component

- 30%
- 20%
- 10%
- 40%

Question No.11

The effect of stray magnetic fields on the actuating torque of a portable instrument is maximum when the operating field of the instrument and the stray fields are

- perpendicular
- inclined at 60 deg
- inclined at 30 deg
- parallel

Question No.12

A four and half digit DMM has the error specification as 0.2% of reading +10 counts. If a DC voltage of 100V is read on its 200V full scale, the maximum error that can be expected in the reading is

- ±0.2%
- ±0.4%
- ±0.1%
- ±0.3%

Question No.13

The conduction loss versus device current characteristics of a power MOSFET is best approximated by

- an exponentially decaying function
- a rectangular hyperbola
- a straight line
- a parabola

Question No.14

The concept of electrically short, medium, and long line is primarily based on the

- normal voltage of the line
- power transmitted over the line
- wavelength of the line
- physical length of the line

Question No.15

In a 400 kV power network, 360 kV is recorded at a 400 kV bus. The reactive power absorbed by a shunt reactor rated for 50 MVAr, 400kV connected at the bus is _____

- 43.5 MVAr
- 40.5 MVAr
- 42.5 MVAr
- 41.5 MVAr

Question No.16

An ideal voltage source should have

- large value of e.m.f.
- infinite source resistance
- small value of e.m.f.
- zero source resistance

Question No.17

A 4-point starter is used to start and control the speed of a

- DC series motor
- DC shunt motor with armature resistance control
- DC shunt motor with field weakening control
- DC compound motor

Question No.18

At an industrial substation with a 4 MW load, a capacitor of 2MVAr is installed to maintain the load power factor at 0.97 lag. If the capacitor bank is out of service, the load power factor will be

- 0.9 lag
- 0.85 lag
- 0.75 lag
- 0.8 lag

Question No.19

Latching current exist in

- Diac characteristics
- Thyristor characteristics

- IGBT charcteristics
- Triac characteristics

Question No.20

If $A = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$ then $\rho(A)$ is

- 2
- 0
- doesn't exist
- 1

Question No.21

An average reading DMM reads 10V when fed with a triangular wave, symmetric about the time axis. For the same input an rms reading meter will read

- $\frac{10}{\sqrt{30}}$
- $10\sqrt{30}$
- $20\sqrt{30}$
- $\frac{20}{\sqrt{3}}$

Question No.22

Slip rings are usually made of

- copper
- carbon
- aluminium
- phospor bronze

Question No.23

The Nyquist plot of a loop transfer function G(s)H(s) of a closed loop control system passes through the point (-1, j0) in the G(s)H(s) plane. The phase margin of the system is

- 180 deg
- 0 deg
- 90 deg
- 45 deg

Question No.24

A smart Power Device

- consists of gate drive circuitry and semiconductor switches fabricated on same chip
- consists of both passive elements and semiconductor switches
- consists of only diodes
- consists of power semiconductor switches

Question No.25

If any two phases for an induction motor are interchanged

- the motor will run in reverse direction
- the motor will not run
- the motor will run at reduced speed
- the motor will burn

Question No.26

According to Kirchhoff's voltage law, the algebraic sum of all IR drops and e.m.f's. in any closed loop of a network is always

- negative
- zero
- positive
- determined by battery e.m.f's.

Question No.27

Varistors are

- resistors with zero temperature coefficient
- non-linear resistors
- carbon resistors
- insulators

Question No.28

$$\int_0^{\pi} \sin^4 x \cos^5 x \, dx =$$

- 0
- $3\pi/128$
- $3\pi/256$
- $5\pi/128$

Question No.29

Tesla is a unit of

- inductance
- flux
- flux density
- field strength

Question No.30

The fourier transform of a signal h(t) is $H(j\omega)=(2\cos\omega)(\sin 2\omega)/\omega$. The value of h(0) is

- 1/2
- 1
- 2
- 1/4

Question No.31

The uniform magnetic field is

- the field of a single conductor
- the field of a dual conductor

- the field of a set of parallel conductors
- the field in which all lines of magnetic flux are parallel and equidistant

Question No.32

A thermistor has

- negative temperature coefficient
- zero temperature coefficient
- variable temperature coefficient
- positive temperature coefficient

