Program: _Electrical Engineering

Curriculum Scheme: Rev2019

Examination: TE Semester V

Course Code: EEC501 and Course Name: Electrical A C Machines-2

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks 2 Marks each.
1.	Kd is less than one (1) for
Option A:	Full pitch winding
Option B:	Short pitch winding
Option C:	Distributed winding
Option D:	Concentrated winding
2.	Which of the direct method to calculate regulation of alternator?
Option A:	EMF
Option B:	Load test
Option C:	MMF
Option D:	ASA
3.	In armature reaction, when the armature flux is perpendicular to main flux?
Option A:	Magnetization
Option B:	Demagnetization
Option C:	Cross -Magnetization
Option D:	Magnetization, demagnetization, and cross magnetization
4.	There are two alternators A and B, under which condition there might be a chance of parallel operation, considering other conditions are ideal.
Option A:	Phase sequence of A is RYB and Phase sequence of B is RBY
Option B:	Power rating of A is 20kW and Power rating of B is 10kW
Option C:	Terminal voltage of A is 415 V and Terminal voltage of B is 400 V
Option D:	Frequency of A is 50 Hz and Frequency of B is 60 Hz
5.	Two alternators sharing a common load and are working in parallel. If excitation of any one alternator changes. Which parameter remains unchanged
Option A:	Induced e.m.f.s of each alternator
Option B:	Operating power factors of each alternator
Option C:	Armature currents of each alternator
Option D:	Load current
6.	Synchronizing torque comes into operation under all of the following cases except
Option A:	Phase difference between two voltages
Option B:	Frequency difference between two voltages
Option C:	Voltage difference between two voltages
Option D:	Reduction in exciting current in one of the alternators.
7.	Synchronous motor is not self-starting because
Option A:	Rapidly reversing torque
Option B:	High resistance of field winding
Option C:	High impedance of field winding

Option D:	Low resistance of field winding
8.	Operation of Synchronous Motor at variable load and constant excitation results in
Option A:	V curve
Option B:	Inverted V curve
Option C:	O curves
Option D:	Self-starting
9.	In synchronous machine, abc to dq0 transformation is
Option A:	Three phase to Three phase transformation
Option B:	Two phase to Three phase transformation
Option C:	Three phase to Two phase transformation
Option D:	Two phase to Two phase transformation
10.	The inductance of a stator circuit varies with
Option A:	Rotor resistance
Option B:	Rotor position
Option C:	Stator resistance
Option D:	Stator losses

Q2	Solve any Four out of Six	5 marks each
A	Illustrate with phasor diagram, why OCC is a drooping curve and why short circuit characteristics is a straight line.	
B	Illustrate with neat sketches, dark lamp method of synchronizing process.	
C	What will happen if a salient pole synchronous motor running under (i) no load condition (ii) full load condition is losing its excitation?	
D	Derive equation of active output power of alternator.	
E	With neat sketches, illustrate how does damper winding reduce the hunting in synchronous machines	
F	Illustrate the Microprocessor/DSP based control scheme of BLDC motor.	

Q3	Solve any Two Questions out of Three	10 marks each
A	A 4 pole 1500 rpm, delta connected alternator has 144 slots and on each slots 24 conductors and winding is shorted by 3 slots, determine pitch factor and distribution factor for the winding and induced line voltage, if flux per pole is 0.06wb.	
B	Two station generators A and B operate in parallel. Station capacity of A is 50 MW and B is 25 MW. Full load speed regulation of A is 3% and of B is 3.5%. Calculate the load sharing. If the connected load is 50MW and no load frequency is 50Hz.	
C	A 1000KV, 1100V, star connected synchronous motor has armature resistance and reactance per phase 3.5 and 40 ohm respectively. Determine induced emf and angular retardation at UPF, 0.8 PF lag, and 0.8 PF lead.	

Q4	Solve any Two Questions out of Three	10 marks each
A	Explain effect of variation of field current and prime mover input on parallel operation of alternators.	
B	Explain slip test to determine Xd and Xq.	
C	Derive equation showing relation between power and power angle relationship and hence draw power angle characteristics.	

