University of Mumbai
Examination 2020 under cluster 3 (Lead College: FCRIT)
Examinations Commencing from 7th January 2021 to 20th January 2021
Program: **F.E (All branches) (Choice Based) (R-2019-20 'C' Scheme)**
Curriculum Scheme: Rev2019
Examination: FE Semester I
Course Code: FEC105 and Course Name: Basic Electrical Engineering

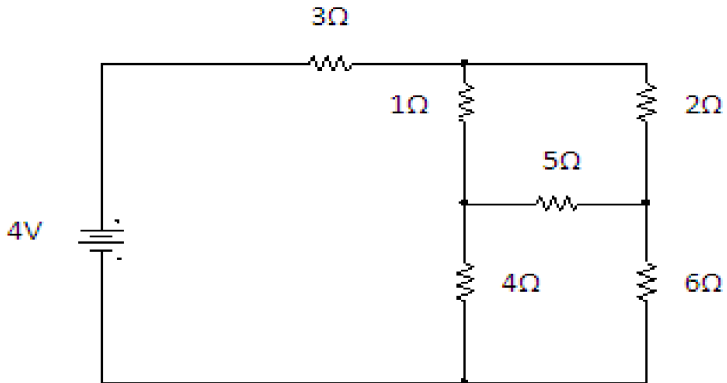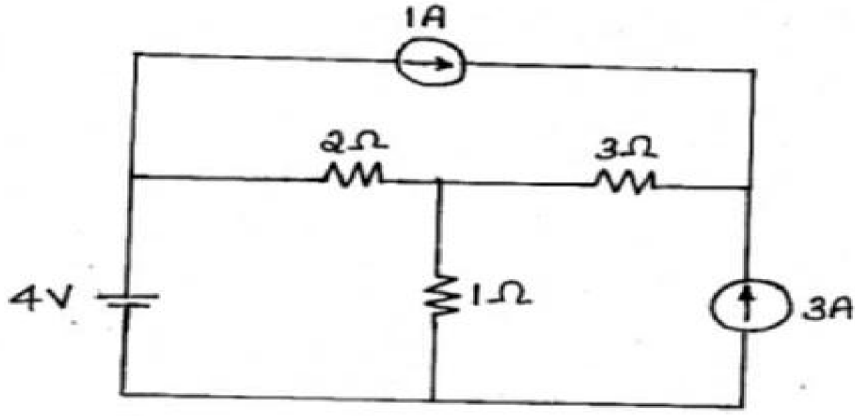Time: 2 hours   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Superposition theorem is applicable to a linear network in determining
Option A:	Current responses
Option B:	Voltage responses
Option C:	Power responses
Option D:	Both Current and Voltage responses
2.	A resistance of 10ohms is connected in series with two resistances each of 15 ohms arranged in parallel. What resistance must be shunted across the parallel combination so that the total current taken shall be 1.5A with 20V applied?
Option A:	10 ohms
Option B:	6 ohms
Option C:	5 ohms
Option D:	5.5ohms
3.	Find the maximum efficiency at Full Load of a 100KVA, 1Phase transformer at upf. If the iron loss at half full load is 2 KW.
Option A:	94.15%
Option B:	98.2%
Option C:	95.2 %
Option D:	96.15%
4.	If voltage source having voltage **5V** is connected in series with resistance **2 Ohms** then by **source transformation** it can be converted into equivalent current source as -------.
Option A:	10 A ,2 Ω in series
Option B:	10 A ,5 Ω in parallel
Option C:	2.5 A ,2 Ω in series
Option D:	2.5 A ,2 Ω in parallel
5.	The losses in the transformer are _____ and _____.
Option A:	Eddy current loss and Copper loss
Option B:	Copper loss and Iron loss
Option C:	Hysteresis loss and eddy current loss
Option D:	Primary loss and secondary loss

6.	If the open circuit voltage is 10V and load resistance is 1ohm. The maximum power transferred to the load is _____.
Option A:	2.5W
Option B:	25W
Option C:	100W
Option D:	50W
7.	When the three 50 ohms are star connected, then the power taken from the mains is
Option A:	2500W
Option B:	3200W
Option C:	1848W
Option D:	2000W
8.	A sinusoidal alternating current of 25Hz frequency has its maximum value of 100A.How long will it take for the current to attain values of 20A starting from zero value?
Option A:	1.28ms
Option B:	1.44ms
Option C:	1ms
Option D:	2ms
9.	If a star network with resistance values $R_{AN}=3\Omega$ $R_{BN}=8\Omega$ $R_{CN}=5\Omega$ is converted into a delta network, resistance values are;
Option A:	$R_{AB}=15.8\ \Omega$ $R_{BC}=26.3\ \Omega$ $R_{CA}=9.88\Omega$
Option B:	$R_{AB}=10\Omega$ $R_{BC}=13\Omega$ $R_{CA}=8\Omega$
Option C:	$R_{AB}=8\Omega$ $R_{BC}=13\Omega$ $R_{CA}=8\Omega$
Option D:	$R_{AB}=10\Omega$ $R_{BC}=11\Omega$ $R_{CA}=12\Omega$
10.	A 110V,60 W bulb is operated on a 230V,50Hz supply.What value of resistance must be connected in series ,so that the bulb operates at the correct voltage.
Option A:	$10\ \Omega$
Option B:	$22\ \Omega$
Option C:	$0.5\ \Omega$
Option D:	$220\ \Omega$
11.	The peak value of a sine wave is 200V. Its average value is
Option A:	12.74V
Option B:	100V
Option C:	127.4 V
Option D:	220V
12.	A voltage of 120 V at 50 Hz is applied to a resistance, R in series with a capacitance C. The current drawn is 2 A, and the power loss in the resistance is 100 W. Calculate the capacitance.
Option A:	10 µF
Option B:	2.2 µF
Option C:	58.36 µF
Option D:	47 µF

