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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE367
Course Name: NEW AND RENEWABLE SOURCES OF ENERGY
(EE)

Max. Marks: 100 Duration: 3 Hours

PART A
Answer all questions, each carries 5 marks. Marks

1		What is the present status of various modes of renewable power generations in India. Explain.	(5)
2		Define and explain the following angles as related to solar geometry: (i) Surface azimuth angle (ii) Declination angle (iii) Latitude angle	(5)
3		Draw and Explain the VI characteristics of a solar cell. How does temperature affect the performance of solar cell?	(5)
4		List out any five merits and demerits of OTEC.	(5)
5		Discuss the different types of wind turbine rotors used to extract wind.	(5)
6		Explain the terms solidity, pitch angle, tip speed ratio, cut-in speed and cut speed of wind turbine	(5)
7		With a neat diagram, explain the working of biogas plant	(5)
8		What are the components of a micro hydel power plant	(5)

PART B
Answer any two full questions, each carries 10 marks.

9	a)	Explain various energy storage systems. Give advantages and disadvantages of each.	(6)
	b)	List the merits and de-merits of non-conventional energy resources	(4)
10	a)	Find the hour angle at the sunrise and the sunset on March 22 for a surface inclined at an angle of 20^0 facing south at New Delhi (280 35' N, 770 12' E).	(6)
	b)	Explain the principle, working and components of a solar flat plate collector	(4)
11	a)	Explain the principle and working of the following solar radiation measuring instruments: (i) Pyranometer (ii) Pyrheliometer and (iii) Sunshine recorder	(7)
	b)	What is solar constant? Explain.	(3)

PART C
Answer any two full questions, each carries10 marks.

12		Discuss the basic principle of OTEC. Describe a closed cycle OTEC with its advantages and disadvantages.	(10)
13	a)	Explain various types of tidal power plants.	(5)
	b)	Classify solar cell based on the type of material used. Explain each one.	(5)
14	a)	Draw and explain the block diagram of a standalone solar PV power system	(5)
	b)	A certain PV cell is illuminated with an irradiance of 1000 W/m^2. If the cell is 100 mm X 100 mm in size and produces 3 A at 0.5 V at the maximum power point. What is the conversion efficiency?	(3)
	c)	What is maximum power point tracking?	(2)

PART D

Answer any two full questions, each carries 10 marks.

15	a)	Prove that the maximum wind turbine output can be achieved when V_d=1/3 V_u, where V_d and V_u are down-stream and up-stream wind velocity respectively.	(6)
	b)	What is pitch control of wind turbine? Explain.	(4)
16	a)	Explain any two types of biogas plants? Discuss the factors which decide the quality of biogas.	(5)
	b)	Determine the power output of a wind turbine whose blades are 12 m in diameter and when the wind speed is 6 m/s, the air density is about 1.2 kg/m^3 and the maximum power coefficient of the wind turbine is 0.35.	(5)
17	a)	With a neat schematic diagram, explain the biomass gasification based electric power generation system.	(5)
	b)	Describe the working and constructional features of PEM fuel cell.	(5)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE369

Course Name: HIGH VOLTAGE ENGINEERING (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1 With neat diagram describe the working of a simple Voltage Doubler circuit for the generation of high DC voltages. (5)

2 How are damped high frequency oscillations obtained from a Tesla coil? (5)

3 What are the main components of a Multistage Impulse Generator? (5)

4 State the different factors affecting the Sphere Gap measurement. (5)

5 What is meant by Partial Discharge? Define Discharge Extinction Voltage. (5)

6 Explain the importance of RIV measurements for EHV power apparatus? (5)

7 Which are the classifications of high voltage laboratories? (5)

8 Explain the Impulse Testing of transformers. (5)

PART B

Answer any two full questions, each carries 10 marks.

9 A Cockcroft Walton type voltage multiplier has 8 stages with capacitances all equal to 0.05μF. The supply transformer secondary voltage is 125kV at a frequency of 150Hz. If the load current to be supplied is 5mA, find: (10)
(i) The percentage ripple (ii) The regulation (iii) The optimum number of stages for minimum regulation or voltage drop.

10 a) What is the basic principle of operation of an Electrostatic machine? (4)

b) Describe with neat diagram the principle of operation, advantages and limitations of Van de Graff generator. (6)

11 a) What is a Cascaded Transformer? Why cascading is done? (5)

b) Describe with neat diagram a three stage Cascaded Transformer. Label the power ratings of various stages of the transformer. (5)

PART C

Answer any two full questions, each carries 10 marks.

