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AMC ENGINEERING COLLEGE, BENGALURU – 560 083

Department of Electrical & Electronics Engineering

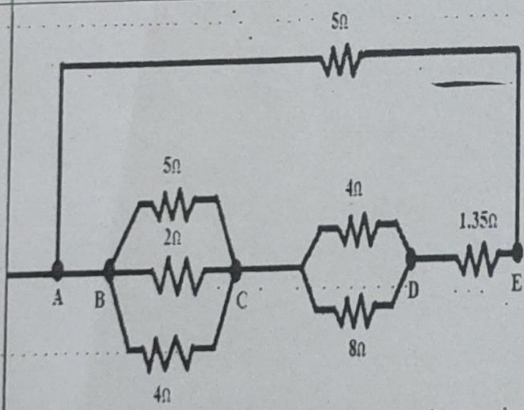
I Internal Test II SEM BE (2021-22)

Common to all Sections (G, H, I, J, K)

Subject Name: BASIC ELECTRICAL ENGINEERING | Subject code: 21ELE23

Max Marks: 40 | Time: 90 Min

Answer any of the Two Full questions: (Either 1 or 2 and 3 or 4)

Q. No	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1. a	State Ohm's Law and explain. (7 Marks)	20	1	1/1	Understand
b	State the limitations of Ohm's Laws. (3 Marks)		1	1/1	Understand
c	Two resistances 10Ω and 20Ω are connected in parallel. A resistance of 5Ω is connected in series with the combination. A voltage of 100V is applied across the circuit. Calculate the equivalent resistance of the circuit. Find the current in each resistance and the voltage across 5Ω. Find also the power consumed in all the resistances. (10 Marks)		1	1/1	Apply
	OR				
2.a	State and explain Kirchhoff's laws. (10 marks)	20	1	1/1	Understand
b	 Find the resistance of the network shown in figure. (5 marks)		1	1/1	Apply
c	125 volts at 60Hz is applied across a capacitance connected in series with a non-inductive resistor. The combination carries a current of 2.2A and causes a power loss of 96.8W in the resistor. Power loss in the capacitor is negligible. Calculate the resistance and capacitance. (5 marks)		1	1/1	Apply
3. a	State and develop the condition to draw maximum power from the load using maximum power transfer theorem. (8 marks)	20	1	1/1	Apply
b	Prove that a capacitor does not consume any power. (7 marks)		1	1/1	Evaluate

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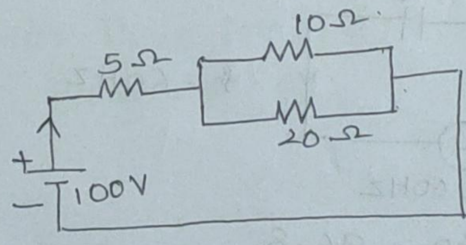
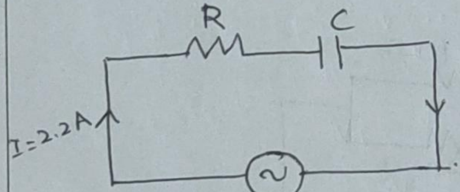
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

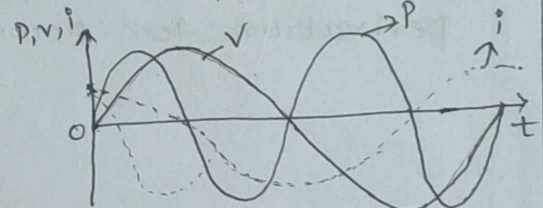
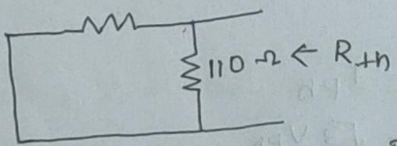
SCHEME OF VALUATION FOR ~~I/II/III~~ INTERNALS

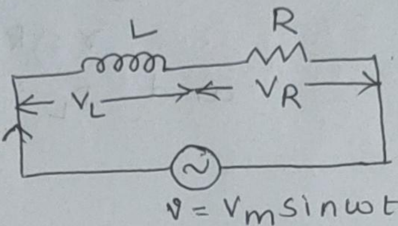
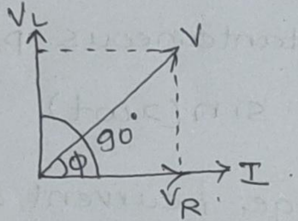
Subject Title	:	BASIC ELECTRICAL ENGG.	Subject Code	:	21ELE23
Year of Study	:	I Year (2021-22)	Year/Sem	:	I/II
Faculty Name	:	SM, SRM, SMB, KV	Date of Test	:	12-07-22
Branch	:	ISE, EEE, ECE, AIML, MT, ME, CV, AE	Max. Marks	:	40

Q.No	Description	Marks
1(a)	Statement of Ohm's law	02
	Equation stating ohm's law, $I \propto V$	02
	Explanation of ohm's law	03
		07
1(b)	Not applicable for non-linear elements	01
	Not applicable for non-metallic devices	01
	Not applicable to arc lamps	01
		03
1(c)	Circuit  $V_{5\Omega} = 43.1V$	01
	Equivalent resistance $= 11.666\Omega$	01
	$I_{5\Omega} = 8.620A$; $I_{10\Omega} = 5.746A$ $I_{20\Omega} = 2.874A$	03
	$P_{5\Omega} = 371.52W$ $P_{10\Omega} = 330.16W$ $P_{20\Omega} = 165.19W$	03

10

Q.No	Description	Marks
2a.	Statement of KCL	02
	KCL Explanation	02
	KCL Equation	01
	Statement of KVL	02
	KVL Explanation	02
	KVL Equation	01
		10
2b	$R_{BC} = 1.052\,\Omega$	01
	$R_{CD} = 2.666\,\Omega$	01
	$R_{BE} = 5.068\,\Omega$	01
	$R_{AE} = 2.516\,\Omega$	02
		05
2c.	 $f = 60HZ$ 125V, 60HZ	01
	$P_R = I^2R = 96.8$ $R = 20\,\Omega$ $I = \frac{\lvert V\rvert}{\lvert Z\rvert}$ but, $Z = \sqrt{R^2+X_C^2}$	02
	$2.2 = \frac{125}{\sqrt{20^2+X_C^2}} = X_C = 53.18\,\Omega = \frac{1}{2\pi f C}$ $C = \frac{1}{2\pi f X_C} = 49.88\,\mu f$	02
		05

Q.No	Description	Marks
3a.	Statement of maximum power transfer theorem	02
	circuit	01
	Derivation for deriving max. power condition	03
	$r = R_L$	
	and $P_L = \frac{V_{TH}^2}{4R_{th}}$	02
		08
3b.	Expression for instantaneous power	
	$P = \frac{V_m I_m}{2} \sin(2\omega t)$	01
	waveform of voltage, current & power 	03
	Derivation for Pavg for pure capacitor circuit $P_{avg} = 0$	03
		07
3c	Find value of R  $R_{th} = \frac{R \times 110}{R + 110}$ But, $R_{th} = 10\Omega$ $R = 11\Omega$	05

