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B. Tech. 6th Semester (EE)
Examination – May, 2025

POWER SYSTEMS - II

Paper : PCC-EE-302-G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What do you mean by control area in power system ? Explain it.

   (b) Why do we go for iterative methods to solve load problems ?

   (c) Define the term ITL.

   (d) Define steady state stability.

     P. T. O.

(e) In which condition generator bus is treated as load bus ?

(f) What is the objective of the economic dispatch problem ? $6 \times 2.5 = 15$

SECTION – A

2. Detail the algorithm to perform load flow using GS method and also draw its flow chart. 15

3. Formation of y bus by direct inspection method for the data as given below : 15

Sr. No.	Sending node	Receiving node	R(PU)	X(PU)
1	1	2	0.10	0.40
2	1	4	0.15	0.60
3	2	3	0.05	0.20
4	3	4	0.10	0.40
5	4	5	0.10	0.40
6	5	3	0.15	0.60
7	2	4	0.15	0.60

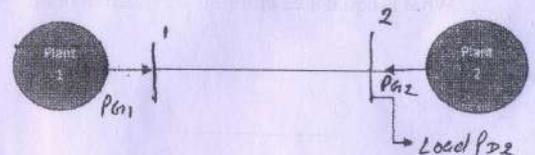## SECTION – B

4. In a two bus system if 100MW is transmitted from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by the load when the system λ is Rs. 25/MWh. The Incremental fuel costs of the two plants are given below : 15

$dC_1/dP_{G1}=0.020\, P_{G1} + 16\, Rs./MWh$

$dC_2/dP_{G2}=0.04\, P_{G2} + 20\, Rs./MWh$

5. Derive the expression for economic load dispatch considering transmission line losses. 15

SECTION – C

6. What are the different methods for voltage control ? Explain them in brief. 15

7. Explain with block diagram of single area load frequency control. 15

SECTION – D

8. Derive swing equation and discuss its application in study of power system stability. 15

9. (a) Derive an expression for the maximum power transfer between two nodes, Show that this power is maximum when $X = \sqrt{3}R$. Where X is reactance and R is the resistance of the system. 10

    (b) What is equal area criterion ? Explain in brief. 5

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B. Tech. 6th Semester (EE)
Examination – May, 2025

POWER ELECTRONICS

Paper : PCC-EE-205-G

Time : Three Hours] [*Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Draw the equivalent circuit of IGBT and explain.

    $10 \times 1.5 = 15$

   (b) Draw the switching characteristics of Power Transistor.

   (c) What are the necessary conditions for turning ON a SCR ?

   (d) Mention the advantages of RC triggering over R triggering.

P. T. O.

(e) Draw the circuit diagram of three phase M-3 controlled converter.

(f) Obtain the output waveforms & average output voltage for I-phase Half wave controlled rectifier with RL load.

(g) Write the applications of inverter.

(h) What are the applications of DC chopper ?

(i) What is ON-OFF control in ac voltage controllers ?

(j) What is meant by Duty cycle ?

SECTION – A

2. (a) Write about the role of power electronics. What are the requirements of good gate driver circuits of IGBT and MOSFET ?   7.5

   (b) Explain the various triggering modes, construction and working of a TRIAC.   7.5

3. Write technical notes on: DIAC, Power Diode & SIT.   15

SECTION – B

4. Explain construction, characteristics, ratings and protection in SCR.   15

5. (a) Explain the series and parallel connections in SCRs.   7.5

   (b) Write technical notes on: pulse transformer and opto-coupler.   7.5

SECTION – C

6. (a) Describe a 3-phase half wave diode bridge rectifier with a circuit diagram and relevant waveforms for R load.   7.5

   (b) Explain the operation of single phase two pulse midpoint converter with relevant voltage and current waveforms and also derive the expression for average output voltage.   7.5

7. Write down about four quadrant / dual converter. 15

SECTION – D

8. Explain 120 degree mode and 180 degree mode inverters.   15

9. (a) Differentiate between voltage and current commutated choppers.   7.5

   (b) Write about four quadrant chopper.   7.5

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B. Tech. 6th Semester (EE)
Examination – May, 2025
ELECTRONICS DESIGN LABORATORY

Paper : LC-EE-310G

Time : Three Hours]   *[Maximum Marks : 50*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What are the basics of PCB design ?   2.5 × 4 = 10

   (b) Why is 8051 called 8-bit microcontroller?