13.	A circuit with a resistor, inductor and capacitor having resonant frequency f_0, if all the component values are now doubled, the new resonant frequency is
Option A:	$2f_0$
Option B:	$4f_0$
Option C:	$f_0/2$
Option D:	$f_0/4$
14.	A 200 V, 50 Hz, inductive circuit takes a current of 10A, lagging 30 degree. Find the resistance R and reactance X_L
Option A:	20 Ω and 10 Ω
Option B:	20 Ω and 5 Ω
Option C:	17.32 Ω and 10 Ω
Option D:	3.3 Ω and 5 Ω
15.	A 415- V three-phase star connected system is connected to a delta connected balanced load of 100 ohm each. How much is the line current?
Option A:	2.866 A
Option B:	4.15A
Option C:	7.18A
Option D:	2.39A
16.	In a two wattmeter method measurement of the three phase power, one of the wattmeter is showing zero reading. Find the power factor of the circuit.
Option A:	1
Option B:	0
Option C:	0.5
Option D:	0.25
17.	During O.C and S.C testing of a transformer
Option A:	Both SC and OC tests are performed at rated current
Option B:	Both SC and OC tests are performed at rated voltage
Option C:	SC test is performed at rated voltage and OC test is performed at rated current
Option D:	SC test is performed at rated current and OC test is performed at rated voltage
18.	The leakage flux in the transformer is represented in equivalent circuit as
Option A:	Resistance connected in parallel with both primary and secondary winding
Option B:	Inductance connected in parallel with both primary and secondary winding
Option C:	Resistance connected in series with both primary and secondary winding
Option D:	Inductance connected in series with both primary and secondary winding
19.	The torque developed by a single-phase motor at starting is
Option A:	less than the rated torque
Option B:	More than the rated torque
Option C:	Zero
Option D:	None of these
20.	The rotational speed of a given stepper motor is determined solely by the
Option A:	Shaft load
Option B:	Step pulse frequency

Option C:	Polarity of stator current
Option D:	Magnitude of stator current.

Q2 (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	Two impedances $Z_1 = (6+j8)$ and $Z_2 = (8-j6)$ are connected in series. If the applied voltage to the combination is 200V. Find the total current and total power consumed .
ii.	Each phase of a three phase delta connected load has an impedance of Zph $= (50\angle 30)$ ohms. The line voltage is 400V.Calculate the total power.
iii.	Find the current through 3Ω resistor using Mesh Analysis.
B	**Solve any One** **10 marks each**
i.	Explain the working principle of Transformer and derive the EMF equation of transformer. A single phase transformer has primary voltage of 230V. No load primary current is 5A. No-load pf is 0.25. Number of primary turns is 200 and frequency is 50Hz. Calculate (i) maximum value of flux in the core
ii.	Find the current flowing through 1Ohms resistor using Superposition theorem.

Q3 (20 Marks Each)	
A	**Solve any TWO** **5 marks each**
i.	Explain principle of operation of Three-phase induction motor.
ii.	Draw and explain phasor diagram of a transformer for Lagging power factor.
iii.	Find the RMS value of the waveform given below.
B	**Solve any One** **10 marks each**
i.	A voltage of $(200 \angle 53.13)$ V is applied across two impedances in parallel. The values of the impedances are $(12+j16)$ ohms and $(10-j20)$ ohms. Determine kVA, kVAR and kW in each branch and power factor of the whole circuit.

ii.	Three identical choke coil are connected as a delta load to a three-phase supply. The line current drawn from the supply is 15A and the total power consumed is 7.5kW. The kVA input to the load is 10kVA. Find:
	    (i) Line and Phase voltage
	    (ii) Impedance, Resistance and Reactance value of each phase
	    (iii) Power factor
	    (iv) Phase current

University of Mumbai
Examination 2020 under cluster __ (Lead College: _____)
Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021
Program: __First Year Engineering _____
Curriculum Scheme: Rev2019
Examination: FE Semester I
Course Code: FEC105 and Course Name: Basic Electrical Engineering

Time: 2 hour   Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	B
Q3.	D
Q4	D
Q5	B
Q6	B
Q7	B
Q8.	A
Q9.	A
Q10.	D

Question Number	Correct Option
Q11.	C
Q12.	C
Q13.	C
Q14.	C
Q15.	C
Q16.	C
Q17.	D
Q18.	D
Q19.	C
Q20.	B