Q.No	Description	Marks
4a.	rms Value of alternating quantity Definition	01
	Definition of average Value of alternating quantity	01
		02
4b.	Circuit 	01
	Phasor Diagram  and equations	
	Derivation for Power for a 1-φ siries R-L Circuit	02
	$P = VI \cos\phi$	
		08
4c	Circuit Diagram with explanation	04
	Phasor Diagram	03
	Equations	
	$I_L = I_{Ph}$	01
	$V_L = \sqrt{3}\, V_{Ph}$	01
	$P = \sqrt{3} V_L I_L \cos\phi$	01
		10

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083
Department of Electrical & Electronics Engineering
II Internal Test II SEM BE (2021-22)
Common to Sections G, H, I, J & K

Subject Name: BASIC ELECTRICAL ENGINEERING — Subject code: 21ELE23
Max Marks: 40 — Time: 75 Min

Answer any of the Two Full questions: (Either 1 or 2 and 3 or 4)

Q. No	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1. a	Show that in a three-phase, balanced circuit, two wattmeters are sufficient to measure the total three phase power and power factor of the circuit.	08	2	2/1	Apply
b	Obtain the relationship between line and phase values of current in a three-phase balanced delta connected system.	08	2	1/1	Understand
c	List the advantages and disadvantages of two wattmeter method.	04	2	1/1	Understand
	OR				
2.a	With a neat diagram showing important parts of DC machine and explain important features of the parts shown.	08	3	1/1	Understand
b	Explain briefly the types of DC generators	08	3	1/1	Understand
c	A consumer has a maximum demand of 200kW at 40% load factor. If the tariff is Rs.100 per kW of maximum demand plus 10paise per kWh, find the overall cost per kWh.	04	5	2/1	Analyze
3. a	Explain pipe earthing in detail with a neat diagram.	10	5	1/1	Understand
b	Explain the necessity of earthing.	05	5	3/1	Understand
c	Write about precautionary measures taken against electric shock.	05	5	3/1	Understand
	OR				
4. a	Mention the advantages of three phase sequence over single phase system.	05	2	1/1	Understand
b	With a neat diagram, explain the working of RCCB.	08	5	1/1	Understand
c	Calculate annual bill of a consumer whose maximum demand is 100kW, power factor=0.8 lagging and load factor is 60%. The tariff used is Rs.75 per kVA of maximum demand plus 15paise per kWh consumed.	07	4	2/1	Analyze

CO 2: Analyze three phase AC circuits.
CO 3: Explain the working principles of transformers and electrical machines.
CO 4: Explain the concepts of electric power transmission and distribution of power.
CO 5: Understand the wiring methods, electricity billing and working principles of circuit protective devices and personal safety measures.

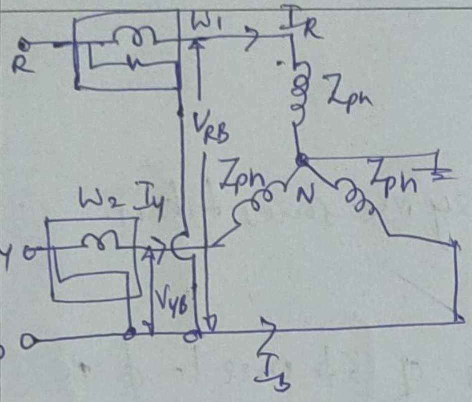
Prepared by	Scrutinized by (HOD)	Approved by Principal
Signature:	Signature:	Signature:
Name: KNB, SRM, SM, KV	Name: Dr. P B Manoj	Name: Dr. Girisha C

AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF VALUATION FOR I/II/III INTERNALS

Subject Title	:	BASIC ELECTRICAL ENGINEERING	Subject Code	:	21ELE23
Year of Study	:	2022	Year/Sem	:	1st / 2SEM
Faculty Name	:	KNB, SRM, SM, KV	Date of Test	:	12/8/2022
Branch	:	EEE	Max. Marks	:	40

Q.No	Description	Marks
1.a)		
	* Circuit diagram – Y/Δ	2
	* proof of $W_1+W_2 = \sqrt{3} V_L I_L \cos\phi$	2
	* phasor diagram	2
	* powerfactor Eqn $= \cos\left[\tan^{-1}\left\{\sqrt{3}\left(\frac{W_1-W_2}{W_1+W_2}\right)\right\}\right]$	2
b)	Circuit diagram – Δ n/w	3
	phasor diagram	3
	Equation ⇒ $I_L=\sqrt{3} I_{ph}$ & $V_L=V_{ph}$	2
c)	Advantages – (2 to 3)	2
	Disadvantege – (2 to 3)	2
2a.	Cross-sectional view of DC machine	4
	Explanation	4
b.	Classification of DC Generators with Equations	4
	Explanation.	4

Q.No	Description	Marks
2. c.	Units consumed / year = 7,00800 kwh Annual charges = Rs. 90,080/- cost per kwh = Rs. 0.1285 (or) 12.85 paise	3 1
3. a.	Pipe Earthing * Neat Diagram — * Explanation —	 5 + 5
b.	Necessity (Min 3)	— 5
c.	Electric shock – precautionary measures taken (Min 3)	— 5
4 a.	~~Significance~~ Advantages of 3ϕ over 1-ϕ AC (Min 3)	— 5
b.	R.CCB * Neat diagram * Explanation	 — 4 — 4
c.	Units consumed / year = 5.256×10^5 kwh Max. demand in kVA = 125 kVA Annual Bill = Rs. 88,215/-	— 3 — 2 — 2

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083
Department of Electrical & Electronics Engineering
III Internal Test II SEM BE (2021-22)
Common to Sections G, H, I, J & K

Subject Name: BASIC ELECTRICAL ENGINEERING — Subject code: 21ELE23
Max Marks: 40 — Time: 75 Min

Answer any of the Two Full questions:(Either 1 or 2 and 3 or 4)

Q. No.	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1.a	Derive EMF equation of a single-phase transformer.	06	3	1/1	Apply
b	Discuss various types of losses in a transformer.	06	3	1/1	Understand
c	A 250kVA, 11000/415V, 50Hz single-phase transformer has 80 turns on secondary. Calculate (i) primary and secondary currents (ii) number of primary turns (iii) maximum value of flux in the core (iv) voltage induced per turn on secondary.	08	3	2/1	Apply
	OR				
2. a	Describe the main parts of synchronous generator.	06	3	1/1	Understand
b	Derive the EMF equation of a synchronous generator.	06	3	1/1	Apply
c	State the differences between slip ring and squirrel cage rotors.	08	3	1/1	Understand
3. a	Explain the various types of DC motors with circuit diagrams and equations.	08	3	1/1	Understand
b	Derive the condition for maximum efficiency in a transformer.	06	3	1/1	Apply
c	Explain the different ratios of a transformer.	06	3	1/1	Understand
	OR				
4. a	Show that rotating magnetic field is produced when a 3-phase balanced supply is given to the stator winding of a 3-phase induction motor.	08	3	1/1	Understand
b	Define slip of an induction motor and derive expression for frequency of rotor current in terms of supply frequency.	06	3	1/1	Understand
c	A 3-phase, 400V, 50Hz supply is given to 3-phase induction motor with 4 pole running at 1440rpm. Determine the speed of rotor and frequency of the rotor current.	06	3	2/1	Apply

CO 3: Explain the working principles of transformers and electrical machines.

