



Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058

END SEMESTER/RE-EXAMINATION MAY 2025



Program: B.Tech. *Elect Engg VIII*

Duration: 3 Hour.

Course Code: PC-BTE801

Maximum Points: 100

Course Name: Power System Dynamics and Control (R18)

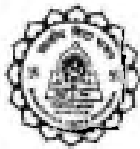
Semester: VIII

Notes:

1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if necessary.

141/5/25

Q.No.	Questions	Points	CO	BL	Modu No.
Q.1.	Define rotor angle stability and voltage stability.	5	1,2	1,2	1
a.	Write the expression, defining all variables used, to describe the rotating magnetic field produced by balanced three phase currents through sinusoidal distributed stator winding.	5	1,2	3	2
b.	Describe equal area criterion for transient stability studies.	5	1,2	1,2	3,4
c.	What are the principal causes of voltage in stability?	5	1,2	1,2	6
d.		5	1,2	1,2	7
Q.2	Consider				
a.	$f_{as} = \cos t \quad f_{bs} = \frac{1}{2}t \quad f_{cs} = -\sin t$ Find expressions for f_{qs}, f_{ds}, and f_{0s} Resolve f_{as}, f_{bs}, and f_{cs} into the directions of f_{qs}, f_{ds} for $t = \pi/3$ second and $\theta = \pi/3$ radian.	15	1,2	1,2,3	2
b.	Transform stationary three phase inductive element to arbitrary reference frame.	05	1,2	1,2,3	2
Q.3.a.	Describe synchronizing coefficient and explain its significance in determining steady state stability.	05	1,2	3	4
b.	A 60 Hz synchronous generator having inertia constant $H=9.94$ MJ/MVA and transient reactance of $X_d' = 0.3$ pu is connected to an	15	1,2	3	4

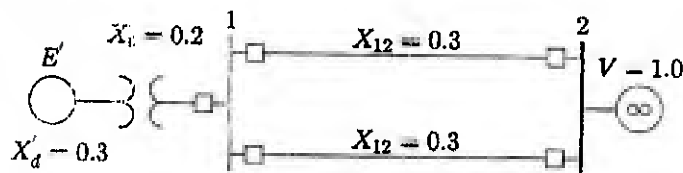


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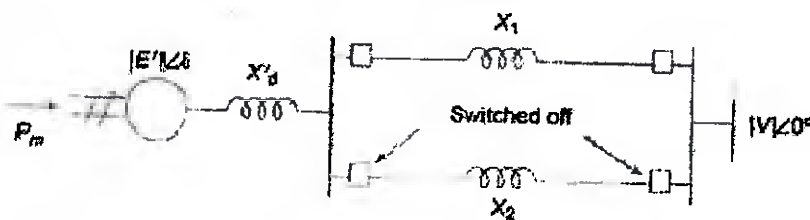
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END SEMESTER MAY 2025



infinite bus through a purely reactive circuit as shown below. Reactances are marked on the diagram on a common system base. The generator is delivering real power of 0.6 pu, 0.8 power factor lagging to the infinite bus at the voltage of $V = 1$ pu. Assuming the per unit damping power coefficient is $D = 0.138$. Consider a small disturbance of $\Delta\delta = 10^\circ = 0.1745$ radian. Obtain equations describing the motion of rotor angle and generator frequency.

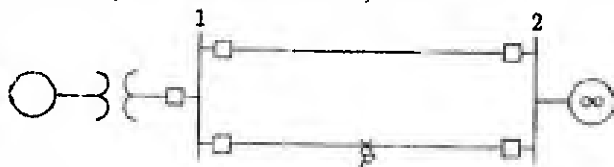


Q.4 a. Critically analyze the application of Equal Area Criterion, for studying Transient Stability, for sudden loss of one parallel line.



10 1,2 3,4 5

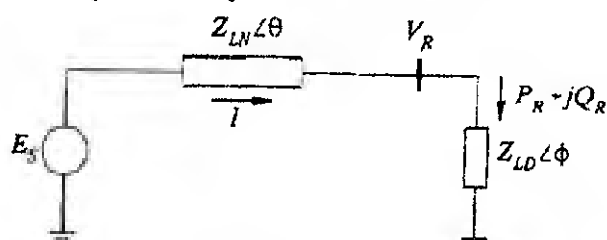
b. For the system shown below,



10 1,2 1,2,3 5

Assume that input power is constant. The rotor is running at synchronous speed. Consider a three phase fault at the middle of one line. Apply modified Euler's Method and derive expressions for iterative solution of resulting swing equation.