Question No.33

The inductance and capacitance of a line are respectively 1H and 0.01 μF. If the instantaneous value of interrupted current is 10A, the voltage across the breaker contacts will be

- 100kV
- 125kV
- 75kV
- 66kV

Question No.34

$G(s)H(s) = \frac{K}{s^2+2s+2}$, the angle of departure of the RLD is

- ±135 deg
- ±0 deg
- ±180 deg
- ±90 deg

Question No.35

A DC ammeter has a resistance of 0.1Ω and its current range is 0-100A. If the range is to be extended to 0-500A, the meter requires the following shunt resistance

- 0.025Ω
- 1.0Ω
- 0.011Ω
- 0.01Ω

Question No.36

A series circuit consists of R=2.4Ω, L=25 μH, C and a thyristor. For obtaining self commutation in the circuit, the value of C should be equal to

- 50μF
- 30μF
- 10μF
- 20μF

Question No.37

Chopper is a circuit that converts

- Fixed AC to variable DC
- Fixed DC to variable DC
- AC to DC

- DC to variable AC

Question No.38

A negative sequence relay is commonly used to protect

- a bus bar
- a transformer
- an alternator
- a transmission line

Question No.39

The firing angle in thyristor converter circuit is to

- vary the frequency
- vary the amplitude
- vary the output voltage of the converter
- vary the input current of the converter

Question No.40

If $Z\{u_n\}=\frac{2z^2-3z}{3z^2+4}$ then $u_0=$

- 2/3
- 3/2
- -3/4
- 0

Question No.41

What is the making current if CB is single phase

- 100kA
- 80kA
- 204kA
- 160kA

Question No.42

A terminal where three or more branches meet is known as

- node
- anode
- combination
- terminus

Question No.43

A conductor of length L has current I passing through it, when it is placed parallel to a magnetic field. The force experienced by the conductor will be

- BLI2
- B2LI
- zero
- BLI

Question No.44

A 230V, 1kW electric heater is fed through a triac from 230V, 50Hz source. The load power for a firing angle of 70 deg is _____

- 173.4
- 137.4
- 713.4
- 731.4

Question No.45

Permissible change in power frequency is

- ±5 Hz
- ±1 Hz
- ±10 Hz
- ±0.5 Hz

Question No.46

The steady state stability limit of a transmission line is 400MW. If 30% series compensation is added to the line then the new SSSL of transmission line will be (R and C of line are neglected, voltages at both ends of line remains unchanged)

- 400MW
- 280MW
- 571.5MW
- 1333.3MW

Question No.47

In thermal power plants, the pressure in the working fluid cycle is developed by

- condenser
- turbine
- super heater
- feed water

Question No.48

Circuit turn off time is defined as the time

- for which the SCR is reverse biased by the commutation circuit
- for which the SCR is reverse biased to reduce its current below the holding current
- taken by the SCR turn off
- required for the SCR current to become zero

Question No.49

If two sinusoids of the same frequency but of different amplitudes and phase angles are subtracted, the resultant is

- a sinusoid of double the frequency
- a sinusoid of the same frequency
- not a sinusoid
- a sinusoid of half the original frequency

Question No.50

Fleming's left hand rule is used to find

- polarity of a magnetic pole
- direction of force on a current carrying conductor in a magnetic field
- direction of magnetic field due to current carrying conductor
- direction of flux in a solenoid

Question No.51

An RLC resonant circuit has a resonance frequency of 1.5 MHz and a bandwidth of 10kHz. If C=150pF, then the effective resistance of the circuit will be

- 4.7Ω
- 29.5Ω
- 9.4Ω
- 14.75Ω

Question No.52

A state space representation for the transfer function $\frac{Y(s)}{U(s)} = \frac{s+6}{s^2+5s+6}$ is $\dot{x} = Ax + Bu\ ;\ y = Cx$ where $A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ and the value of C is

- [6 1]
- [1 2]
- [1 6]
- [2 1]

Question No.53

The gain margin of a unity feedback, control system with the open loop transfer function $G(s) = \frac{s+1}{s^2}$ is