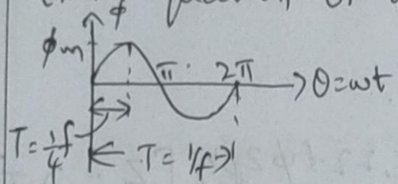
Prepared by	Scrutinized by (HOD)	Approved by Principal
Signature: [signature]	Signature: [signature]	Signature: [signature]
Name: KNB, SM, SRM, KV	Name: Dr. P B Manoj	Name: Dr. Girisha C

AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF VALUATION FOR ~~I/II~~/III INTERNALS

Subject Title	: BASIC ELECTRICAL ENGG.	Subject Code	:	21 ELE23
Year of Study	: 2021-2022	Year/Sem	:	I/II
Faculty Name	: KNB, SM, SRM, KV	Date of Test	:	26-08-22
Branch	: IS, EEE, ECE, AI, ME, MT, CE, AE	Max. Marks	:	40

Q.No	Description	Marks
1(a)	EMF equation of transformer	
		
	$e = \frac{d\phi}{dt}$, $d\phi = \phi_m$, $dt = \frac{1}{4}f$	2M
	Avg. EMF per turn = $4f\phi_m$	2M
	EMF in primary, $E_1 = 4.44 f \phi_m N_1$	
	EMF in secondary, $E_2 = 4.44 f \phi_m N_2$	2M
1(b)	Iron loss (Constant loss): Eddy current loss = $K_e B_m^2 f^2 t^2$ w/unit volume; Hysteresis Loss = $K_h B_m^{1.67} f v$ watts	3M
	Copper loss (Variable loss): $I_1^2 R_1 + I_2^2 R_2 = I_1^2 (R_1 + R_2') = I_1^2 R_{1e} = I_2^2 (R_2 + R_1') = I_2^2 R_{2e}$	3M
1(c)	i) $I_1 = \frac{250k}{11\times10^3} = 22.72A$ $\quad I_2 = \frac{250k}{415} = 602.40A$	2M
	ii) $\frac{V_2}{V_1} = \frac{N_2}{N_1} \Rightarrow N_1 = N_2 \times \frac{V_1}{V_2} = 80 \times \frac{11\times10^3}{415} = 2120$ turns	2M
	iii) $E_1 = V_1 = 4.44 f \phi_m N_1 \Rightarrow \phi_m = \frac{E_1}{4.44 f N_1} = 0.0233 Wb = 0.0233 Wb$	2M
	iv) $\frac{V_2}{N_2} = \frac{415}{80} = 5.18$ V/turn	2M

Q.No	Description	Marks
2a)	Stator — Diagram with explanation	— 1M
	Rotor — 2 types (diagram with explanation)	— 5M
2b)	$e = \frac{d\phi}{dt} = \frac{\phi \times P}{(60/N_s)}$ Avg. emf $= \frac{\phi P N_s}{60}$ As $f = \frac{P N_s}{120} \Rightarrow e_{avg.} = 2f\phi$ emf per turn $= 4f\phi$. Avg. emf per ph. $= 2.22 f \phi Z_{ph}$ $[Z = 2T]$ So, avg. emf per turn $= 4.44 f \phi T_{ph}$. with winding factor, $E_{ph} = 4.44\, K_p K_d f \phi T_{ph}$. $E_{line} = \sqrt{3} E_{ph} = \sqrt{3} \times 4.44\, K_p K_d f \phi T_{ph}$	6M
2c)	4 differences between slip ring and squirrel cage rotors	— 8M
3a)	DC Shunt Motor, DC Series Motor, DC Compound Motor — Each with circuit diagram and equations	— 2M — 2M — 4M

Q.No	Description	Marks
3b)	$\eta = \dfrac{V_2 I_2 \cos\phi}{V_2 I_2 \cos\phi + W_i + W_{cu}}$	1M
	η_{max} condition, $\dfrac{d\eta}{dI_2} = 0$	5M
	$W_i = W_{cu}$ (or) $P_i = P_{cu}$	
3c)	~~Max.~~ Transformation ratio with equation & explanation	3M
	$K = \dfrac{V_2}{V_1} = \dfrac{N_2}{N_1} = \dfrac{I_1}{I_2}$.	
	Volt Ampere rating of transformer with equation & explanation	3M

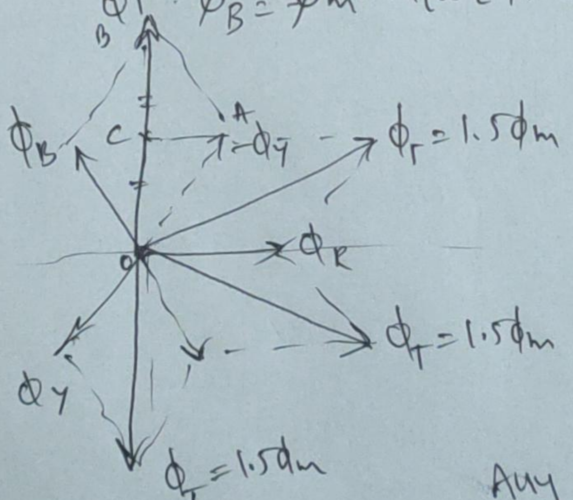
4a)

$\bar{\phi}_T = \bar{\phi}_R + \bar{\phi}_Y + \bar{\phi}_B$

$\phi_R = \phi_m \sin\omega t$

$\phi_Y = \phi_m \sin(\omega t - 120°)$

$\phi_B = \phi_m \sin(\omega t + 120°)$



Case(a)