Q.5. For the simple radial system shown below



15 1,2 1,2,3 6



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	Discuss the various transmission system characteristics by deriving appropriate equations and relevant relationships, using equations and graphical representations, among power system variables explaining the voltage stability phenomenon.				
b.	Describe typical scenario of voltage collapse.	05	1,2	1,2	6
Q. 6.	Write short notes on any two. a. High speed fault clearing. b. Steam turbine fast valving c. High speed excitation system d. Power system stabilizers.	10 10 10 10	1,2	1,2	7
Q. 7.					
a.	Describe the two important aspects in the analysis of voltage stability of a power system.	10	1,2	1,2	6
b.	Consider a 3 phase RL circuit defined by $\mathbf{r}_s = \text{diag}[r_s \ r_s \ r_s]$ $\mathbf{L}_s = \begin{bmatrix} L_s & M & M \\ M & L_s & M \\ M & M & L_s \end{bmatrix}$ Represent the circuit in arbitrary reference frame.	10	1,2	1,2,3	2



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END-SEMESTER/RE EXAMINATION MAY 2025

Program: B.Tech.

Duration: 3 Hour.

Course Code: PC-BTE801

Maximum Points: 100

Course Name: Power System Dynamics and Control (R18)

Semester: VIII

Notes:

1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if necessary.

23/6/25

Q.No.	Questions	Points	CO	BL	Module No.
Q.1.					
a.	Discuss voltage collapse in brief.	5	1,2	1,2	1
b.	Justify the use of Parks transformation in describing the model of synchronous machine.	5	1,2	3	2
c.	Define steady state and transient stability.	5	1,2	1,2	3,4
d.	What are the principal causes of voltage in stability?	5	1,2	1,2	6
					7
Q.2					
a.	Discuss and derive the expressions after transforming a 3 phase balance set to the arbitrary reference frame and also discuss the balanced steady state phasor relationship in transformed variables.	15	1,2	1,2,3	2
b.	Transform stationary three phase resistive element to arbitrary reference frame.	05	1,2	1,2,3	2
Q.3.					
a.	Derive swing equation.	05	1,2	3	4
b.	A 60 Hz synchronous generator having inertia constant $H=9.94$ MJ/MVA and transient reactance of $X_d' = 0.3$ pu is connected to an infinite bus through a purely reactive circuit as shown below. Reactances are marked on the diagram on a common system base. The generator is delivering real power of 0.6 pu, 0.8 power factor lagging to the infinite bus at the voltage of $V = 1$ pu. Assuming the per unit damping power coefficient is $D = 0.138$. Consider a small disturbance of $\Delta\delta = 10^\circ = 0.1745$ radian. Obtain equations describing the motion of rotor angle and generator frequency.	15	1,2	3	4



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Q.4	a. Critically analyze the application of Equal Area Criterion, for studying Transient Stability, for change in the mechanical input for the system shown below. b. For the system shown below, Assume that input power is constant. The rotor is running at synchronous speed. Consider a three phase fault at the middle of one line. Apply modified Euler's Method and derive expressions for iterative solution of resulting swing equation.	10	1,2	3,4	5
Q.5.	a. For the simple radial system shown below Discuss the various transmission system characteristics by deriving appropriate equations and relevant relationships, using equations and graphical representations, among power system variables explaining the voltage stability phenomenon. b. Discuss any one method for prevention of voltage instability.	15	1,2	1,2,3	6
		05	1,2	1,2	6



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Q. 6.	Write short notes on any two. a. High speed fault clearing. b. Steam turbine fast valving c. High speed excitation system d. Power system stabilizers.	10 10 10 10	1,2	1,2	7
Q. 7.					
a.	Describe the two important aspects in the analysis of voltage stability of a power system.	10	1,2	1,2	6
b.	Consider a 3 phase RL circuit defined by $\mathbf{r}_s = \text{diag} [r_s \ r_s \ r_s]$ $\mathbf{L}_s = \begin{bmatrix} L_s & M & M \\ M & L_s & M \\ M & M & L_s \end{bmatrix}$ Represent the circuit in arbitrary reference frame.	10	1,2	1,2,3	2



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END-SEM \ RE EXAMINATION MAY 2025



Program: B.Tech (Electrical) *Sem VIII*

Duration: 3Hr

Course Code: PE-BTE806

Maximum Points: 100

Course Name: Industrial Automation

Semester: VIII

Notes: 1) Q1. is compulsory Solve any four from remaining questions.