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	A synchronous machine is
Option A:	A single excited machine
Option B:	A double excited Machine
Option C:	Made to run at a speed less than Ns
Option D:	Generally a lagging power factor machine.
2.	Which of the following fault occurs most frequently
Option A:	Three phase fault
Option B:	LLG faults
Option C:	Double line fault
Option D:	Single line to ground faults.
3.	For the fault analysis in power system,we use symmetrical components
Option A:	The results are required in terms of symmetrical components
Option B:	The number of equations becomes smaller
Option C:	The sequence network do not have mutual coupling
Option D:	All of the above
4.	In a transmission line there is a flow of zero sequence current when
Option A:	There is an occurrence of over voltage on line due to a charged cloud
Option B:	Line to line faults
Option C:	Three phase faults
Option D:	Double line to ground fault
5.	In which type of fault listed below , the positive and negative sequence voltages are equal
Option A:	Line to line faults
Option B:	Double line to ground fault
Option C:	Single line to ground faults.
Option D:	None of the above
6.	Which of the following network gets affected by the method of neutral grounding
Option A:	Zero sequence network
Option B:	Positive sequence network
Option C:	Negative sequence network
Option D:	All of the above
7.	Transient phenomenon last in power system for a period ranging from
Option A:	Few ms to 1 second
Option B:	1 second to 2 second
Option C:	2 second to 3 second
Option D:	Greater than 3 second
8.	Lightnening arrester should be located
Option A:	Near the circuit breaker
Option B:	Away from the circuit breaker
Option C:	Near the transformer
Option D:	Away from the transformer
9.	Transients in electric circuits normally disappears within a time equal to

Option A:	4 * time constant
Option B:	2 8 time constant
Option C:	8 * time constant
Option D:	Time constant
10.	When a line to ground fault occurs,the current in a faulted phase is 100 A . the zero sequence current in this case will be
Option A:	Zero
Option B:	33.3 A
Option C:	66.6 A
Option D:	100 A

Q 2	Solve any Two Questions out of Three 10 marks each
A	Derive the equation for fault current for LG fault.
B	Discuss the transients on transmission line.
C	Discuss the Phenomenon of Arcing ground.

Q 3.	Solve any Two Questions out of Three 10 marks each
A	Discuss the short circuit of synchronous Machine at loaded condition.
B	Derive the expressions of coefficients for reflection and refraction of travelling waves .
C	Describe the phenomenon of corona. Explain radio interference due to corona.

Q 4.	Solve any Two Questions out of Three 10 marks each
A	*Discuss the advantages and disadvantages of corona.*
B	Explain clearly how lighting arrester is selected ? What is the best location of a lighting arrester and why?
C	*What are the various factors affecting the selection of circuit breaker.Explain Short circuit MVA.*

University of Mumbai
Examination First Half 2022 under cluster __ (Lead College: _____)
Examinations Commencing from 17th May 2022 to ___May 2022