12 Give the Marx circuit arrangement for Multistage Impulse Generator. How is the basic arrangement modified to accommodate the wave time control resistances? (10)

13 Analyse an Impulse Generator circuit of series RLC type. (10)

14 a) With diagram explain the principle of operation of Generating Voltmeters. (6)

b) Discuss its advantages and limitations. (4)

PART D

Answer any two full questions, each carries 10 marks.

15 Explain the operation of high voltage Schering bridge when the test specimen: (10)
(i) is grounded (ii) has high loss factor.

16 Define the following terms used in HV testing as per the standards (10)
(i) Disruptive Discharge Voltage (ii) Creepage Distance
(ii) Impulse Voltage (iv) 100% Flash Over Voltage

17 What are the different tests conducted on bushings. Describe. (10)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE309

Course Name: MICROPROCESSOR AND EMBEDDED SYSTEMS (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries5 marks. Marks

1		Explain demultiplexing of Address/Data Bus.	(5)
2		Write a delay subroutine program in 8085 for 0.4 ms. Assume the clock frequency as 3 MHz.	(5)
3		Differentiate between maskable and non-maskable interrupts and list the interrupt related instructions.	(5)
4		Difference between Microprocessor and Microcontroller.	(5)
5		Write an ALP using 8051 to generate a square wave of 50% duty cycle.	(5)
6		Explain SFR's of 8051.	(5)
7		Explain Assembler Directives of 8051.	(5)
8		Explain the function of TMOD and TCON registers of 8051 Microcontroller.	(5)

PART B

Answer any twofull questions, each carries10 marks.

9		Explain the architecture of 8085 microprocessor with the help of a neat functional block diagram.	(10)
10		Draw and explain the timing diagram of LDAX D.	(10)
11	a)	Explain different addressing modes in 8085 with examples.	(6)
	b)	Explain the terms Machine cycle and T-states.	(4)

PART C

Answer any twofull questions, each carries10 marks.

12	a)	Draw the interrupt structure of 8085.	(5)
	b)	Design memory systems to interface 2K ROM and 2K RAM using 2K x 8 bit memory chips.	(5)
13	a)	Give the current trends and challenges in the field of Embedded Systems.	(5)
	b)	Describe the Embedded System product development model.	(5)
14	a)	Explain Assembler, Compiler, Linker and Loader.	(5)
	b)	Draw the block diagram of 8255.	(5)

PART D

Answer any twofull questions, each carries 10 marks.

15		With neat block diagram, explain the architecture of 8051.	(10)
16	a)	Explain the addressing modes of 8051 with examples.	(6)
	b)	Explain how serial port programming is done in 8051.	(4)
17		Show how an LCD can be interfaced with 8051 and also write a program to send 'Y', 'E', 'S' to LCD continuously.	(10)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE307

Course Name: SIGNALS AND SYSTEMS (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries5 marks. Marks

1 Define unit step function and plot x(t) and x(2t), if x(t) = u(t+2) - u(t-2) (5)

2 Find the unilateral Laplace Transform of ramp function $r(t) = t\,u(t)$. Specify the region of convergence (5)

3 Explain the Dirichlet's condition for the existence of Fourier Transform (5)

4 Define and plot the discrete time ramp signal r(n). Also plot r(n-2). (5)

5 Prove that the sequences $x(n) = a^n u(n)$ and $x(n) = -a^n u(-n-1)$have the same X(z) and differ only in ROC (5)

6 State and prove the convolution property of Z- transform (5)

7 Prove that the discrete Fourier series coefficient $C_k = \frac{1}{N}\sum_{n=0}^{(N-1)} x(n)e^{\frac{-j2\pi kn}{N}}$ for k=0,1,2...,N-1 (5)

8 Write the Fourier series representation of a discrete time periodic signal with periodicity N. What is the difference between continuous time and discrete time Fourier series? (5)

PART B

Answer any twofull questions, each carries10 marks.