2) Assume Suitable data if required and justify the same.

14/5/25

Q. No.	Questions	Points	CO	BL	Mod No.
1a	What is proportional Kick? How to eliminate it?	05	02	02	02
1b	What is the difference between FAT and SAT.	05	04	02	04
1c	Explain Architecture of Industrial Automation and List the advantages of Industrial Automation.	05	01	02	01
1d	Explain different terms associated with industrial PID. Derive industrial form of PID if textbook form is $5+2/s+0.1 s$.	05	03	02	05
2a	In P&I diagram below identify the symbols and describe the process.	10	02	03	03



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2b	What are the different project stages? What are the steps involved in procurement of material / equipment.	10	04	02	04
3a	Explain DCS in detail.	05	03	02	05
3b	What is HMI and RTU?	05	03	03	05
3c	What are the different data files in a PLC? Explain in detail.	10	03	03	05
4a	Explain in detail following instructions: TOF, MOV, JMP and RES.	08	03	02	05
4b	Write a PLC program to turn on three lamps in a sequence and turn off them in the same sequence. There is a manual start push button and stop push button, both of NO type. Do it in following ways: a) Use timers to execute the sequence. Assume sequence as :- - Lamp L1 turns ON when the process starts - After 5 seconds L2 starts - After 15 seconds L3 starts - All the lamps remain ON for exactly 30 seconds and then are turned OFF in the same sequence b) Use sequencer instruction to execute above sequence.	12	01, 03	03	05
5a	List different PID tuning methods? Explain any one in detail.	10	02	03	02
5b	What is a CNC machine? Explain its working principle, advantages and limitations.	10	04	02	07
6a	Design a PI controller for following system. Design specifications are: No steady state offset to step reference signals, 2% settling time < 15 minutes and little overshoot. Assume $K=1$, time constant $\tau = 5$ minutes, $r=1$ unit and $d=0.5$ unit.	10	02	03	02



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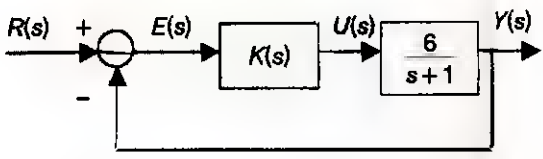
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6b	For an input step of magnitude 3, determine the steady state error for the controller $K(s)$ being: (a) a proportional controller; (b) a P+D controller; (c) a P+I controller Comment on the error produced for each controller. 	10	02	03	02
7a	List any four the names of PLC Manufacturers and programming languages? What is the role of following elements of PLC: input-output module, power supply, programming terminal.	10	01 04	02	05
7b	Explain Accuracy, Range and linearity. Explain the terms: MTTR and MTBF.	10	04	02	06



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End/~~Re~~-Semester AY2024-2025



Program: B. Tech Electrical

sem VIII

Duration: 3 Hr

Course Code: OE-BTE805

Maximum Points: 100

Course Name: Image Processing

Semester: VIII

Note: Q1 is compulsory. Solve any four questions out of remaining six questions

16/9/25

Assume suitable data if required.

Q. No	Questions	Po int s	C O	BL	Mod ule no																		
1 a	Quality of an image depends on number of pixels and gray levels of the picture. Justify or contradict.	4	1	2	1																		
b	Explain Median filter. For the following image perform median filtering <table border="1"><tr><td>24</td><td>26</td><td>34</td></tr><tr><td>38</td><td>44</td><td>32</td></tr><tr><td>32</td><td>30</td><td>38</td></tr></table>	24	26	34	38	44	32	32	30	38	4	2	2	2									
24	26	34																					
38	44	32																					
32	30	38																					
c	Compare the number of computations to compute 256 point DFT using direct method and DIT FFT algorithm.	4	3	2	6																		
d	Derive an expression of optimum thresholding used in image segmentation	4	2	2	4																		
e	With an example explain dilation used in binary image processing	4	4	3	5																		
2 a	Modify Histogram A as Histogram B Histogram A: <table border="1"><tr><td>Gray level r_k</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>No. of pixels n_k</td><td>790</td><td>1023</td><td>850</td><td>656</td><td>329</td><td>245</td><td>122</td><td>81</td></tr></table>	Gray level r_k	0	1	2	3	4	5	6	7	No. of pixels n_k	790	1023	850	656	329	245	122	81	10	2	3	2
Gray level r_k	0	1	2	3	4	5	6	7															
No. of pixels n_k	790	1023	850	656	329	245	122	81															