Program: Electrical

Curriculum Scheme: Rev2016

Examination: TE Semester V
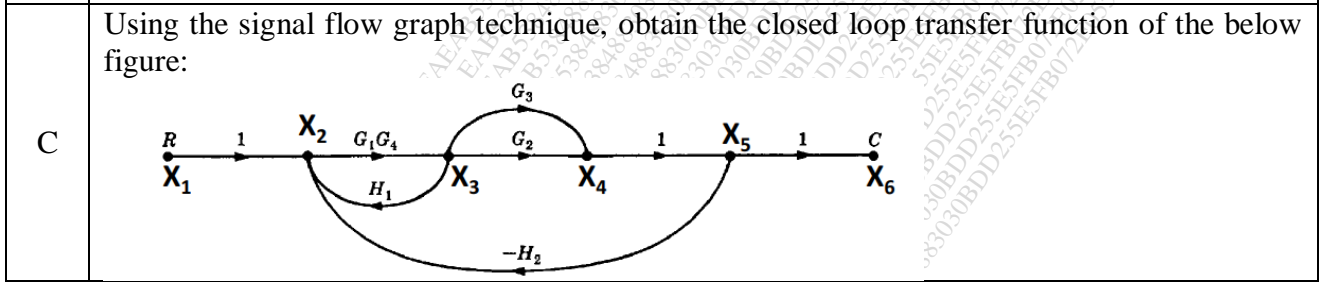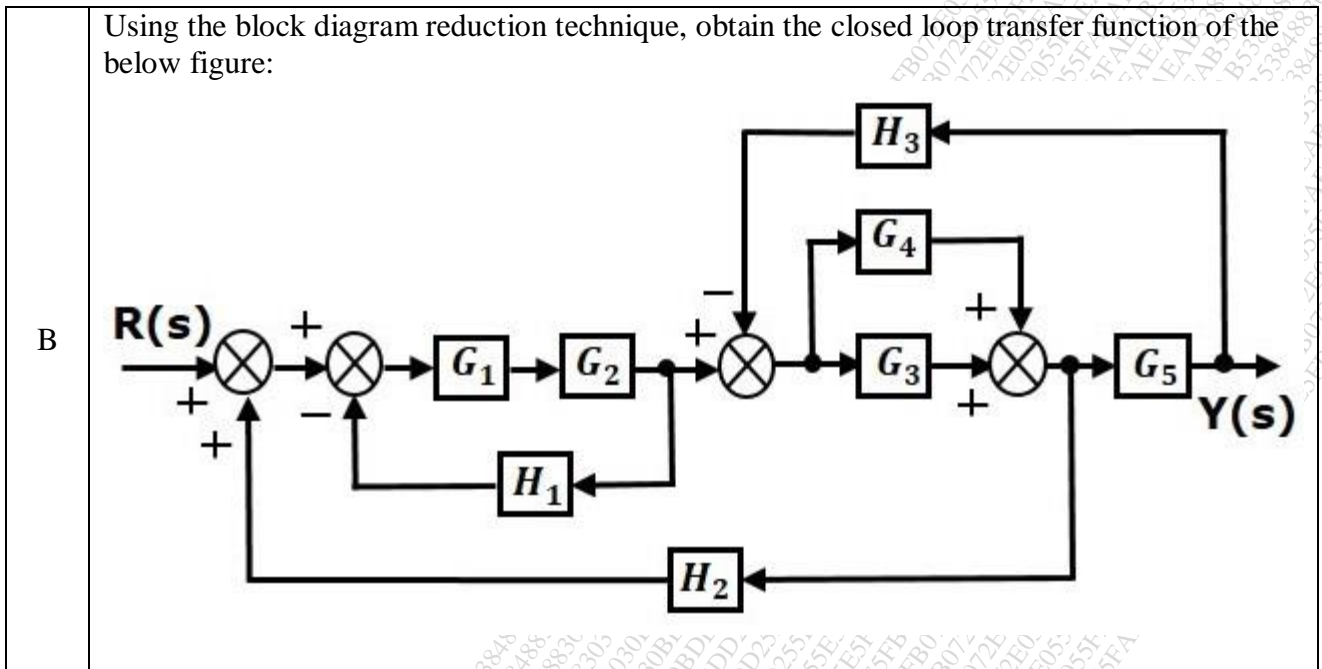
Course Code: EEC 503 and Course Name: Control System

Time: Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The relation between output response and input signal in closed loop system is :
Option A:	Exponential
Option B:	same
Option C:	Linear
Option D:	Nonlinear
2.	Basically, poles of transfer function are the laplace transform variable values which causes the transfer function to become _____
Option A:	Zero
Option B:	Unity
Option C:	Infinite
Option D:	Average value
3.	If finite number of blocks are connected in series or cascade configuration, then how are the blocks combined algebraically?
Option A:	By addition
Option B:	By multiplication
Option C:	By differentiation
Option D:	By integration
4.	Laplace transform of unit impulse signal is
Option A:	A/S
Option B:	A
Option C:	1/S
Option D:	1
5.	The steady state acceleration error for a type 1 system is
Option A:	zero
Option B:	unity
Option C:	between zero and unity
Option D:	infinite
6.	For Nyquist contour, the size of radius is _____
Option A:	25
Option B:	1
Option C:	0

