S2028

Scheme/Answer Key for Valuation Scheme of evaluation(marks in brackets) and answers of problems/key APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE100 Course Name: BASICS OF ELECTRICAL ENGINEERING Max. Marks: 100 Duration: 3 Hours

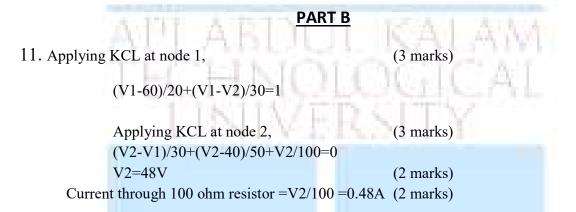
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		PART A		
1.	KCL statement & explanation – (2 marks)			
	KVL statement & explanation – (2 r	nark <mark>s)</mark>		
2				
2.	Any 4 comparisons – 4 marks			
3.	$I=Im/(\sqrt{2})$	– (1 mark)		
	Answer : RMS Value I=10.61A	– (1 mark)		
	$I_{av}=2Im/\pi$	– (1 mark)		
	Answer : Average value $I_{av} = 9.55A$			
		(******)		
4.	Phase angle: I lags V by 90°	– (1 mark)		
	Proof:			
	starting from v= $V_m sin (\omega t)$ and deriving i= $I_m sin (\omega t-90^\circ)$ – (3 marks)			
5.	Four points – (4 marks)			
6.	Primary transmission:	(2 marks)		
	Secondary transmission:	(2 marks)		
7.	principle of operation	(4 marks)		
8.	back e.m.f. explanation	(3 marks)		
	Voltage equation	(1 mark)		
9.	$Ns = \frac{120f}{p} $ (1 mar	k)		
	Ns=1000 rpm (1 mark)			
	N = (1-s) Ns	(1 mark)		
	N= 980 rpm	(1 mark)		

10. Diagram -(1 mark)

Working – (3 marks)



(note : If the candidate has found the node voltage equation in matrix form, then also 6 marks should be given. It is not mandatory that the student should show the derivation of the equations using KCL)

12. a)
$$B_g = 0.4 \text{ Wb/m}^2 \ \mu_r = 400 \ l_g = 6 \text{ x } 10^{-3} \text{m}$$
 A= 12 x $10^{-4} \text{ m}^2 \ l_i = 60 \text{ x } 10^{-2} \text{ m}$
 $\Phi = B_g A = 0.4 \text{ x } 12 \text{ x } 10^{-4} = 4.8 \text{ x } 10^{-4} \text{ Wb}$ (2 marks)
 $S = S_g + S_i = (l_i/\mu_0 \mu_r A) + (l_g/\mu_0 A) = [(60 \text{ x } 10^{-2})/(4 \text{ x } \pi \text{ x } 10^{-7} \text{ x400 } \text{ x } 12 \text{ x } 10^{-4})] + [(6 \text{ x } 10^{-3})/(4 \text{ x } \pi \text{ x } 10^{-7} \text{ x } 12 \text{ x } 10^{-4})] = 497.3 \text{ x } 10^4 \text{ AT/ Wb}$ (2 marks)
 $Mmf = S \text{ x } \Phi = 497.3 \text{ x } 10^4 \text{ x } 4.8 \text{ x } 10^{-4} = 2387.04 \text{ AT}$ (2 marks)

b) Energy derivation (4 mark)



(i) <u>Star</u>

phase voltage $V_{ph} = V_L / \sqrt{3} = 239.6V$	- (1 mark)			
phase current $I_{ph} = V_{ph}/Z = 32.2A = -(1 \text{ mark})$				
power factor = R/Z = 0.538 - (1 mark)				
$P=3 V_{ph} I_{ph} \cos \phi = 12.4 \text{ kW}$	- (<mark>2 marks)</mark>			
(ii) <u>Delta</u>				
phase voltage $V_{ph} = V_L = 415V$ - (1 ma				
$phase \; current = I_{ph} = V_{ph}/Z = 55.78A \qquad \mbox{-} (1 \; mark) \label{eq:phase}$				
power factor = R/Z = 0.538 - (1 mark)				

	$P=3 V_{ph} I_{ph} \cos \phi = 37.3 \text{ kW}$	- (2 marks)			
14	I. a)				
	(i) $X_L = 100$ ohm	– (1 mark)			
	(ii) L=0.318 H	– (1 mark)			
	(iii) P=0 (purely inductive coil)	– (1 mark)			
	(iv) v=311.13 sin (314t)	– (1 mark)			
	i=3.11 sin (314t-90°)	– (1 mark)			
b) Circuit diagram with line and phase voltages and currents labelled $-(1 \text{ mark})$					
	Phasor diagram	– (1 mark)			
	Solving to find I _L	– (1 mark)			
	$I_L = \sqrt{3}I_{ph}$	– (1 mark)			
	$V_L = V_{ph}$	– (1 mark)			
15. Block diagram: (4 marks)					
	Explanation : (6 marks)				
16. Fi	ve marks each				
17. a) Construction – (3 marks)					
	Working $-(2 \text{ marks})$				
	b) Equation for Eg - (1 mark) Eg=2000V -(4 mark)				
18. $\eta = \text{output/(output + losses)} = kVA * pf/(kVA* pf+ W_{cu} + W_i)$ (4 marks)					
	(a) 96.1%	(6 marks)			
	(According to the syllabus, the students ha	ve to study the equation of full load efficiency			
	and application of the same in numerical. Hence part (b) and (c) can be neglected.)				
19.	a) Constructional details of squirrel cage	-(5 marks)			
	b) Constructional details of slip ring	- (5 marks)			
20.	Circuit Diagram	(3 marks)			
	Explanation	(3 marks)			
	Comparison with split-phase motor	(3 marks)			
	one application	(1 marks)			
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