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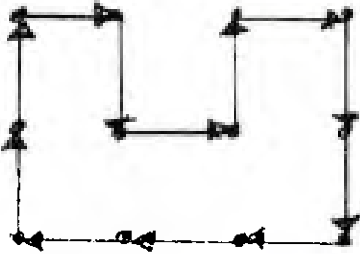
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End/~~Exam~~ Semester AY2024-2025



Histogram B:								
Gray level r_k	0	1	2	3	4	5	6	7
No. of pixels n_k	0	0	0	614	819	1230	819	614
b	What is edge linking? Explain the method used for edge linking? The four pixels of an image has coordinates (2,1) (2,2) (2,3) (2,4). Join the maximum number of pixels using edge linking algorithm and write the equation of the same.	10	2	3	4			
3 a	Explain and compare the following segmentation operators 1. Sobel 2. Prewitt 3. Gradient 4. Laplacian	10	2	2	4			
b	Explain various methods used for image representation. For the following image write chain code, normalized chain code to starting point, first difference, circular first difference, shape number START → 	10	3	2	4			
4 a	Compute Discrete Fourier, Hadamard and Discrete cosine transforms for the image below and compare the results.	15	3	3	6			



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	<table><tr><td>3</td><td>0</td><td>3</td><td>0</td></tr><tr><td>1</td><td>2</td><td>1</td><td>1</td></tr><tr><td>3</td><td>0</td><td>3</td><td>0</td></tr><tr><td>1</td><td>2</td><td>1</td><td>1</td></tr></table>	3	0	3	0	1	2	1	1	3	0	3	0	1	2	1	1				
3	0	3	0																		
1	2	1	1																		
3	0	3	0																		
1	2	1	1																		
b	Apply the following image enhancement technique on following image [0-7] gray levels (i) Image Negative (ii) Bit plane slicing (iii) Contrast stretching [if $s=T[r]$ and $r_1=3$ $r_2=5$ $s_1=2$ $s_2=6$] <table><tr><td>2</td><td>3</td><td>5</td><td>6</td></tr><tr><td>5</td><td>1</td><td>6</td><td>2</td></tr><tr><td>3</td><td>1</td><td>2</td><td>4</td></tr><tr><td>4</td><td>3</td><td>2</td><td>1</td></tr></table>	2	3	5	6	5	1	6	2	3	1	2	4	4	3	2	1	05	2	3	2
2	3	5	6																		
5	1	6	2																		
3	1	2	4																		
4	3	2	1																		
5 a	Compare Lossy and Lossless Image compression techniques. How Huffman code is used for image compression? Also, explain how the Huffman code is decoded? Form Huffman code and decoding tree for the following image data <table><tr><td>Gray Level</td><td>L1</td><td>L2</td><td>L3</td><td>L4</td><td>L5</td></tr><tr><td>Probability</td><td>0.5</td><td>0.03</td><td>0.15</td><td>0.02</td><td>0.3</td></tr></table>	Gray Level	L1	L2	L3	L4	L5	Probability	0.5	0.03	0.15	0.02	0.3	10	3	3	7				
Gray Level	L1	L2	L3	L4	L5																
Probability	0.5	0.03	0.15	0.02	0.3																
b	Explain how is the image processed in spatial and frequency domain? Given a spatial domain mask $h(x,y)$ as follows:	10	2	2	3																