   (c) Discuss the function of transducer.

   (d) Enlist various parts of CRO.

3351-950 -(P-2)(Q-9)(25)   P. T. O.

UNIT – I

2. Describe various elements of generalised measurement system. 10

3. What do you mean by the term noise ? Give the classification of noise for an electronic system. 10

UNIT – II

4. What is signal conditioning ? Explain different types of signal conditioning. 10

5. Draw and explain the block diagram of data acquisition system. Also discuss its objectives. 10

UNIT – III

6. Explain the interfacing of LCD with 8051 microcontroller. 10

7. Explain the working of CPLD and FPGA. 10

UNIT – IV

8. Describe various characteristics of ideal operational amplifier. 10

9. Write a short note on electronic system design employing microcontroller. 10

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B. Tech. 6th Semester (EE) (Elective - III) Examination – May, 2025

POWER SYSTEM PROTECTION

Paper : PEC-EE-06-G

Time : Three Hours]   [Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :   Attempt *five* questions in all, selecting *one* question from each Section. Question No. **1** is *compulsory*. All questions carry equal marks.

1. (i)   Explain the component of protection system ?   15

   (ii) Specify the types of faults ?

   (iii) How we can do the testing of relay.

   (iv) How the power swings effect the system ?

SECTION – A

2. Explain the classification of circuit breaker in details. 15

3. Write notes on :   15

    (a) Instrument transformers

    (b) Protection against the failure of excitation.

SECTION – B

4. Explain the over current and earth fault protection of
   transformer.   15

5. Drive the expression for the double line to ground
   fault.   15

SECTION – C

6. Explain the bus bar protection in detail ?   15

7. Explain the simulation of transient using electro-
   magnetic transient programme.   15

SECTION – D

8. Write notes on :   15

    (a) Out-of-step protection

    (b) Synchro-phasor

9. Explain the under voltage system protection scheme.
                                                          15

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B. Tech. 6th Semester (EE) (Elective - IV)
Examination – May, 2025

ADVANCE ELECTRIC DRIVES

Paper : PEC-EE-18G

Time : Three Hours]　　　　　　　[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. **1** is *compulsory*. All questions carry equal marks.

1. (a) Explain the concept of selected harmonic elimination in PWM techniques.　　　　　$10 \times 1.5 = 15$

   (b) Describe the operation and advantages of three-level inverters in AC drives.

   (c) Discuss the advantages and limitations of using PWM converters as line-side rectifiers.

   (d) Explain the concept of H-bridge as a 4-quadrant drive and its applications.

3353- 600-(P-4)(Q-9)(25)　　　　　　　　P. T. O.

(e) Explain the concept of reference frame theory in induction motor drives.

(f) Explain the principles of voltage-fed inverter control, including vector control.

(g) Explain the Evolution of switched reluctance motors in brief.

(h) What do you mean by space vector modulation ?

(i) Explain open loop v/f control for synchronous machines in brief.

(j) Explain the operation of diode rectifiers with boost choppers in AC drives.

SECTION – A

2. Discuss the principles of PWM control in AC drives and its advantages. Explain the concept of selected harmonic elimination and its significance in reducing harmonic distortion in motor operation.   15

3. Describe the operation and advantages of three-level inverters in AC drives. Discuss the different topologies and control techniques used in three-level inverters, such as space vector modulation.   15

SECTION – B

4. Explain the operation of diode rectifiers with boost choppers in AC drives. Discuss the advantages and limitations of using PWM converters as line-side rectifiers in motor control applications.   15

5. Discuss the control strategies for Current Source Inverters (CSI) in AC drives.   15

SECTION – C

6. Explain the concept of reference frame theory in induction motor drives. Discuss the different transformations used. such as dq0 transformation, and their significance in motor control.   15

7. Describe the modelling of induction machines for control purposes. Explain the principles of voltage fed inverter control, including v/f control and vector control, and their applications in motor control.   15

SECTION – D

8. Discuss the principles and advantages of Direct Torque Control (DTC) for induction motor drives. Explain how DTC achieves fast and accurate torque control without the need for speed or position sensors.   15

9. Describe the characteristics and applications of permanent magnet motors, such as BLDC and PMSM. Compare different types of permanent magnet motors and discuss the configurations and control techniques used in BLDC and PMSM drives. 15

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B. Tech. 6th Semester (EE) (Elective - V) Examination – May, 2025

CONVENTIONAL AND RENEWABLE ENERGY RESOURCES

Paper : OEC-EE-08G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) What are the recent trends in power generation ?
$$10 \times 1.5 = 15$$

    (b) Explain the significance of load factor in power generation.