- infinite
- $\frac{1}{\sqrt{2}}$
- 0
- $\sqrt{2}$

Question No.54

An analog voltmeter uses external multiplier settings. With a multiplier setting of 20 kΩ, it reads 440V and with a multiplier setting of 80kΩ it reads 352 V. For a multiplier setting of 40kΩ, the voltmeter reads

- 394V
- 371V
- 383V
- 406V

Question No.55

If the fault current is 2kA, the relay setting is 50% and CT ratio is 400/5, then the plug setting multiplier of a relay will be

- 7

- 5
- 8
- 10

Question No.56

For harnessing low variable waterheads, the suitable hydraulic turbine with high percentage of reaction and runner with adjustable vanes is

- impeller
- pelton
- Kaplan
- francis

Question No.57

Eigen values of a matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ are

- -2, -3
- -1, -6
- 1, 6
- 2, 3

Question No.58

The gain of the amplifier without feedback is 1000, with feedback factor 0.009, the gain of the amplifier with negative feedback is

- 200
- 100
- 150
- 10

Question No.59

An ac induction motor is used for a speed control application. It is driven from an inverter with a constant V/f control. The motor name plate details are as follows: (no.of poles=2, V=415V, ph:3, f=50Hz, N=2850 rpm) The motor is run with the inverter output frequency set at 40Hz, and the with half the rated slip. The running speed of the motor is

- 2280 rpm
- 2400 rpm
- 2790 rpm
- 2340 rpm

Question No.60

If $\overline{E}$ is the electric field intensity, $\nabla\left(\nabla \times \overline{E}\right)$ is equal to

- null vector
- zero
- $\overline{E}$
- $\left|\overline{E}\right|$

Question No.61

Both inverter and converter operation can be obtained by

- semiconverters
- full wave converter by varying firing angle
- choppers
- inverters by varying firing angle

Question No.62

Which of the following circuit element stores energy in the electromagnetic field ?

- Variable resistor
- Condenser
- Resistance
- Inductance

Question No.63

Sparking occurs when a load is switched off because the circuit has high

- resistance
- impedance
- capacitance
- inductance

Question No.64

Similarity break down characteristics can be have with

- Diac
- Triac
- MCT
- Thyristor

Question No.65

The local equivalent of the HEX number AB.CD is

- 526.632
- 526.314
- 253.314
- 253.632

Question No.66

Poly phase motors are

- having low torque
- having high torque
- having high ripples
- having high impedance

Question No.67

In a 3-phase full converter, the output voltage during overlap is equal to___

- zero
- average value of the conducting phase voltages

- source voltage
- source voltage minus the inductance drop

Question No.68

A magnetic field exists around

- copper
- aluminium
- moving charges
- iron

Question No.69

An induction motor with speed of 1000 r.p.m and f=50Hz will have

- 8 poles
- 2 poles
- 6 poles
- 4 poles

Question No.70

A dc series motor driving an electric train faces a constant power load. It is running at rated speed and rated voltage. If the speed has to be brought down to 0.25p.u , the supply voltage has to be approximately brought down to

- 0.5 p.u
- 0.75 p.u
- 0.125 p.u
- 0.25 p.u

Question No.71

Which of the following can have negative temperature coefficient ?

- Compounds of silver
- Metallic alloys
- Electrolytes
- Liquid metals

Question No.72

When a program is being executed in an 8085 microprocessor, its program counter contains

- the total number of instructions in the program being executed
- the memory address of the instruction that is being currently executed
- the number of instructions in the current program that have already been executed
- the memory address of the instruction that is to be executed next

Question No.73

Semi converter is constructed with

- both diodes and Thyristor
- IGBT’s
- only Thyristors
- only diodes

Question No.74

In a three-phase induction motor, the number of poles in the rotor winding is always

- less than number of poles in stator
- zero
- equal to number of poles in stator
- more than the number of poles in stator

Question No.75

Most of the reheat units have a generation rate around

- 10%
- 0%
- infinite
- 3%

Question No.76

Latching current of a thyristor is associated with

- Forward characteristics
- not related to thyristor
- Both forward and reverse characteristics
- Reverse characteristics

Question No.77

The direction of induced e.m.f. can be found by

- Fleming's right hand rule
- Kirchhoff s voltage law
- Lenz's law
- Laplace's law