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		1/9	1/9	1/9					
		1/9	1/9	1/9					
		1/9	1/9	1/9					
	Find equivalent filter in frequency domain.								
6 a	Explain vector quantization used for image compression. Generate codebook of size 4				10	3	3	7	
	160	160	160	160	160	160	160	160	80
	160	200	180	180	180	180	200	160	80
	160	200	220	220	220	220	200	160	80
	160	200	220	230	230	230	200	160	80
	160	200	220	230	250	230	200	160	80
	160	200	220	230	230	230	200	160	80
	160	200	220	200	200	200	200	160	80
	160	200	220	220	220	220	200	160	80
	160	160	160	160	160	160	160	160	80
	80	80	80	80	80	80	80	80	80
b	A satellite image needs to process and identify land cover types such as forest, water, urban etc.. Explain in detail with justification, the image processing algorithms which can be used for the same.				10	1	2	1	
7	With application and example explain the following morphology algorithms 1. Erosion 2. Convex Hull 3. Hit or miss 4. Thickening 5. Thinning 6. Region filling				20	4	2	5	



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~~End/Reexam~~ Semester ~~AY 2024-2025~~
June

Program: B. Tech Electrical

Sem VIII

Duration: 3 Hr

Course Code: OE-BTE805

Maximum Points: 100

Course Name: Image Processing

Semester: VIII

Note: Q1 is compulsory. Solve any four questions out of remaining six questions

m/b/25

Assume suitable data if required.

Q. No	Questions	Po int s	C O	BL	Mod ule no																		
1 a	Compare 4-, 8- and m- adjacency.	4	1	2	1																		
b	Write the 3x3 masks that can be used as 1. Low pass filter 2. High pass filter 3. High Boost filter	4	2	2	2																		
c	Draw the flow graph to evaluate 8 point DFT using DIT FFT algorithm	4	3	2	6																		
d	Explain the principles on which image segmentation can be achieved.	4	2	2	4																		
e	With an example explain erosion used in binary image processing	4	4	3	5																		
2 a	Given an image with poor contrast. Justify how histogram equalization will improve the image quality. For the following image data perform Histogram equalization. Draw Histograms before and after equalization. <table><tr><td>Gray level r_k</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>No. of pixels n_k</td><td>790</td><td>1023</td><td>850</td><td>656</td><td>329</td><td>245</td><td>122</td><td>81</td></tr></table>	Gray level r_k	0	1	2	3	4	5	6	7	No. of pixels n_k	790	1023	850	656	329	245	122	81	10	2	3	2
Gray level r_k	0	1	2	3	4	5	6	7															
No. of pixels n_k	790	1023	850	656	329	245	122	81															
b	What is thresholding?	10	2	3	4																		



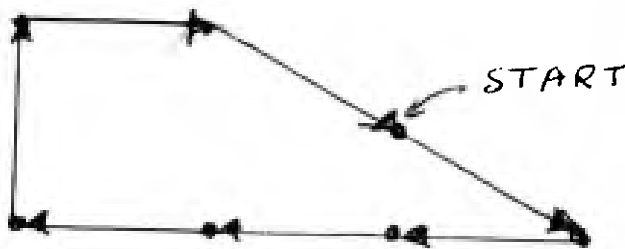
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~~End/Reexam Semester~~ **AY 2024-2025**

June

	Explain global, local and adaptive thresholding. An image composed of small non overlapping blobs of mean gray level 125 and variance 400 on a background of mean 16 and variance 400. All blobs occupy 25% of the image area. Find threshold																																																																				
3 a	Explain region growing, region splitting and region merging algorithms on the following image. Assume the $\max(g(x,y)) - \min(g(x,y)) \leq 3$ and any seed pixel for region growing algorithm <table><tr><td>155</td><td>156</td><td>156</td><td>156</td><td>157</td><td>157</td><td>156</td><td>156</td></tr><tr><td>156</td><td>157</td><td>156</td><td>157</td><td>155</td><td>155</td><td>154</td><td>157</td></tr><tr><td>156</td><td>156</td><td>154</td><td>154</td><td>153</td><td>152</td><td>155</td><td>156</td></tr><tr><td>155</td><td>154</td><td>155</td><td>154</td><td>152</td><td>153</td><td>154</td><td>156</td></tr><tr><td>150</td><td>153</td><td>152</td><td>153</td><td>153</td><td>152</td><td>154</td><td>157</td></tr><tr><td>150</td><td>150</td><td>150</td><td>150</td><td>152</td><td>152</td><td>155</td><td>156</td></tr><tr><td>151</td><td>151</td><td>150</td><td>151</td><td>150</td><td>153</td><td>154</td><td>154</td></tr><tr><td>151</td><td>150</td><td>151</td><td>150</td><td>152</td><td>153</td><td>155</td><td>154</td></tr></table>	155	156	156	156	157	157	156	156	156	157	156	157	155	155	154	157	156	156	154	154	153	152	155	156	155	154	155	154	152	153	154	156	150	153	152	153	153	152	154	157	150	150	150	150	152	152	155	156	151	151	150	151	150	153	154	154	151	150	151	150	152	153	155	154	10	2	2	4
155	156	156	156	157	157	156	156																																																														
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End/Reexam Semester AY2024-2025