9 a) Check whether the given signal x(t) is energy or power signal. Find the energy and power of the signal. $x(t) = e^{-5t}u(t)$ (4)

b) The impulse response of a LTI system is $h(t) = (2 + e^{-3t})\,u(t)$.Check whether the system is (i) Stable or unstable (ii) Causal or non causal (iii)Memory or memory less (6)

10 a) Find the response of a LTI system with impulse response $h(t) = e^{-2t}u(t)$ for an input $x(t) = t\,u(t)$. (4)

b) Check whether the system $y(t) = x(t)\,x(t-1)$ is (6)
i) Linear or Non linear ii) Causal or Non causal
iii) Time invariant or Time variant

11 For the following system described by differential equation, find the impulse response, if the system is (i) stable (ii) causal (10)

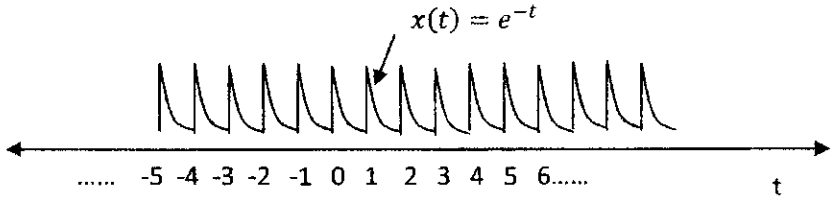
$$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = \frac{d^2x(t)}{dt^2} + 8\frac{dx(t)}{dt} + 13x(t)$$

Assume initial conditions as zero.

PART C

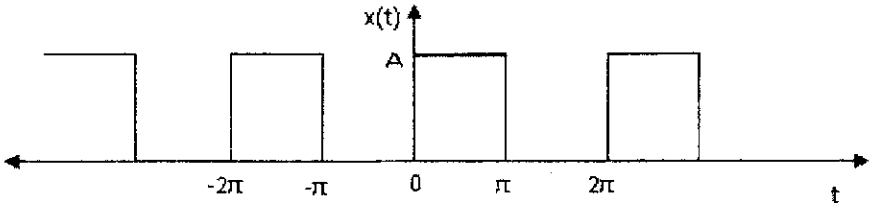
Answer any twofull questions, each carries10 marks.

12 Find the exponential Fourier series of the given signal. Plot the magnitude and phase spectrum. (10)



13 a) Find the Fourier transform of the signal $x(t) = e^{-at}u(t)$ (4)

b) Obtain the trigonometric Fourier series of the following signal (6)



14 a) State and prove Sampling Theorem (5)

b) Using matrixmethod find the convolution of$x[n] = \{1, 4, 3, 1\}$and $h[n] = \{1, 2, 3, 2\}$ (5)

PART D

Answer any twofull questions, each carries 10 marks.

15 a) Find the z-transfonn and ROC of $x(n) = \left(\frac{1}{3}\right)^n u(n)$ (4)

b) Find the inverse Z-transform of $X(z) = \frac{3z^{-1}}{(1-z^{-1})(1-2z^{-1})}$if (6)

i) ROC is $|z| > 2$ii) ROC is $|z| < 1$

16 An LTI system is described by the difference equation (10)

$$y(n) - \frac{9}{4}y(n-1) + \frac{1}{2}y(n-2) = x(n) - 3x(n-1)$$

Specify the ROC of H(z), and determine h(n) for the following conditions

i) The system is stable ii) The system is causal

17 Determine the Fourier series representation of the following discrete time signal and sketch the frequency spectrum (10)

x(n)={.....1,2,-1,1,2,-1,1,2,-1.....}

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE305

Course Name: POWER ELECTRONICS (EE)

Max. Marks: 100 Duration: 3 Hours

Graph sheets will be supplied.

PART A

Answer all questions, each carries 5 marks. Marks

1		Draw the circuit for two transistor analogy of silicon controlled rectifier and briefly describe the working.	(5)
2		Derive the expression for the output voltage of half wave controlled rectifier with R load.	(5)
3		Draw the input and output voltage waveforms of 3ø half controlled rectifier with R load for a firing angle of 30^0.	(5)
4		What are the different classifications of inverters?	(5)
5		Explain the terms modulation index and frequency modulation ratio related to pulse width modulation.	(5)
6		What are the control strategies for the regulation of output voltage in ac voltagecontrollers?	(5)
7		Explain time ratio control method to vary the output voltage in choppers.	(5)
8		Derive an expression for average output voltage in terms of input dc voltage and duty cycle for a step up chopper.	(5)

PART B

Answer any twofull questions, each carries10 marks.

