

University of Mumbai
Examination 2020 under Cluster 3 (Lead College: Fr. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai)

Examinations Commencing from 22nd April 2021 to 30th April 2021

Program: F.E (All Branches) (Choice Based) (R-2019-20 'C' Scheme)

Curriculum Scheme: Rev 2019 C Scheme

Examination: FE Semester I

Course Code: FEC105 and Course Name: Basic Electrical Engineering

Time: 2 hours

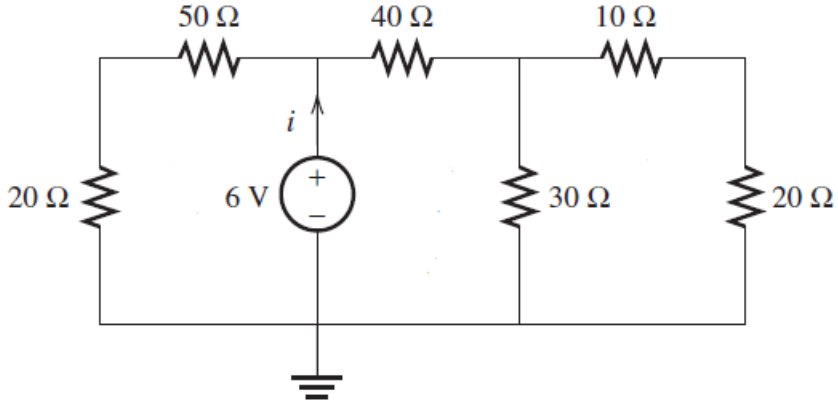
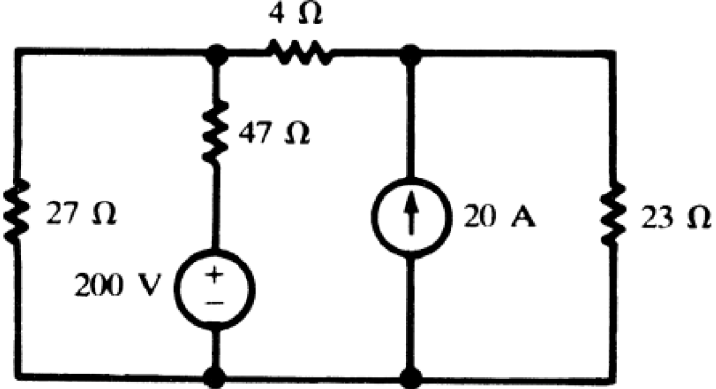
Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	An RLC series circuit is in resonance when
Option A:	Voltage across inductor and voltage across capacitor are different.
Option B:	Inductive reactance is less than capacitive reactance.
Option C:	Inductive reactance is greater than capacitive reactance.
Option D:	Inductive reactance and capacitive reactance are equal.
2.	If open circuit voltage is 18.75 V and the equivalent resistance is 4 Ohms, the maximum power transferred to the load will be
Option A:	21.97W
Option B:	9.36W
Option C:	75W
Option D:	4.68W
3.	Three delta connected resistors absorb 180KW when connected to a three-phase line. If the resistors are connected in star, the power absorbed is
Option A:	540KW
Option B:	90KW
Option C:	60KW
Option D:	180KW
4.	In an R-L-C series circuit, the voltages across the resistor, inductor and capacitor are 12V, 15V and 10V respectively. What is the supply voltage?
Option A:	13V
Option B:	10V
Option C:	5V
Option D:	37V
5.	If a star network has three branches as $R_{an}= 8 \text{ Ohms}$, $R_{bn}= 3 \text{ Ohms}$ and $R_{cn}= 12 \text{ Ohms}$, then its equivalent delta circuit will have
Option A:	$R_{ab} = 14 \text{ Ohms}$, $R_{bc} = 27 \text{ Ohms}$, $R_{ca} = 28 \text{ Ohms}$
Option B:	$R_{ab} = 13 \text{ Ohms}$, $R_{bc} = 19.5 \text{ Ohms}$, $R_{ca} = 5.2 \text{ Ohms}$
Option C:	$R_{ab} = 24 \text{ Ohms}$, $R_{bc} = 36 \text{ Ohms}$, $R_{ca} = 96 \text{ Ohms}$
Option D:	$R_{ab} = 13 \text{ Ohms}$, $R_{bc} = 19.5 \text{ Ohms}$, $R_{ca} = 52 \text{ Ohms}$