June



4	a	Compute Discrete Fourier, Hadamard and Discrete cosine transforms for the image below and compare the results. <table><tr><td>1</td><td>1</td><td>1</td><td>2</td></tr><tr><td>2</td><td>2</td><td>1</td><td>2</td></tr><tr><td>3</td><td>3</td><td>1</td><td>2</td></tr><tr><td>4</td><td>4</td><td>1</td><td>2</td></tr></table>	1	1	1	2	2	2	1	2	3	3	1	2	4	4	1	2	15	3	3	6									
1	1	1	2																												
2	2	1	2																												
3	3	1	2																												
4	4	1	2																												
	b	For 3 bit pixel image perform gray level slicing $r1=3$ and $r2=5$ -- Without background -- With background For the same image do thresholding if $T=4$ <table><tr><td>6</td><td>2</td><td>7</td><td>6</td><td>0</td></tr><tr><td>2</td><td>1</td><td>2</td><td>2</td><td>1</td></tr><tr><td>2</td><td>3</td><td>4</td><td>5</td><td>2</td></tr><tr><td>0</td><td>3</td><td>2</td><td>2</td><td>1</td></tr><tr><td>2</td><td>6</td><td>6</td><td>5</td><td>1</td></tr></table>	6	2	7	6	0	2	1	2	2	1	2	3	4	5	2	0	3	2	2	1	2	6	6	5	1	05	2	3	2
6	2	7	6	0																											
2	1	2	2	1																											
2	3	4	5	2																											
0	3	2	2	1																											
2	6	6	5	1																											
5	a	Explain how filtering is done in frequency domain Given a spatial domain mask $h(x,y)$ as follows: <table><tr><td>0</td><td>1/6</td><td>0</td></tr><tr><td>1/6</td><td>1/3</td><td>1/6</td></tr><tr><td>0</td><td>1/6</td><td>0</td></tr></table> Find equivalent filter in frequency domain.	0	1/6	0	1/6	1/3	1/6	0	1/6	0	10	2	2	3																
0	1/6	0																													
1/6	1/3	1/6																													
0	1/6	0																													
	b	For the following image write Run length code and Huffman code	10	3	3	7																									



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and determine the number of bits required to represent image in each case.											
250	250	250	250	250	250	250	250				
250	250	250	250	250	250	250	250				
250	250	250	250	250	250	250	250				
200	200	200	200	200	200	200	200				
200	200	200	200	200	200	200	200				
200	200	200	200	200	200	200	200				
200	200	200	150	150	150	150	150				
100	100	100	100	100	100	100	100				
6 a	Write a short note on each 1. JPEG image Formation 2. Vector quantization							10	3	3	7
b	The character recognition system is developed for hand written characters. Explain the various components and algorithms in detail required to be used for the same.							10	1	2	1
7 a	With application and example explain the following morphology algorithms 1. Dilation 2. Closing 3. Convex Hull 4. Hit or miss							10	4	2	5
b	Explain algorithm hole filling. With steps show hole filling for the below image and structuring element Image							10	4	2	5



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END SEM/RE-EXAMINATION MAY/JUNE 2025

Program: B. Tech

Elect Sem VII

Course Code: PE-BTE802

Course Name: Smart Grid

Duration: 03 Hour

Maximum Points: 100

Semester: VIII

Instructions:

1. Attempt any FIVE questions.
2. Draw neat diagrams wherever possible.

201925

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1(a)	What is the need of smart grid implementation? Discuss the important functions and opportunities of smart grid. Hence, explain CDM opportunities in smart grid.	01+ 06+ 03	01	L-1	01
Q. 1(b)	Explain the role of Plug in Hybrid Electric Vehicle (PHEV) in making greener future. Hence state advantages and disadvantages of PHEV from smart grid point of view.	04+ 03+ 03	01	L-1	02
Q. 2 (a)	List the different types of Smart appliances used in smart grid. Explain the key features of smart appliances. Hence, describe the different tasks to be performed by home area network (HAN) in smart grid environment.	02+ 04+ 04	01	L-1	02
Q. 2 (b)	What is GIS? Explain the complete GIS process with flowchart and it's application in different fields. State advantages and disadvantages of GIS.	01+ 02+ 01+ 03+ 03	02	L-1	03
Q. 3 (a)	Explain the working of Phasor Measurement Unit with block diagram in detail. State the advantages of PMU over the conventional methods.	02+ 06+ 02	02	L-1	03
Q. 3 (b)	Explain the significance of smart storage. Hence describe pumped hydro compressed air energy storage with diagram in detail.	02+ 08	02	L-1	03



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END SEM/RE-EXAMINATION MAY/JUNE 2025

Q. 4 (a)	What is the need of microgrid? How microgrid formation takes place? Hence explain different modes of operation of microgrid.	01+ 02+ 05	03	L-1	04
Q. 4 (b)	Write detail notes on the following by explaining working principle with diagram and it's applications. (1) Micro turbine. (2) Thin film solar cell. (3) Fuel cells.	04+ 04+ 04	03	L-1	04
Q. 5 (a)	Why power quality audit is necessary in smart grid? Hence explain the various steps followed to conduct power quality audit.	04+ 04	03	L-1	05
Q. 5 (b)	Explain the different power quality issues of grid connected renewable energy sources integrated in Smart Grid. Hence, what is power quality conditioner? Explain different power quality conditioners used in Smart Grid (Any Two).	03+ 01+ 04+ 04	03	L-1	05
Q. 6 (a)	What is the importance of information and communication technology system (ICT) in smart grid environment? Hence explain the advanced metering infrastructure (AMI) used for Smart Grid in detail. Discuss the wireless mesh network used for smart grid communication.	04+ 04+ 04	04	L-1	06
Q. 6 (b)	Explain Home area network (HAN), neighbourhood area network (NAN), wide area network (WAN) and do their comparative analysis.	02+02 +02+02	04	L-1	06
Q. 7 (a)	What is cloud computing? Hence draw and explain the cloud computing architecture. Explain the solution to smart grid cyber security system.	01+01 +04 04	04	L-1	07
Q. 7 (b)	Explain the different cloud computing opportunities and challenges. Hence explain cloud based smart meter.	04+ 04+ 02	04	L-1	07



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~~END SEM~~ RE-EXAMINATION ~~MAY~~ JUNE 2025

Program: B. Tech

Duration: 03 Hour

Course Code: PE-BTE802

Maximum Points: 100

Course Name: Smart Grid

Semester: VIII

Instructions:

1. Attempt any FIVE questions.
2. Draw neat diagrams wherever possible.

25/6/25

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1(a)	What is the need of smart grid implementation? Discuss the important functions and opportunities of smart grid. Hence, explain CDM opportunities in smart grid.	01+ 06+ 03	01	L-1	01
Q. 1(b)	Explain the role of Plug in Hybrid Electric Vehicle (PHEV) in making greener future. Hence state advantages and disadvantages of PHEV from smart grid point of view.	04+ 03+ 03	01	L-1	02
Q. 2 (a)	List the different types of Smart appliances used in smart grid. Explain the key features of smart appliances. Hence, describe the different tasks to be performed by home area network (HAN) in smart grid environment.	02+ 04+ 04	01	L-1	02
Q. 2 (b)	What is GIS? Explain the complete GIS process with flowchart and it's application in different fields. State advantages and disadvantages of GIS.	01+ 02+ 01+ 03+ 03	02	L-1	03
Q. 3 (a)	Explain the significance of smart storage. Hence describe pumped hydro compressed air energy storage with diagram in detail.	02+ 08	02	L-1	03
Q. 3 (b)	Explain the working of Phasor Measurement Unit with block diagram in detail. State the advantages of PMU over the conventional methods.	02+ 06+ 02	02	L-1	03



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END SEM/RE-EXAMINATION MAY/JUNE 2025