9	a)	Derive the expression for resistance used for static voltage equalisation for a series connected string.	(5)
	b)	In a power circuit, 4 SCRs are to be connected in series in a string to handle 6kV and 1kA. The voltage and current ratings of SCRs are 1800V and 1000A and have a maximum difference in their blocking currents of 10mA. Difference in recovery charge is 10μC. Design a suitable equalizing circuit with figure.	(5)
10		A single phase semi converter delivers a constant load current I_O . Express its source current in Fourier Series and derive the expressions for displacement factor and current distortion factor.	(10)
11	a)	Explain the structure & principle of operation of IGBT.	(5)
	b)	Draw RC triggering circuit for SCR and explain with relevant wave forms.	(5)

PART C

Answer any two full questions, each carries10 marks.

12 Draw the circuit of 3 phase fully controlled rectifier with RLE load and explain the working for $\alpha=60^{\circ}$ with necessary waveforms. Derive the expression for output voltage. (10)

13 Explain the operation of 3 phase voltage source inverter with 180° mode of operation. (10)

14 Explain how two 3 phase full converters can be connected back to back to form a circulating current type of dual converter with the help of waveforms. (10)

PART D

Answer any two full questions, each carries 10 marks.

15 For a single phase voltage controller feeding a resistive load, describe the working with reference to source voltage, source current, output voltage and output current. (10)

16 Describe the working of four quadrant chopper with relevant circuit diagrams and its operation in all the four quadrants. (10)

17 Explain with circuit diagram and waveforms, the working of Buck regulator for continuous current mode. Obtain expressions for inductance and capacitance. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE303

Course Name: LINEAR CONTROL SYSTEMS (EE)

Max. Marks: 100 Duration: 3 Hours

Graph sheet and semi-log sheets will be supplied. Assume any missing data.

PART A

Answer all questions, each carries 5 marks.

1 Distinguish between open loop system and closed loop system. (5)

2 Obtain the transfer function of an AC tachogenerator. (5)

3 A unity feedback system has a open loop transfer function of $G(s) = \frac{10}{(s+1)(s+2)}$. Determine the steady state error for unit step input. (5)

4 What is angle criterion referred to root locus? (5)

5 Define gain margin and phase margin of a system. (5)

6 Determine the phase cross over frequency of a system with open loop transfer function $G(s) = \frac{1}{s(1+2s)(1+s)}$. (5)

7 Write a short note on Nichols chart. (5)

8 Explain the Nyquist stability criterion. (5)

PART B

Answer any two full questions, each carries 10 marks.

9 a) Obtain the force voltage analogy of a general mechanical translation system. (5)

b) Find the overall transfer function of the signal flow graph shown in Figure (1) using Mason's gain formula. (5)

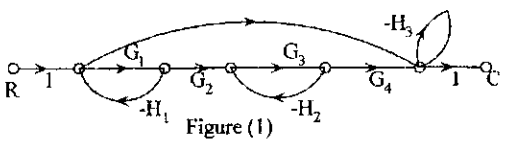

Figure (1)

10 a) Obtain the transfer function of an armature controlled DC motor. (5)

b) The forward path transfer function of a unity feedback control system is given by $G(s) = \frac{2}{s(s+3)}$. Obtain an expression for unit step response of the system. (5)

11 a) Explain the effect of time constant on the speed of time response of a control system. (4)

b) Obtain the electrical analogous of the mechanical system shown in Figure (2). Use force-voltage analogy. (6)

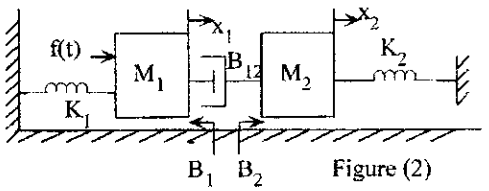

Figure (2)

PART C

Answer any two full questions, each carries 10 marks.