$\omega t = 0$

$\phi_T = \bar{\phi}_B - \bar{\phi}_Y$

$= 1.5\phi_m$

proof

OAC,

$\cos 30° = \dfrac{OC}{OA} = \dfrac{\phi_T/2}{\phi_Y}$ — 8M

$\dfrac{\sqrt{3}}{2} = \dfrac{\phi_T/2}{-\phi_Y}$

$\phi_T = \dfrac{\sqrt{3}}{2} \times \left(-\dfrac{\sqrt{3}}{2}\right)\phi_m$

$\boxed{\phi_T = 1.5\,\phi_m}$

$\omega t = 120°$, $\bar{\phi}_T = 1.5\phi_m$

$\omega t = 180°$, $\bar{\phi}_T = 1.5\phi_m$

Any 4 cases, each cases 2M each

Q.No	Description	Marks
4b)	$Slip = \frac{N_s - N}{N_s}$ (2M) (freq, $f_r = sf$) 4M	2+4 =6M
4c)	$N = 1440 rpm.$	
	$N_s = \frac{120f}{P} = \frac{120 \times 50}{4} = 1500 rpm$	2M
	$Slip = \frac{N_s - N}{N_s} = \frac{1500-1440}{1500} = 0.04$	2M
	$f_r = sf = 0.04 \times 50 = 2 Hz$	2M

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083

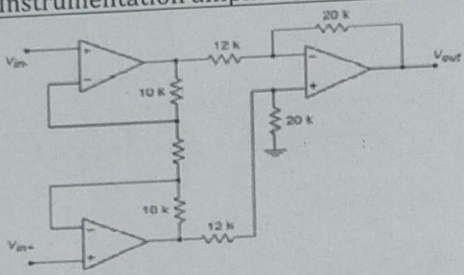
Department of Electrical & Electronics Engineering

I Internal Test IV SEM BE (2021-22)

Course Name: Operational Amplifiers and Linear Ics
Max Marks: 30

Course code: 18EE46
Time: 75 Min

Answer any of the Two Full questions:

Q. No	Question	Marks	Cos	POs/ PSO	Blooms cognitive level
1. a	With a neat diagram explain the 3 Op-amp Instrumentation amplifier.	8	1	1,3/1,2	Understand
b	 For the instrumentation amplifier shown in fig, determine the value of R_G if the gain required is 1500.	7	1	1,3,4/1, 2	Evaluate
	OR				
2.a	With a circuit of 3 input summing amplifier in inverting mode, derive an expression for output in	8	1	1,3/1,2	Analyze
b	Calculate the output voltage V_0 of the subtractor circuit. $V_1 = 5V$, $V_2 = 10V$, $R_1 = 3K\Omega$, $R_2 = 5K\Omega$ $R_f = 10K\Omega$ and $R_{comp} = 2K\Omega$.	7	1	1,3,4/1, 2	Evaluate
3. a	Explain in detail the all pass filter.	8	2	1,3/1,2	Analyze
b	Design a wide band pass filter with $f_L = 200Hz$, $f_H = 1kHz$ and pass band gain = 4. Assume capacitor value for high pass section = 0.05μF and for low pass section = 0.01μF. Also calculate the value of Q factor for the filter and center frequency. Draw the circuit diagram.	7	2	1,3,4/1, 2	Evaluate
	OR				
4. a	Derive the gain equation for first order low pass Butterworth filter.	8	2	1,3/1,2	Analyze
b	Using a 741op-amp, design the first order high pass filter to have a 1kHz cut off frequency.	7	2	1,3,4/1, 2	Evaluate

CO 1: Describe the characteristics of ideal and practical operational amplifier.
CO 2: Design filters and signal generators using linear ICs.

Prepared by	Scrutinized by (HOD)	Approved by Principal
Signature:	Signature:	Signature:
Name: Dr.R.Selvamathi	Name: Dr. P B Manoj	Name: Dr. Girisha C

AMC Engineering College
Department of EEE
18EE46 - operational ampr & linear ICs.
(2021-22)

I IA Scheme.

1 a). Block diagram of OP-amp.

Diagram - 3 M
Explanation - 5M } 8 m.

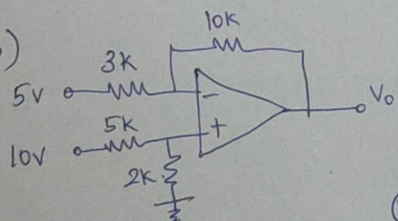
b). Inverting amplifier

Diagram - 2 M
Derivation - 4 M } 7 m
inv preferred - 1 M

2 a) Inv & non Inv summing amplifier

Inverting summing ampr - 4M
non inv. summing ampr - 4M } 8 m

b)



① 5V alone.

$V_{o1} = -\frac{R_f}{R_1} = \frac{-10}{3} = -3.33\ V$. — 2 M.

② case 2 10V alone.

3 M
$V_B = \left(\frac{2}{2+5}\right) 10 = 2.857\ V$

$V_{o2} = \left(1+\frac{R_f}{R_1}\right) V_B = \left(1+\frac{10}{3}\right) 2.857 = 12.38\ V$

$V_o = V_{o1} + V_{o2} = -3.33 + 12.38 = 9.05\ V$.

2 M

⑦ M.

3a). all pass filter:

Diagram - 3 M
Explanation - 5M

b) $f_L = 200Hz$ $f_H = 2kHz$ Pass band gain = 4.

$Q = ?$. $f_c = ?$.

HPF
C = 0.05 μF

LPF
C = 0.01 μF.

$f_L = \frac{1}{2\pi R'C'}$

$R' = \frac{1}{2\pi \times 200 \times 0.05 \times 10^{-6}} = 15.915\,k\Omega$ } 2M

$A_{FT} = 4$
$A_1 = A_2 = 2$
$A_1 = A_2 = 1 + \frac{R_f}{R_1} = 2$
$R_f = R_1 = 10k\Omega$.
} 1M

LPF

C = 0.01 μF $f_H = 2kHz$

$R = \frac{1}{2\pi \times 2 \times 10^3 \times 0.01 \times 10^{-6}} = 7.958\,k\Omega$ } 2M

(7) M.

Diagram - 2M.

4a). HPF 1st order.

Diagram - 3 M
Derivation - 5M.
} 8 M.

b). f = 1kHz.
C = 0.001 μF
$f_H = 1kHz$ R = 159.15 kΩ.
} 5M

Diagram - 2 M

$R_f = R_1 = 10k\Omega$.