Option D:	∞
7.	Which among the following constitute the state model of a system in addition to state equations?
Option A:	Input equations
Option B:	Output equations
Option C:	State trajectory
Option D:	State vector
8.	According to properties of state transition matrix, Ø (0) = ?
Option A:	Zero
Option B:	Non-zero
Option C:	I
Option D:	Negative
9.	Which one of the following is not the property of root loci?
Option A:	The root locus is symmetrical about imaginary axis
Option B:	They start from the open loop poles and terminate at the open loop zeroes
Option C:	The breakaway points are determined from dK/ds = 0
Option D:	Segments of the real axis are the part of the root locus if and only is the total number of real poles and zeroes to their right is odd.
10.	10. If the unity feedback system is given by the open loop transfer function G(s) = $ks^2 / [(1 + 0.3s) (1 + 0.05s)]$, what would be the initial slope of magnitude plot?
Option A:	20 dB/decade
Option B:	40 dB/decade
Option C:	60 dB/decade
Option D:	80 dB/decade

Q2	Solve any two out of three	10 marks each
A	Compare Open and Closed loop System with examples.	

B	Using the block diagram reduction technique, obtain the closed loop transfer function of the below figure:
C	Using the signal flow graph technique, obtain the closed loop transfer function of the below figure:

Q3.	Solve any two out of three	10 marks each
A	The unity feedback system is characterized by an open loop transfer system $G(s)= 10/(S+2)$ $(s+5)$. Determined damping ratio, undamped natural frequency of oscillation.. What is the percentage overshoot of the response to a unit step input	
B	Find the value of K_{mar} by using Routh Hurwitz for $s^3+18s^2+77s+K=0$	
C	Find the state space Model for the system $Y(S)/U(S)= 1/(s^2+s+1)$	

Q4.	Solve any two out of three	10 marks each

A	Discuss the stability of system using Root Locus. $$G(s)H(s) = 20/S(S+2)(S+4)$$	
B	For unity feedback system having G(s) = (s+20)/ (s+1) (s+50) (s+7), sketch Bode plot and find Wgc, Wpc, GM and PM. Also comment on stability.	
C	For a certain control system: $G(s)H(s) = \dfrac{k}{s(s+5)(s+10)}$. Sketch the Nyquist plot and hence calculate the range of values of k for stability.	

University of Mumbai
Examination First Half 2022
Examinations Summer 2022
Program: **Electrical Engineering**
Curriculum Scheme: Rev2019
Examination: TE Semester V
Course Code: EEC504 and Course Name: Electromagnetic Field and Wave

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The curl of the electric field intensity is
Option A:	Conservative
Option B:	Rotational
Option C:	Divergent
Option D:	Static
2.	For Static magnetic field
Option A:	$\nabla \times B = \rho$
Option B:	$\nabla \times B = \mu J$
Option C:	$\nabla \times B = \mu_0 J$
Option D:	$\nabla \times B = 0$
3.	Give the cylindrical co-ordinates of the point 'P' whose Cartesian co-ordinates are x=1,y=√3 and z=4 units
Option A:	$r = 2, \emptyset = 30°, z = 4$
Option B:	$r = 3, \emptyset = 45°, z = 4$
Option C:	$r = 4, \emptyset = 90°, z = 4$
Option D:	$r = 2, \emptyset = 60°, z = 4$
4.	If $\vec{E}$ is an electric field and $\vec{B}$ is magnetic induction, then the energy per unit time in electromagnetic field is given by
Option A:	$E^2 + B^2$
Option B:	$\vec{E} . \vec{B}$
Option C:	$\vec{E} \times \vec{B}$
Option D:	E/B
5.	Magnetic flux will be _____ if the surface area vector of a surface is perpendicular to the magnetic field.
Option A:	Zero
Option B:	Unity
Option C:	Close to maximum
Option D:	Maximum
6.	Electric field intensity (E) at any point in an electric field is equal to
Option A:	Potential gradient
Option B:	(Potential Gradient)^2
Option C:	(Potential Gradient)$^{1/2}$
Option D:	(Potential Gradient)$^{1/3}$
7.	When a potential satisfies Laplace equation, then it is said to be
Option A:	Solenoidal