12 a) For a unity feedback control system with the open loop transfer function (5)

$$G(s) = \frac{10(s+5)}{s^2(s+1)}$$

Find the position, velocity and acceleration error coefficients.

b) Using Routh-Hurwitz criterion determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable. (5)

$$G(s) = \frac{K}{s[s(s+20)+T]}$$

13 a) Explain the effect of addition of poles and zeros on the nature of root locus. (4)

b) Sketch the root locus for the open loop transfer function of a unity feedback system given below, (6)

$$G(s) = \frac{K}{s(s+1)(s+3)}$$

14 a) Determine the stability of the system whose overall transfer function is given below (5)

$$G(s) = \frac{2s+5}{s^5+1.5s^4+2s^3+4s^2+5s+10}$$

b) Explain the nature of time response of a second order system according to the location of roots of the characteristic equations. (5)

PART D

Answer any two full questions, each carries 10 marks.

15 a) Explain any three frequency domain specifications of a control system. (3)

b) The open loop transfer function of system is given by

$$G(s) = \frac{10}{s(0.4s+1)(0.1s+1)}$$

(7)

Draw the bode plot and obtain the gain and phase cross over frequencies.

16 a) Explain the steps involved in obtaining the polar plot. (3)

b) The open loop transfer function of a unity feedback system is given by (7)

$$G(s) = \frac{1}{s(s+1)(2s+1)}$$

Sketch the polar plot and determine the gain margin and phase margin.

17 a) Define the phase cross over frequency and gain cross over frequency of a system. (5)

b) Differentiate between minimum phase and non-minimum phase system with suitable examples. (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE301

Course Name: POWER GENERATION, TRANSMISSION AND PROTECTION(EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries5 marks.

1		Write using figures and equations how the power factor is improved using capacitors in power system.	(5)
2	a)	A 3 phase 80km long Transmission line has its conductors of 1cm diameter spaced at the corners of the equilateral triangle of 100cm side. Find the inductance per phase of the system.	(3)
	b)	Define Ferranti effect.	(2)
3		Derive the equation for Sag in transmission lines, when the support is at equal and unequal heights.	(5)
4		Explain different types of DC links.	(5)
5		Define the terms Restriking voltage, Recovery voltage, Zones of protection, properties of SF_6 gas	(5)
6		Draw the block diagram of microprocessor based over current relay.	(5)
7		Explain Insulation Coordination.	(5)
8		Explain Buchholz Relay and write its importance in Transformer protection.	(5)

PART B

Answer any twofull questions, each carries10 marks.

9	a)	Explain Hydro Electric power plants using a neat sketch.	(6)
	b)	Explain the term Load factor, Load curve and write its features.	(4)
10	a)	What do you mean by Voltage Regulation and Efficiency of power transmission.	(3)
	b)	Derive the ABCD Constants for medium length lines using nominal π method draw its phasor diagram.	(7)
11	a)	Derive the L-L Capacitance of a two wire line.	(4)
	b)	A 3phase, 50 Hz, 132 kV OH Line has conductors placed in a horizontal plane 4m apart. Conductor diameter is 2 cm. If the line length is 100km calculate the charging currents per phase assuming complete transposition.	(6)

PART C

Answer any twofull questions, each carries10 marks.

12	a)	Find the optimum transmission voltage in power system for transmission and write its empirical formulae.	(4)
	b)	Explain corona and derive the equation for disruptive critical voltage and visual critical voltage.	(6)
13	a)	Explain with figures the configuration of **TCSC.**	(4)
	b)	Explain Intersheath grading of cables using figures.	(6)
14	a)	Explain different types of insulators used for transmission and distribution.	(3)
	b)	State the methods of improving string efficiency.	(3)

c) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate line to neutral voltage. Assume that the shunt capacitance between each insulator and earth is $1/8^{th}$ of the capacitance of the insulator itself. Also find the string efficiency. (4)

PART D

Answer any twofull questions, each carries 10 marks.

15 a) Explain the Operation the Vacuum CB using a neat sketch and write its advantages. (6)

b) Explain any two types of Amplitude Comparators. (4)

16 a) Explain Carrier – Current protection Scheme for long transmission lines. (4)

b) Explain the characteristics features of Surge Diverters and explain any two types of Surge Diverters. (6)

17 a) Drive the Essential Qualities of Protective relays. (3)

b) Explain using phasor diagram the directional feature of relays. (3)

c) A 2 wire dc ring distributor is 300m long and is fed at 240V at point A. At point B, 150m from A, a load of 120A is taken and at C, 100m in the opposite direction from A, a load of 80A is taken. If the resistance per 100m of single conductor is 0.03Ω find: (4)

i)Current in each section of distributor ii) Voltage at points B and C.

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