    (c) Describe the working principle of a thermal power station.

    (d) Discuss the selection criteria for wind energy plant sites.

3357-1050-(P-3)(Q-9)(25)   P. T. O.

(e) Define energy audit and its importance.

(f) What is co-generation and how does it contribute to energy conservation?

(g) Differentiate between base load and peak load power plants.

(h) Describe the working principle of a nuclear power plant.

(i) How are reserves and depreciation accounted for in power generation planning?

(j) Explain the concept of group diversity factor in load forecasting.

SECTION – A

2. Discuss the availability of different energy sources worldwide and their contribution to power generation. 15

3. Explain the concept of interconnected generation of power plants and its advantages. 15

SECTION – B

4. Explain the concept of load forecasting. How is it useful in power generation planning? 15

5. Discuss the significance of capacity factor and how it influences the selection of unit size in power plants. 15

SECTION – C

6. Compare and contrast thermal, hydroelectric, and nuclear power plants in terms of their working principles and environmental impacts. 15

7. Describe the selection criteria and working principles of hydroelectric power plants. 15

SECTION – D

8. Discuss the importance of energy management in electric energy conservation. 15

9. Explain the concept of energy-efficient motors and their role in energy conservation. 15

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B. Tech. 6th Semester (EE)
Examination – May, 2025

DIGITAL SIGNAL PROCESSING

Paper : PCC-ECE-307-G/PCC-EEE-306-G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit. Q. No. 1 is *compulsory*. All questions carry equal marks.

1. Explain the following : $2.5 \times 6 = 15$

   (a) What are the conditions for BIBO stability ?

   (b) Determine the ZT including the ROC of

   $$x(n) = \begin{cases} a^n, n \ge 0 \\ 0, n < 0 \end{cases}$$

(c) Find out the circular convolution of the two sequences $x_1(n) = \{1, 1, 2, 2\}$ and $x_2(n) = \{1, 2, 3, 4\}$.

(d) Describe the various application and advantages of MDSP.

(e) Differentiate analog and digital filters.

(f) Obtain the polyphase decompositions of the IIR digital system having following transfer function :

$$H(z) = \frac{1 - 4Z^{-1}}{1 + 5Z^{-1}}$$

UNIT – I

2. State and prove the sampling theorem. Draw the spectrum of a sampled signal and explain the aliasing effect.   15

3. (a) Determine the inverse Z-Transform of the following function by using partial fraction expansion method   10

$$X(Z) = \frac{Z}{3Z^2 - 4Z + 1}$$

(i) $|Z| > 1$

(ii) $|Z| < \dfrac{1}{3}$

(iii) $\dfrac{1}{3} < |Z| < 1$

(b) Explain the different properties of ROC of Z-transform.   5

UNIT – II

4. Discuss the various properties of Discrete Fourier Transform (DFT) in detail.   15

5. Determine the IDFT of $X(k) = \{1, 2, 3, 4\}$ 15

UNIT – III

6. (a) Design of FIR filter by using rectangular window function.   10

(b) What is meant by linear phase response ? Prove that filter with the following response has linear phase response : $h(n) = \{2, 1, 1, 2\}$.   5

7. (a) Design the digital IIR filter using bilinear transformation when the transfer function of analog filter is :   8

$$H_a(S) = \frac{3}{(S + 2)(S + 3)}$$

With $T = 0.1$

(b) Obtain the mapping formula for impulse invariant transformation.   7

UNIT – IV

8. Examine the decimation of smapling rate by an integer factor (M) with example.   15

9. Sketch the cascade and parallel realizations for the system function. 15

$$H(Z) = \frac{1 + \frac{1}{4}Z^{-1}}{\left(1 + \frac{1}{2}Z^{-1}\right)\left(1 + \frac{1}{2}Z^{-1} + \frac{1}{4}Z^{-2}\right)}$$