Option B:	Divergent
Option C:	Harmonic
Option D:	Lamellar
8.	Line integral of an electric field around a closed path is _____
Option A:	Infinity
Option B:	Unity
Option C:	Finite
Option D:	Zero
9.	If $\bar{J}$ is current density of ρ is the electric charge density then the equation $\bar{J} + \frac{\partial \rho}{\partial t}$ represents
Option A:	Poisson's equation
Option B:	Continuity equation
Option C:	Laplace equation
Option D:	Wave equation
10.	Transform the vector $A = y\widehat{x} + (x + z)\widehat{ay}$ located at point (-2,6,3) into cylindrical coordinates
Option A:	(6.325,-71.57,3)
Option B:	(6325,71.57,3)
Option C:	(6.325,73.57,3)
Option D:	(6.325,-73.57,3)

Q2	Solve any Two Questions out of Three 10 marks each
A	Derive the Maxwell wave equations.
B	A line charge, $\rho_L = 50nC/m$, is located along the line x=2, y=5, in free space. (a) Find $\bar{E}$ at $P(1,3,-4)$. (b) If the surface x=4 contains a uniform surface charge density, $\rho_s = 18nC/m^2$, at what point in the z=0 plane is $\bar{E}_{total} = 0$.
C	Assume a homogeneous material of infinite extent with $\varepsilon = 2 X 10^{-10} \frac{F}{m}, \mu = 1.25 X 10^{-5} H/m$ and $\sigma = 0$. Let $\bar{E} = 400\cos(10^9 t - kz)\widehat{a_z} V/m$. If all the fields vary sinusoidally (or cosinusoidaly), use Maxwell's equations to find $\bar{D}, \bar{B}, \bar{H}$ and k.

Q3	Solve any Two Questions out of Three 10 marks each
A	A surface current density, $K = 20\widehat{a_x} A/m$, flows in the y=0 plane throughout the region -5 < z < 5m, -∞ < x < ∞. Find $\bar{H}$ at P(0,10,0) in free space.
B	Derive the expression for curl of magnetic field intensity.
C	Given the points $P(\rho = 5, \varnothing = 60°, z = 2)$ and $Q = (\rho = 2, \varnothing = 110°, z = -1)$; (a) find the distance $\left|\bar{R}_{PQ}\right|$; (b) give a unit vector in Cartesian coordinates at P that is directed towards Q; (c) give a unit vector cylindrical coordinates at P that is directed towards Q.

Q4	Solve any Two Questions out of Three 10 marks each
A	Derive the Laplace equation.
B	Find the work done in moving a 5µC charge from the origin to P(2,-1,4) through the field $\bar{E} = 2xyz\widehat{a_x} + x^2 z\widehat{a_y} + x^2 y\widehat{a_z} V/m$ via the path: (a) Straight line segments (0,0,0) to (2,0,0) to (2,-1,0) to (2,-1,4) (b) Straight line x=-2y, z=2x (c) Curve $x = -2y^3, z = 4y^2$.

C	Let $\overline{H} = -y(x^2 + y^2)\hat{a}_x + x(x^2 + y^2)\hat{a}_y$ A/m in the z=0 plane for $-5 \le x \le 5$m and $-5 \le y \le 5$m. Find the total current passing through the z=0 plane in the $\hat{a}_z$ direction inside the rectangle $-1 < x < 1$ and $-2 < y < 2$ by two different methods.