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083

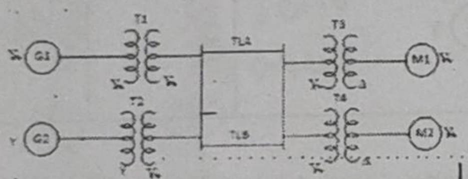
Department of Electrical & Electronics Engineering

III Internal Test VI SEM BE (2021-22)

Course Name: POWER SYSTEM ANALYSIS 1 | Course code: 18EE62

Max Marks: 30 | Time: 75 Min

Answer any of the Two Full questions:

Q. No	Question	Marks	Cos	POs/ PSO	Blooms cognitive level
1.	The one line diagram of a power system is shown. The device ratings of the devices are as follows: G1 and G2 : 104 MVA, 11.8 kV, $X_1 = X_2 = 0.2$ p.u, $X_0 = 0.1$p.u T1 and T2 : 125 MVA, 11Y – 220Y kV, $X_1 = X_2 = X_0 = 0.1$p.u M1 : 175 MVA, 6.6 kV, $X_1 = X_2 = 0.3$ p.u, $X_0 = 0.15$p.u M2 : 50 MVA, 6.9 kV, $X_1 = X_2 = 0.3$ p.u, $X_0 = 0.1$p.u Transmission line reactance : $X_1 = X_2 = 30\Omega$, $X_0 = 60\Omega$. Draw the sequence impedance diagram in p.u on the base of 200MVA, 220kV in transmission lines. 	10	3	1;2/1, 2	APPLY
	OR				
2.	Derive expression for fault currents if double line to ground fault occurs through fault impedance Z_f on a three phase generator.	10	4	1,2/1, 2	ANALYSE
3.	Explain the equal area criterion concept, when a power system, is subjected to sudden increase in load.	10	5	1,2/1, 2	APPLY
	OR				
4.	A turbo generator, 6pole, 50Hz, of capacity 80MW working at 0.8pf has an inertia of 10MJ/MVA. (a) Calculate the energy stored in the rotor at synchronous speed. (b) Find rotor acceleration if te mechanical input is suddenly raised to 75MW for an electrical load of 60MW. (c) Supposing the above acceleration is maintained for a duration of 6 cycles, calculate the change in torque angle and the rotor speed at the end of 6 cycles.	10	5	1,2/1, 2	EVALUATE
5	A 25 MVA, 11kV, three phase generator has a subtransient reactance of 20%. The generator suppliestwo motors over a transmission line with transformer at both ends as shown in fig. the motors have rated input of 15 & 7.5MVA, both 10kV with 25% subtransient reactances. The three phase transformers are both rated 30MVA, 10.8/121kV, connection $\Delta - Y$ with leakage reactance of 10% each. The series reactance of line is 100Ω. Calculate the fault current when a single line to ground fault occurs at F. The motors are loaded	10	4	1,2/1, 2	EVALUATE

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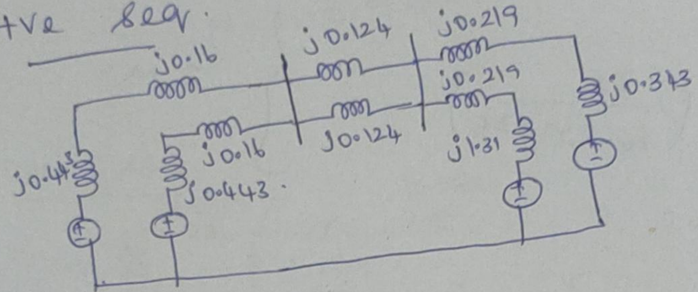
Dept of EEE.

18EE62 - Power System-1 (2021-22)

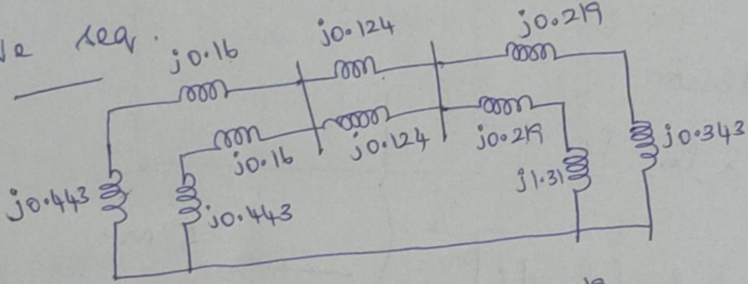
III IA Scheme.

1) +ve seq.



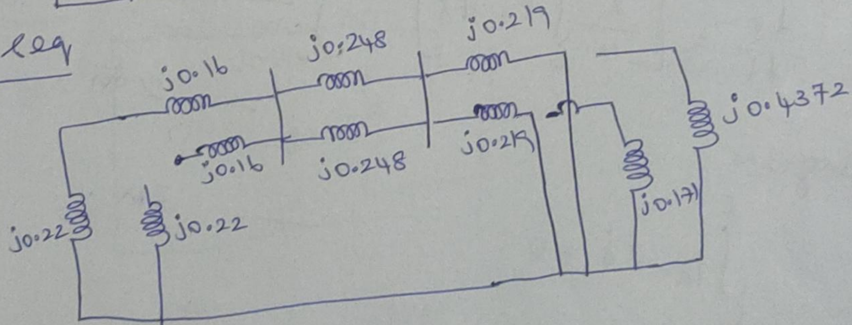
— 3M

-ve seq.



— 3M

zero seq



— 4M.

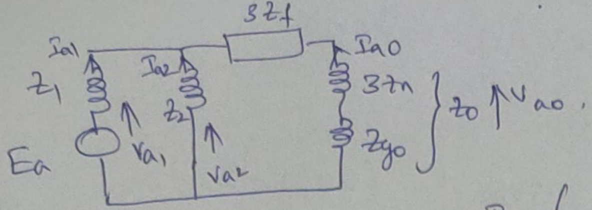
2). DLG fault through Z_f. (Gen^r).

Diagram - ~~2~~. $I_a = 0$, $V_b = (I_b + I_c) Z_f$, $V_c = (I_b + I_c) Z_f$ } 2M.

$V_{a1} = V_{a2} = \frac{1}{3}(V_a - V_b)$ $V_{a0} = \frac{1}{3}(V_a + 2V_b)$.

$V_{a0} - V_{a2} = 3 I_{a0} Z_f$. } 3M.

$I_{a0} + I_{a1} + I_{a2} = 0$



$$I_{a2} = -I_{a1}\left(\frac{Z_0+3Z_f}{Z_0+3Z_f+Z_2}\right)$$ } 3 M.

$$I_{a0} = \frac{-I_{a1}Z_2}{Z_0+Z_2+3Z_f}.$$

$$I_f - I_b + I_c$$

$$I_f = -3I_{a1}\left(\frac{Z_2}{Z_0+Z_2+3Z_f}\right)$$ } 2 M.

if neutral is not gnd

$Z_0 = \infty$ $\quad I_f = 0$

3). Equal area criterion.

$$\frac{H}{\pi f_s}\frac{d^2\delta}{dt^2} = P_m - P_e.$$

$$\frac{d\delta}{dt} = \left[\frac{2}{M}\int_{\delta_0}^{\delta} P_a \cdot d\delta\right]^{1/2}.$$ } — 5 M.

— 2 M.

Diagram — 3M.

$$\int_{\delta_0}^{\delta} P_a \cdot d\delta = 0$$

4) $P=6$ $\quad f_s = 50Hz$ $\quad G = \frac{~~80~~ 80}{0.8} = 100$ MVA.