6.	In a star connected system, current in the line conductor is
Option A:	Equal to the phase current
Option B:	Lesser than the phase current
Option C:	Greater or lower both are possible
Option D:	Greater than the phase current
7.	If R is the resistance of secondary winding of an electrical transformer and K ($K = N_2/N_1$) is the transformation ratio then the equivalent secondary resistance referred to primary will be
Option A:	R/VK
Option B:	R/K^2
Option C:	RK^2
Option D:	K/R^2
8.	The equation of 50Hz current sine wave having rms value of 60A is
Option A:	$60 \sin 25t$
Option B:	$60 \sin 50t$
Option C:	$84.85 \sin 314t$
Option D:	$42.42 \sin 314t$
9.	If a voltage source of 5 Volts has an internal resistance of 0.2 Ohms, then its equivalent circuit after source transformation would be
Option A:	5 A current source with 0.2 Ohms connected in series with it
Option B:	5 V voltage source in parallel with 0.2 Ohms
Option C:	25 V voltage source in series with 0.2 Ohms
Option D:	25 A current source in parallel with 0.2 Ohms
10.	An induction motor operates on the basis of interaction between
Option A:	two currents flowing in opposite directions
Option B:	two similar magnetic poles
Option C:	stator and rotor fields
Option D:	three currents flowing in same direction
11.	Voltage division rule and current division rule are applicable to _____ and _____ circuits respectively.
Option A:	Series and Parallel
Option B:	Parallel and Series
Option C:	Series and Series
Option D:	Parallel and Parallel
12.	A transformer has turns ratio $N_1:N_2$ of 6. If a 40 Ohms resistance is connected across the secondary, what is the resistance referred to the primary?
Option A:	240 Ohms
Option B:	1440 Ohms
Option C:	2750 Ohms
Option D:	5.7 KOhms

13.	A coil having a resistance of 15 Ohms and an inductance of 25 mH is connected to a 230 V, 50 Hz supply. Calculate the impedance of the coil and the current flowing through the circuit.
Option A:	16.9 Ohms, 13.6A
Option B:	13.6 Ohms, 16.9 A
Option C:	22.85 Ohms, 10.06A
Option D:	22.85 Ohms, 16.9A
14.	The algebraic sum of the currents meeting at a junction or a node in an electric circuit is
Option A:	infinity
Option B:	dependent on applied voltage
Option C:	zero
Option D:	unity
15.	For an R-C series circuit, current _____ the applied voltage by _____.
Option A:	leads, an angle less than 90 degrees
Option B:	lags, an angle greater than 90 degrees
Option C:	leads, an angle equal to 90 degrees
Option D:	lags, an angle equal to 90 degrees
16.	In a single-phase transformer, the purpose of open circuit test is to determine
Option A:	Equivalent resistance
Option B:	Iron loss
Option C:	Full load copper loss
Option D:	Equivalent reactance
17.	If a current of 8 Amperes flows through a resistor of 5 Ohms which is in series with a parallel combination of 2 Ohms, 2.5 Ohms and 3 Ohms, calculate the current through 2.5 Ohm resistor.
Option A:	2.59A
Option B:	5.2A
Option C:	6.6A
Option D:	1.5A
18.	Slip is expressed as a percentage of
Option A:	Torque
Option B:	Stator speed
Option C:	Synchronous speed
Option D:	Rotor speed
19.	Four resistances of values 5 ohms, 10 ohms, 15 ohms and 20 ohms are connected in series across a 50V source. How is this voltage divided among these resistors?
Option A:	10V, 10V, 20V, 10V
Option B:	5V, 10V, 15V, 20V
Option C:	5V, 5V, 20V, 20V
Option D:	20V, 10V, 10V, 10V
20.	In a linear circuit, the superposition theorem can be applied to calculate the

Option A:	voltage and power
Option B:	current and power
Option C:	power
Option D:	voltage and current

Q2	
A	Solve any Two 5 marks each
i.	<p>Using mesh analysis find the current 'i' flowing through the 6V source in the circuit shown below:</p> 
ii.	The resonance frequency of an RLC series circuit is 1200Hz and Q factor is 40. If impedance at resonance is 50 Ohms, find the values of 1) L 2) C 3) bandwidth 4) upper and lower cutoff frequencies.
iii.	With reference to ac quantities explain the terms: Instantaneous Value, RMS Value, Form Factor, Peak Factor.
B	Solve any One 10 marks each
i.	<p>Find the current flowing through the 23 Ohms resistance by applying Superposition Theorem.</p> 
ii.	The voltage applied to an ac series circuit containing R = 30 Ohms, L = 0.1 H and C = 50 microfarad is 200V, 50 Hz. Find the circuit impedance,

	circuit current, power factor, active power, reactive power and apparent power.
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Q3.	
A	Solve any Two 5 marks each
i.	State and explain maximum power transfer theorem.
ii.	The equation of an alternating current is given by $i = 60 \sin 300t$. Determine 1) maximum value 2) frequency 3) rms value 4) average value 5) form factor.
iii.	How to obtain the approximate equivalent circuit of a transformer as referred to the primary?
B	Solve any One 10 marks each
i.	Three inductive coils, each with a resistance of 20 Ohms and an inductance of 0.04 H are connected 1) in star and 2) in delta, to a three phase, 400V, 50 Hz supply. Calculate for each of the above case 1) Phase current and Line Current and 2) Total power absorbed.
ii.	The following data were obtained from testing a 5kVA, 200/400V, 50Hz transformer: OC Test (LV side): 200 V 0.7A 70W SC Test (HV side): 22 V 10A 85W Determine the equivalent circuit of the transformer referred to the low voltage side and insert all the parameter values obtained.

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	A
Q3.	C
Q4	A
Q5	D
Q6	A
Q7	B
Q8.	C
Q9.	D
Q10.	C
Q11.	A
Q12.	B
Q13.	A
Q14.	C
Q15.	A
Q16.	B
Q17.	A
Q18.	C
Q19.	B
Q20.	D