University of Mumbai
Examination First Half 2022
Examinations Commencing from 17th May 2022 to4thJune 2022
Program: **Electrical Engineering**
Curriculum Scheme: Rev2019
Examination: TE SemesterV
Course Code: EEDO5011and Course Name: Renewable Energy Sources

Time: 2hour 30 minutes Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	What is connect across PV cell to protect photovoltaic cells from against the destructive effects of cell shading?
Option A:	Resistance
Option B:	Blocking diode
Option C:	Bypass diode
Option D:	capacitor
2.	Conventional source are called _____ sources of energy.
Option A:	Renewable
Option B:	Non-Renewable
Option C:	both Renewable and non-Renewable
Option D:	Geothermal energy
3.	For High head applications _____turbines are used.
Option A:	Pelton
Option B:	Kaplan
Option C:	Fransis
Option D:	Propeller
4.	Solar cell works based on
Option A:	Laser technology
Option B:	Photo-conduction
Option C:	Thermal emission
Option D:	Tyndall effect
5.	Which renewable energy source contributes the power generation most in India ?
Option A:	Wind
Option B:	Solar
Option C:	Biomass
Option D:	Geothermal
6.	The Geothermal energy is obtained in the form of _____
Option A:	Light
Option B:	Protons
Option C:	Photons
Option D:	Heat
7.	In the open cycle OTEC, which working fluid is used?
Option A:	Ammonia
Option B:	water
Option C:	Propane

Option D:	Isobutane
8.	How is OTEC caused?
Option A:	By wind energy
Option B:	By geothermal energy
Option C:	By solar energy
Option D:	By gravitational force
9.	Which of the following converts energy from the combustion of fuel directly to the electrical energy?
Option A:	Ni-Cd cell
Option B:	Dynamo
Option C:	Fuel cell
Option D:	Electrolytic cell
10.	Which part of the wind turbines senses wind speed, wind direction, shaft speed and torque?
Option A:	Turbine blade
Option B:	Shaft
Option C:	Rotor
Option D:	Controller

Q2. (20 Marks Each)	Solve any Four out of Six5 marks each
A	Illustrate the phenomenon of hot spots in PV module.
B	Illustrate advantages and disadvantages of a horizontal axis wind turbine (HAWT)
C	Write a short note on: Solid oxide fuel cell
D	Describe the working principle of a tidal energy power generation
E	What are the different ways to use solar thermal energy? Describe any one of them in brief with the help of neat diagram
F	State and compare various renewable energy sources. What is the possibility of mitigating the problem faced due to fossil fuels with the integration of renewable energy?

Q3. (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Explain the following technologies: i) Wave energy ii) Pumped hydro storage system
B	Explain the working of a wind energy system (WES) with its various components. What are the different power converter topologies used for WES? Explain anyone in detail.
C	Draw I-V (current v/s voltage) and P-V (power v/s voltage) characteristics of a solarPV cell and clearly mark all essential parameters on it. What is the impact of change in solar radiation and temperature on solar PV characteristics?

Q4. (20 Marks Each)	
A	**Solve any two** **5 marks each**
i.	Explain the concept of mismatch in Solar PV module.
ii.	Write a short note on : Biomass energy
iii.	Explain the concept of aerofoils in wind energy system (WES).
B	**Solve any One** **10 marks each**
i.	Describe the principle of operation of Proton Exchange Membrane Fuel Cell (PEMFC) along with its electrical characteristics. Illustrate how PEMFC can fedpower to three phase AC standalone load.
ii.	What is MPPT in solar system? Explain any one MPPT algorithm.

University of Mumbai

Program: BE ELECTRICAL Engineering
Curriculum Scheme: Revised 2016
Examination: Third Year Semester V
Course Code: EEC501   Course Name:PS-II

Examinations Summer 2022

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Single line diagram of which of the following power system is possible?
Option A:	Power system with LG fault
Option B:	Balanced power system
Option C:	Power system with LL fault
Option D:	Power system with LLG fault
2.	If all the sequence voltages at the fault point in a power system are equal, then fault is _____
Option A:	LLG fault
Option B:	Line to Line fault
Option C:	Three phase to ground fault
Option D:	LG fault
3.	The per unit impedance of a synchronous machine is 0.25 pu. The machine is rated 10MVA. The short circuit capacity of the machine is_____MVA
Option A:	25
Option B:	50
Option C:	100
Option D:	40
4.	Calculate $a-a^2$ =? In symmetrical component theory
Option A:	1.732j
Option B:	-1.732j
Option C:	0
Option D:	1
5.	The most common type of fault is
Option A:	3 phase short together
Option B:	Double line to Ground
Option C:	Double line fault
Option D:	Single line to ground
6.	What is the sum of (IB+IY) in case of line-line fault , if fault is occurring in B and Y lines
Option A:	Infinity
Option B:	0
Option C:	1
Option D:	2
7.	If the travelling wave travels along a loss free overhead line does not result in any reflection after it has reached the far end , then the far end of the line is_____
Option A:	Open circuited
Option B:	Short circuited
Option C:	Terminated into resistance
Option D:	Terminated into capacitance