$H = 10$ MJ/MVA $\quad N_s = \frac{120 f_s}{P} = 1000$ rpm.

— 2M

(i). $G \cdot H = 100(10) = 1000$ MJ

ii) $\alpha = \frac{50\pi}{1000}(15) = 2.356$ ele·rad/sec^2. — 2 M.

135 ele·deg/sec^2.

(iii) time Period

$$\delta = \frac{1}{2}\alpha t^2 = 0.972 \text{ ele. deg.}$$ — 3M

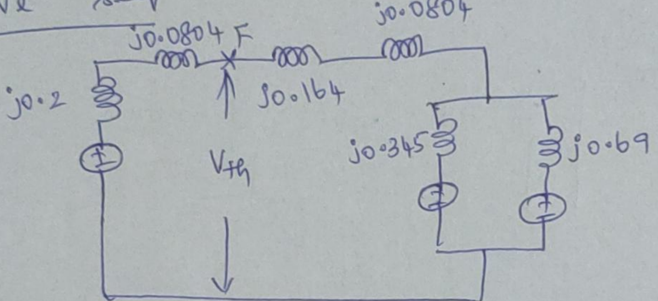
(iv) $$\alpha = \frac{135}{1080} \text{ rps/sec} = \frac{135 \times 60}{1080} = 7.5 \text{ rpm/sec.}$$

— 3M

$$N = N_s + \alpha . t = 1000 + (7.5)(0.12)$$

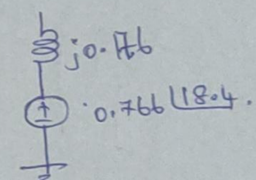
$$N = 1000.9 \text{ rpm.}$$

5). +ve seq.



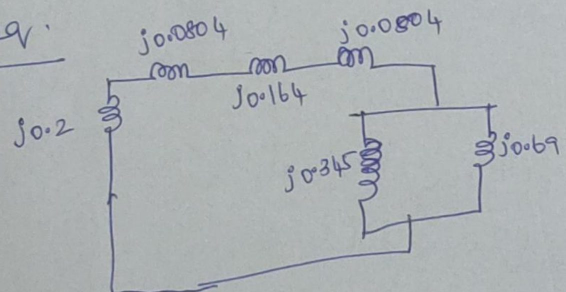
$V_{th} = 0.766 \angle 18.4$ p.u

$Z_{th} =$

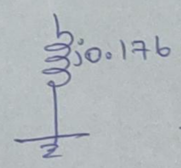


— 3M.

-ve seq.

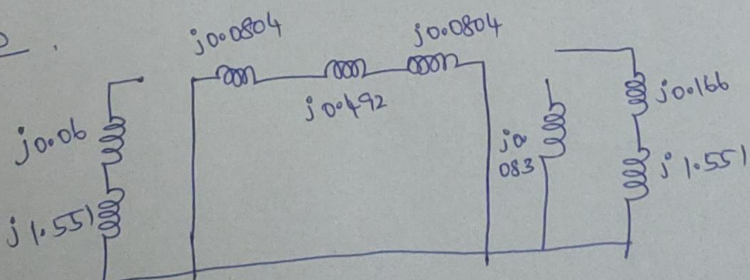


$Z_{th} =$

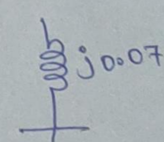


— 2M.

Zero.

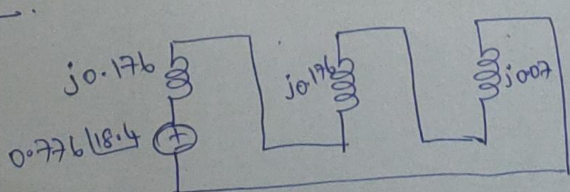


Z_{th}



— 2M

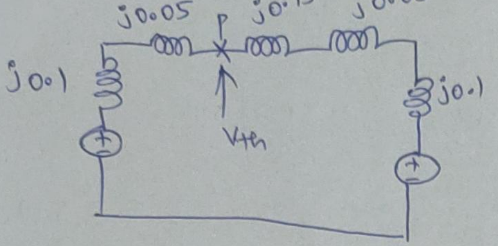
interconnection



$I_f = 5.445$ p.u

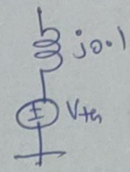
$I_f = 637.42$ A } → 2M.

6) +ve seq



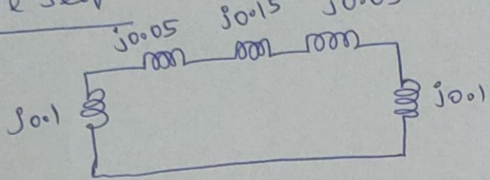
$V_{th} = 1\angle 0°$ p.u

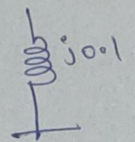
$Z_{th} = j0.1$



— 3M

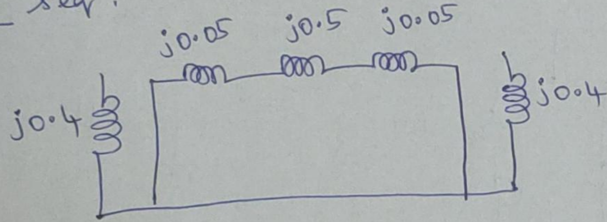
-ve seq





— 2M

Zero seq.



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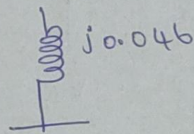
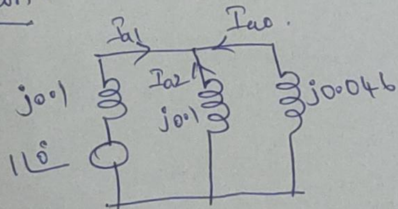


— 2M.

interconnection:



$I_{a1} = j7.6$ p.u

$I_{a2} = j2.4$ p.u

$I_{a0} = j5.2$ p.u

$(I_{a1})_{T_1} = -j5.07$

$(I_{a2})_{T_1} = j1.6$ p.u

$(I_{a0})_{T_1} = j4.77$ p.u

$(I_{a1})_{M_1} = 5.07\angle -60°$

$(I_{a2})_{M_1} = 1.6\angle 60°$

$(I_{a0})_{M_1} = 0$

} 3M.