Question No.78

The magneto-motive force is

- the flow of an electric current
- the sum of all currents embraced by one line of magnetic field
- the voltage across the two ends of exciting coil
- the passage of magnetic field through an exciting coil

Question No.79

If the CLTF of a unity feedback system is $\frac{4}{s^2+7s+13}$, find the corresponding OLTF is

- $\frac{4}{s^2+7s+9}$
- $\frac{4}{s^2+5s+13}$
- $\frac{4}{s^2+5s+9}$

- $\frac{4}{s^2+7s+13}$

Question No.80

One telsa is equal to

- 1 Wb/mm^2
- 1 Wb/m
- 1 Wb/m^2
- 1 mWb/m^2

Question No.81

The transmission line distance protection relay having the property of being inherently directional is

- reactance relay
- OHM relay
- impedance relay
- MHO relay

Question No.82

The peak value of a sine wave is 200 V. Its average value is

- 141.4 V
- 200V
- 282.8 V
- 127.4 V

Question No.83

Thyristor protection can be have with

- Snubber circuit
- Capacitance
- Inductance
- Resistance

Question No.84

The 8085 assembly language instruction that stores the content of H and L registers into the memory locations 2050H and 2051H respectively, is

- SPHL 2050H
- SPHL 2051H
- SHLD 2050H
- STAX 2050H

Question No.85

Which of the fallowing inductor will have the least eddy current losses ?

- Powdered iron core
- Laminated iron core
- Iron core
- Air core

Question No.86

For the function $f(x)=x^2e^{-x}$, the maximum occurs when x is equal to

- 2
- 0
- -1
- 1

Question No.87

The static electric field in a conductor is

- cannot be determined
- infinite
- zero
- unity

Question No.88

The Biot-Savart's law is a general modification of

- Faraday's laws
- Ampere's law
- Kirchhoffs law
- Lenz's law

Question No.89

The concept on which Superposition theorem is based is

- linearity
- non-linearity
- duality
- reciprocity

Question No.90

The laplace transform of a function f(t) is $F(s)=\frac{5s^2+23s+6}{s(s^2+2s+2)}$. As $t\to\infty$, f(t) approaches

- 17/2
- 3
- 5
- ∞

Question No.91

$\int_c \bar{r}.d\bar{r}$ where C is the curve $x^2+y^2=4$

- 2
- 1
- 3
- 0

Question No.92

Three phase squirrel cage induction motor has a starting current of seven times the full load current and full load slip of 5%. If a starting torque of 0.5 per unit is required then the per unit starting current should be

- 3.75
- 3.16
- 4.65
- 2.13

Question No.93

The complete set of only those logic gates designated as universal gates is

- XNOR, NOR and NAND
- NOR and NAND
- XOR, NOR and NAND
- NOT, OR and AND

Question No.94

Three phase squirrel cage induction motor has a starting current of seven times the full load current and full load slip of 5%. If an auto transformer is used for reduced voltage starting torque, the auto transformer ratio (%) should be

- 78.25%
- 57.77%
- 72.56%
- 81.33%

Question No.95

A 400V, 15kW, 4-pole, 50Hz, Y-connected induction motor has full load slip of 4%. The output torque of the machine at full load is

- 95.50 Nm
- 624.73 Nm
- 99.47 Nm
- 1.66 Nm

Question No.96

The effective value of sinusoidal voltage is 14.14 volts and so its peak value is

- 30 volts
- 20 volts
- 7.07 volts
- 10 volts

Question No.97

A transformer transforms

- frequency
- voltage
- current
- power

Question No.98

A unity feedback closed loop system has the loop transfer function $G(s) = \frac{Ke^{-2s}}{s}$.

The system becomes stable for the range

- $0<K<\pi/4$
- $\pi/4<K<\pi/2$
- $\pi<K<2\pi$
- $\pi/4<K<\pi$

Question No.99

A high input impedance and high switching frequency operated semiconductor device is

- MOSFET
- FET
- IGBT
- Transistor

Question No.100

A three phase 11/66 kV, delta star transformer, protected by Merz-price scheme has CT ratio of 400/5 on LT side. Ratio of CT on HT side will be equal to

- 23:1
- 1:23
- 23:3
- 3:23