8.	The insulation characteristics of protective device is _____ to that of insulation characteristics of equipment's under protection
Option A:	below
Option B:	above
Option C:	inline
Option D:	Not comparable

9.	Corona loss is less when the shape of the conductor is
Option A:	Circular
Option B:	Flat
Option C:	Oval
Option D:	Independent of Shape

10.	The effect of dirt on the surface of the conductor is to _____ irregularity and thereby _____ the breakdown voltage
Option A:	Decreases, reduces
Option B:	Increases, increases
Option C:	Increases, reduces
Option D:	Decreases, increases

Q2, (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Explain the sequence impedance and sequence network of transmission line
B	Write an algorithm for sort circuit studies
C	Illustrate working principle of Lightning Arrestor and explain any one type of arrestor in detail.

Q3 (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Discuss the Fortesque theorem for symmetrical component analysis
B	What are power system transients? Explain capacitance switching and current chopping phenomenon.
C	Why is insulation co-ordination required? Explain insulation co-ordination based on lightning.

Q4, (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Discuss the generation of voltage and current travelling waves on short circuited line with figure and equations.
B	Derive the equation of fault current and sequence network for Double line to Ground Fault. State the various assumptions in calculation.
C	Discuss the generation and formation of corona ring and corona pulses in EHV lines.

University of Mumbai
Examination First Half 2021
Examinations Commencing from Mar-June2022
Program: Electrical Engineering
Curriculum Scheme: Rev2016
Examination: TE Semester V
Course Code: Electrical Machines III and Course Name: EEC502

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In an induction motor, no-load the slip is generally
Option A:	Less than 1%
Option B:	5%
Option C:	2%
Option D:	4%
2.	The starting torque of a squirrel-cage induction motor is
Option A:	Full-load torque
Option B:	Slightly more than full-load torque
Option C:	Low
Option D:	Negligible
3.	The good power factor of an induction motor can be achieved if the average flux density in the air gap is
Option A:	Infinity
Option B:	Large
Option C:	Absent
Option D:	Small
4.	In a split-phase motor, the running winding should have
Option A:	High resistance and low inductance
Option B:	High resistance and High inductance
Option C:	Low resistance and high inductance
Option D:	Low resistance and low inductance
5.	If an induction motor with certain ratio of rotor to stator slots, runs at 1/7 of the normal speed, the phenomenon will be termed as
Option A:	Humming
Option B:	Hunting
Option C:	Cogging
Option D:	Crawling
6.	Which of the following motor will have a relatively higher power factor?
Option A:	Capacitor run motor
Option B:	Shaded pole motor
Option C:	Capacitor start motor
Option D:	Split phase motor

7.	The condition for maximum running torque in 3-phase Induction motor is
Option A:	R= S × X/2
Option B:	R = X/2
Option C:	R =X × S
Option D:	R =X
8.	For controlling the speed of an induction motor, if the supply frequency is reduced by 10% then to maintain the same magnetizing current the supply voltage should be
Option A:	Increased by 10%
Option B:	Decreased by 10%
Option C:	Increased by 20%
Option D:	Decreased by 20%
9.	Semi-closed slots or totally closed slots are used in induction motors to improve
Option A:	Starting current
Option B:	Starting Torque
Option C:	Power Factor
Option D:	Pull-out Torque
10.	In case of induction motors, the ratio of core length to pole pitch for minimum cost is taken as
Option A:	2 – 3
Option B:	1.5 – 2
Option C:	3 – 5
Option D:	4 – 6

Q2 (20 Marks Each)	Solve any Four out of Five 5 marks each
A	How a rotating magnetic field is created in a 3-phase induction motor?
B	Enlist the types of 1-Φ Induction motors and their applications.
C	What is the significance of magnetic loading?
D	What is the significance of B60 in Induction machine design?
E	Why the induction motor is called as a poor power factor machine? Also explain why it is called as a generalised transformer?