~ & ~

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083

Department of Electrical & Electronics Engineering

III Internal Test VI SEM BE (2021-22)

Course Name: Control Systems
Max Marks: 30

Course code: 18EE61
Time: 75 Min

Answer any of the Two Full questions: (Either 1 or 2 & 3 or 4)

Q. No.	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1. a	Sketch the root locus of the system whose open loop transfer function is, $G(s)=\frac{K}{s(s+2)(s+4)}$. Find the value of K so that the damping ratio of the closed loop system is 0.5.	12	CO4	3/1	Evaluate
B	Write note on (i) Break away point (ii) Asymptotes.	3	CO4	1/1	Understand
	OR				
2.a	Explain the general procedure for constructing bode plots.	8	CO4	1/1	Understand
B	Explain the frequency-domain specifications for a closed loop frequency response system.	7	CO4	1/1	Understand
3. a	State and explain Nyquist stability criterion.	10	CO5	1/1	Understand
B	What are the steps to design lead compensator?	5	CO5	1/1	Analyze
	OR				
4. a	Write a note on PID controller.	10	CO5	1,2/1	Understand
B	Write a note on lag-lead compensator.	5	CO5	1/1	Understand

CO 4: Illustrate the performance of a given system in time and frequency domains, stability analysis using Root locus and Bode plots.
CO 5: Discuss stability analysis using Nyquist plots, design controller and compensator for a given specification.

AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF VALUATION FOR ~~I/II/~~III INTERNALS

Subject Title	:	CONTROL SYSTEMS	Subject Code	:	18EE61
Year of Study	:	III	Year/Sem	:	III / VI
Faculty Name	:	KARTHEEK VANKADARA	Date of Test	:	11-07-2022
Branch	:	EEE	Max. Marks	:	30

Q.No	Description	Marks
1(a)	Poles $-0, -2 \& -4 = n$ zeros $-$ Nil $= m$ Angle of asymptotes $= \frac{\pm 180°(2q+1)}{n-m}$ where $q = 0,1,2$ $= \pm 60°, \pm 180°, \pm 300°$. Centroid $= \frac{\text{Sum of poles} - \text{Sum of zeroes}}{n-m} = \frac{0-2-4-0}{3-0} = -2$	2M
	Breakaway point: Characteristic equation $- s^3 + 6s^2 + 8s + K = 0$. $K = -s^3 - 6s^2 - 8s$ $\frac{dK}{ds} = 0 \Rightarrow 3s^2 + 12s + 8 = 0 \Rightarrow s = -0.845$ or -3.154 when $s = -0.845 \Rightarrow K = 3.08$ (positive) L breakaway point when $s = -3.154 \Rightarrow K = -3.08$ (negative)	2M
	Crossing point on imaginary axis: Put $s = j\omega$ in characteristic equation Equating imaginary part to zero: $-j\omega^3 + j8\omega = 0$ $\omega^2 = 8 \Rightarrow \omega = \pm\sqrt{8} = \pm 2.8$ Crossing point of root locus is $\pm j2.8$ Equating real part to zero: $K = 6\omega^2 = 6 \times 8 = 48$	4M

Q.No	Description	Marks
	To find K for $\xi = 0.5$: let $\alpha = \cos^{-1}\xi = 60^\circ$. $K = \frac{\text{Product of length of vector from all poles to point}}{\text{Product of length of vector from all zeroes to point}}$ $K = 7.96$	4M
1b)	(i) Breakaway point explanation	2M
	(ii) Asymptotes	1.5
2a)	Procedure for constructing bode plots	8M
2b)	Explanation of frequency-domain specifications	7M
3a)	Explanation of Nyquist stability criterion	10M
3b)	$G(s) = \frac{1+sT}{1+\alpha Ts}$ Bode Plot $\phi_m = \phi_s - \phi_c$ $\sin\phi_m = \frac{1-\alpha}{1+\alpha}$ $\omega_m = \frac{1}{T\sqrt{\alpha}}$ $\omega_{c_1} = 1/T$; ω_2 $K = K_c\alpha$	5M

Q.No	Description	Marks
4a)	Meaning of PID controller	3M
	Working of PID controller	4M
	Applications of PID controller	3M
4b)	Neat circuit diagram with pole-zero diagram	2M
	Explanation	3M

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083
Department of Electrical & Electronics Engineering
I Internal Test IV SEM BE (2021-22)

Course Name: **Power Generation and Economics** Course code: 18EE42
Max Marks: 30 Time: 75 Min

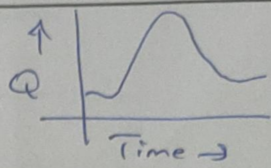
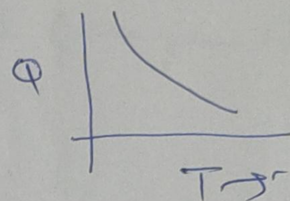
Answer any of the Two Full questions:

Q. No	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1. a	Define the Following: (i)Hydrograph (ii) Mass curve (iii) flow duration curve	08	1	1,3 /1,2	Understand
b	Explain the classification of hydro-electric power plants.	07	1	2,3,4 /1,2	Understand
	OR				
2.a	Explain the working of hydro-electric power plants with neat layout.	08	1	1,2,3 /1,2	Understand Analyse
b	What is a steam prime mover? With neat sketch explain the working of Pelton wheel turbine.	07	1	2,3 /1,2	Understand
3. a	What is a stream prime mover? Explain Impulse and Reaction turbine.	08	1	1,3 /1,2	Understand
b.	Explain the governing mechanism of water turbine, with neat sketch.	07	1	2,3 /1,2	Analyse
	OR				
4. a	With flow diagram, explain the fuel handling system and disposal of ash handling system in	08	1	2,3,4 /1,2	Understand
b	Mention the classification of stokers. Explain overfeed and underfeed stoker with diagram.	07	1	1,2,3 /1,2	understand

CO 1: Describe the working of hydroelectric, steam, nuclear power plants and state functions of major equipment of the power plants

1 Internal Test

Subject Title: Power Generation and Economics **Subject Code:** 18EE42

Question Number	Solution	Marks Allocated
1a.	Hydrograph – definition 	03
	Mass curve – exp. with reservoir capacity	02
	Flow duration curve 	03
1b.	classification of hydro electric Power plants.	02
	classification based on water flow on water head on type of load	05
2a)	working of hydro-electric power plants	
	schematic arrangement	02
	working and components brief explanation	06
2b)	steam prime mover	
	sketch of Pelton wheel turbine	02
	working of turbine	02
		03

Q.No.		Marks
3a.	Types of steam prime movers	2
	Impulse Turbine - sketch, working	3
	Reaction Turbine - sketch, working	3.
3b.	governing mechanism sketch (arrangement) Block diagram	03
	working	04
4a.	fuel handling various stages with flow diagram	04
	disposal of ash with stage by stage explanation	04
4b.	classification of stokers.	02
	overfeed stages diagram	
	underfeed stocker stages diagram	05

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AMC ENGINEERING COLLEGE,BENGALURU – 560083

Department of Electrical and Electronics Engineering

III Internal Test VI SEM BE (2021-22)

Sub Name: Renewable Energy Resources (Open Elective) **Sub code: 18EE653**
Max Marks: 40 **Time: 75 Min**

Answer any of the Two Full questions:

Q.No	Question	Marks	Cos	POs/ PSO	Blooms cognitive level
1. a	What is the principle of OTEC? Write a short note on Carnot cycle.	8	5	1,5 ,8/1,2	Understand
b	Discuss the principal and working of sea wave energy conversion system.	7	5	1,5 ,8/1,2	Understand
	OR				
2.a	With a neat diagram, explain oscillating water column device for harnessing sea wave energy	8	5	1,5 ,8/1,2	Apply
b	Using schematic diagram, Explain the co-operating two basin system	7	4	1,5 ,8/1,2	Apply
3. a	With a neat diagram explain fixed dome type Biogas plant.(JANATA)	8	4	1,5 ,8/1,2	Apply
b	i)Describe the advantages and disadvantages of fluidized bed gasifier. ii)Explain the advantages and Applications of Biogas.	7	4	1,5 ,8/1,2	Apply
	OR				
4. a	Explain the single basin and two basin system of tidal power harnessing.	8	5	1,5 ,8/1,2	Apply
b	Discuss the tidal power generation in India.	7	4	1,5 ,8/1,2	Understand

CO4:To discuss biomass production, biomass gasifiers, biogas,its composition ,production benefits,tidal energy resources ,energy availability ,power generation.

CO5:To explain motion in the sea wave ,power associated with sea wave and energy availability and the devices for harnessing wave energy

AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF VALUATION FOR I/II/III INTERNALS

Subject Title	:	Renewable Energy Resources	Subject Code	:	18EE658
Year of Study	:	2021-22	Year/Sem	:	3rd 6th Sem
Faculty Name	:	Prof. SHIVALINGASWAMY G D	Date of Test	:	13th July 22
Branch	:	EEE	Max. Marks	:	40

Q.No	Description	Marks
1 a)	OTEC -> Full form and principle with brief explanation.	4.
	Short explanation on Carnot cycle.	4.
b)	Working of sea wave energy conversion system with its principal's	4+3
2a)	Oscillating water column device for harnessing sea wave energy. => neat diagram. Explaination in complete	3+5
b)	Explaination of co-operating two basin system with neat schematic diagram.	4+3
3a)	neat diagram of Fixed dome type Biogas plant	4.
	Explaination of fixed dome type Biogas plant	4.

Q.No	Description	Marks
3 b)	i) Advantages and disadvantages of Fluidized bed gasifier with brief explanation	4.
	ii) Advantages & Applications of Biogas.	3.
4a)	Brief Explaination of single basin tidal Power harnessing. & two basin tidal Power harnessing.	4 4.
b)	Explanation of Tidal Power generation in India with examples.	8.

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AMC ENGINEERING COLLEGE, BENGALURU – 560 083
Department of Electrical & Electronics Engineering
III Internal Test VIII SEM BE (2021-22)

Course Name: Integration of Distributed Generation — Course code: 17EE833
Max Marks: 30 — Time: 75 Min

Answer any of the Two Full questions:

Q. No.	Question	Marks	COs	POs/ PSO	Blooms cognitive level
1. a	Explain the statistical approach to hosting capacity.	7	CO4	1,2/1,2	Understand
b	Explain the sources of unbalanced voltage for a weaker transmission system.	8	CO4	1,2/1,2	Understand
OR					
2.a	Explain the dynamic voltage control used to increase hosting capacity.	7	CO4	1,2/1,2	Understand
b	Explain the fast voltage fluctuations in wind and solar power.	8	CO4	1,2/1,2	Understand
3. a	Explain how voltage unbalance occurs with connection of distributed generation.	7	CO5	1,2/1,2	Understand
b	List the causes for voltage dips due to distributed generation.	8	CO5	1,2/1,2	Analyze
OR					
4. a	Write short notes on (i) Emission limits for other customers. (ii) Higher disturbance levels.	7	CO5	1,2/1,2	Understand
b	With relevant graph, explain the overvoltage curtailment scheme for increasing hosting capacity.	8	CO5	1,2/1,2	Apply

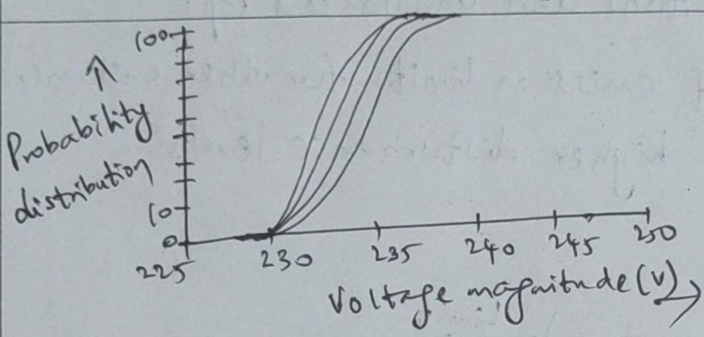
CO 4: Discuss effects of the integration of DG: increased risk of overvoltages and increased levels of power quality disturbances.
CO 5: Discuss effects of the integration of DG: incorrect operation of the protection, discuss the impact the integration of DG on power system stability and operation.

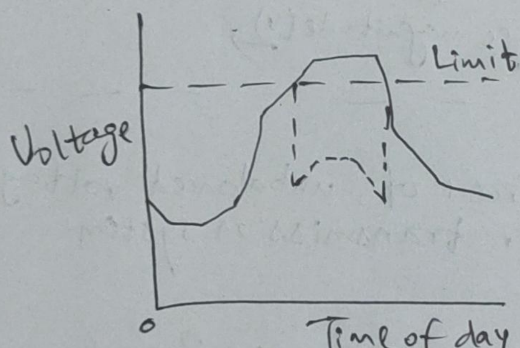
AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHEME OF VALUATION FOR ~~I/II~~/III INTERNALS

Subject Title	:	IDG	Subject Code	:	17EE833
Year of Study	:	IV	Year/Sem	:	IV / VIII
Faculty Name	:	KARTHEEK VANKADARA	Date of Test	:	28-06-2022
Branch	:	EEE	Max. Marks	:	30

Q.No	Description	Marks
1a)		3M
	Explanation	4M
1b)	Explanation of sources of unbalanced voltage for weaker transmission system	8M
2a)	Dynamic voltage control for increasing hosting capacity using tap changer } Explanation	7M
2b)	Explanation of fast voltage fluctuations in wind power	4M
	Explanation of fast voltage fluctuations in solar power	4M

Q.No	Description	Marks
3a)	Weaker Transmission System Strong Distribution System Large Single-Phase Generators Many Single-Phase Generators	7M
3b)	Synchronous Machines: Balanced Dips Sychronous Machines: Unbalanced Dips Induction Generators and Unbalanced Dips	3M 3M 2M
4a)	(i) Explanation of emission limits for other customers (ii) Explanation of higher disturbance levels	3M 4M
4b)	 	4M
	Explanation ———————	4M