Q. 4 (a)	What is the need of microgrid? How microgrid formation takes place? Hence explain different modes of operation of microgrid.	01+ 02+ 05	03	L-1	04
Q. 4 (b)	Write detail notes on the following by explaining working principle with diagram and it's applications. (1) Micro turbine. (2) Variable speed wind generators. (3) Fuel cells.	04+ 04+ 04	03	L-1	04
Q. 5 (a)	Explain the different power quality issues of grid connected renewable energy sources integrated in Smart Grid. Hence, what is power quality conditioner? Explain different power quality conditioners used in Smart Grid (Any Two).	03+ 01+ 04+ 04	03	L-1	05
Q. 5 (b)	Why power quality audit is necessary in smart grid? Hence explain the various steps followed to conduct power quality audit.	04+ 04	03	L-1	05
Q. 6 (a)	What is the importance of information and communication technology system (ICT) in smart grid environment? Hence explain the advanced metering infrastructure (AMI) used for Smart Grid in detail. Discuss the wireless mesh network used for smart grid communication.	04+ 04+ 04	04	L-1	06
Q. 6 (b)	Explain Home area network (HAN), neighbourhood area network (NAN), wide area network (WAN) and do their comparative analysis.	02+02 +02+02	04	L-1	06
Q. 7 (a)	What is cloud computing? Hence draw and explain the cloud computing architecture. Explain the solution to smart grid cyber security system.	01+01 +04 04	04	L-1	07
Q. 7 (b)	Explain the different cloud computing opportunities and challenges. Hence explain cloud based smart meter.	04+ 04+ 02	04	L-1	07



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End Semester Examination/ Re-Examination
May/June-2025

Max. Marks: 100

Class: **B.TECH.** *Elect* Semester: **VIII**

Name of the Course: **Advanced Electric Drives**

Duration: **03 Hours**

Program: **B.TECH. (Electrical)**

Course Code: **PE-BTE 805**

Instructions:

- Solve any four questions.
- Answers to all sub questions should be grouped together
- Figures to the right indicates full mark
- Assume suitable data if required and justify the same.

20/5/25

Qu. No	Description of question	Max. Marks	CO
1. a)	What are the limitations of per phase equivalent circuit model of three phase induction motor? Suggest the applications where this model is used and reasons for the same.	05	02
1.b)	For low speed operation of induction motor, it is difficult to maintain the constant flux using V/F control. Justify it.	05	02
1.c)	What is the harmonic spectrum in phase voltage and line voltage output of square wave inverter.	05	02
1.d)	What are the benefits of adding third harmonic voltage in modulating wave of sine-triangle PWM technique control of three phase inverter?	05	01
2. a)	Discuss the constant torque and constant power operation of separately excited DC motor with the torque, power, current, and voltage and speed characteristics.	08	01
2. b)	Develop the model of three phase induction motor in stationary reference frame. And draw the equivalent circuit.	12	03

3. a)	What is stator flux oriented control of three phase induction motor? Compare the direct and indirect stator flux oriented control of three phase induction motor.	12	02
3. b)	Develop the torque equation of three phase induction motor in: (i) Stationary reference frame (ii) Synchronously rotating reference frame.	08	02
4. a)	What is indirect rotor flux oriented control (FOC) of three phase induction motor? Draw the block diagram and discuss the closed-loop implementation under constant flux operation of induction motor.	12	03
4. b)	What is four quadrant operation of separately excited DC motor? Draw the circuit and explain this operation by DC-DC converter.	08	03
5. a)	What is direct torque control (DTC) of three phase IM? Develop the mathematical equations for the implementation of DTC of three phase IM.	12	03
5. b)	Discuss the Sine-Triangle PWM technique to control the inverter. Compare the magnitude of output voltage of inverter in sine-triangle PWM technique and square wave inverter technique.	08	01
6. a)	For space vector modulation technique, calculate the magnitude and angle of all switching positions (eight switching positions) and draw its space diagram.	12	01
6. b)	A PMSM is controlled in field weakening mode. Draw the block diagram and suggest the suitable control technique.	08	02
7. a)	Draw the schematic diagram of synchronous machine and discuss the model of synchronous motor in synchronous reference frame	10	03
7. b)	What is the working principle of switched reluctance motor (SRM)? Discuss the different configurations and control techniques of SRM drive.	10	02