Q3 (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Draw the equivalent circuit of 3 phase induction motor and state the relevance of each parameter. Write the equation for the mechanical power developed.
B	Discuss the effects of dispersion coefficient on maximum power factor and on overload capacity of 3 ph Induction motor.
C	What is frame and frame size in case of Induction motor? Draw a figure showing structural dimensions of standard flame?

Q4. (20 Marks Each)	Solve any Two Questions out of Three 10 marks each
A	Determine the main dimensions, turns per phase, number of slots of a 250 Hp, 3ph, 50Hz, 400V, 1410rpm, slip ring induction motor. Assume B_{av} = 0.5 Wb/ m², ac = 30000 A/m, efficiency = 0.9 and power factor = 0.9, winding factor = 0.955, current density = 3.5 A/mm². The slot space factor is 0.4 and the ration of core length to pole pitch is 1.2. The machine is delta connected.
B	Explain the calculation of leakage reactance for parallel sided stator slot of induction motor
C	Illustrate working of star- delta starter with neat diagram. State its function.

Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry 2 marks each**
1.	.... is the time required for the anode current to rise from 10% to 90% of thyristor ON state current
Option A:	Turn on time (ton)
Option B:	Delay time (td)
Option C:	Rise time (tr)
Option D:	Turn off time (toff)
2.	The output characteristics of IGBT is similar to ......
Option A:	Power BJT
Option B:	Power MOSFET
Option C:	SCR
Option D:	Diode
3.	.... is used for overcurrent protection of SCR
Option A:	Fuse only
Option B:	MOV and Circuit Breaker
Option C:	Fuse and Circuit Breaker
Option D:	Capacitor
4.	Freewheeling diodes are needed in controlled rectifiers when the load is ……...
Option A:	R load
Option B:	L load
Option C:	Both R and L loads
Option D:	R-L load
5.	The voltage gain of Buck-Boost DC to DC converter is unity for duty cycle is equal to …….
Option A:	0.1
Option B:	0.5
Option C:	0.7
Option D:	1
6.	Among the following, which is a Wide Band gap device?
Option A:	Si Diode
Option B:	Si MOSFET
Option C:	Silicon Carbide MOSFET
Option D:	IGBT
7.	Inverters convert ……
Option A:	AC to DC
Option B:	AC to AC
Option C:	DC to DC
Option D:	DC to AC
8.	…………. technique is commonly used for better quality output in inverters for generating switching pulses
Option A:	Sinusoidal PWM
Option B:	Single pulse PWM

Option C:	Square wave
Option D:	Quasi-sine wave
9.	In ………. converter output voltage is always lesser than input voltage
Option A:	Boost
Option B:	Buck
Option C:	Buck-Boost
Option D:	Cuk
10.	The isolation between control and power circuit is provided by ………. in driver IC, HCPL 3120.
Option A:	pulse transformer
Option B:	opto coupler
Option C:	isolation transformer
Option D:	50Hz transformer

Q2.	**Solve any Four out of Six** **5 marks each**
A	Draw the V-I characteristics of SCR and show all three modes of operation, break over voltage, latching current and holding current.
B	Compare power BJT & IGBT
C	What are the drawbacks of half wave controlled rectifier with single SCR?
D	Compare single phase half bridge and full bridge inverter
E	What is bidirectional DC-DC converter? What are its applications?
F	What is a matrix converter?
Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Describe the operation of a single phase fully controlled rectifier for R load with neat diagrams.
B	Describe the operation of Boost DC-DC converter with neat diagrams.
C	Draw the diagram of single-phase half bridge rectifier (semi controlled) for R-L load, draw the supply and load voltage. Derive the average output voltage.
Q4.	**Solve any Two Questions out of Three** **10 marks each**
A	Describe any two PWM technique used in Inverter
B	Describe the application of any one DC-DC converter with neat diagrams.
C	Describe the operation of any two commutation circuit of SCR