BTS – IV(SS) – 09.14 – 0652 Reg. No. | | | | | | | | |

A

B.Tech. Degree IV Semester Special Supplementary Examination September 2014

IT/CS/CE/SE/ME//EE//EC/EB/EI/FT 1401 ENGINEERING MATHEMATICS III

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) Show that the real and imaginary parts of an analytic function form an orthogonal system.

(b) Show that the transformation $w = \frac{2z+3}{z-4}$ changes the circle $x^2 + y^2 - 4x = 0$ into a straight line $4u + 3 = 0$.

(c) Find the poles and residues of the function $f(Z) = \frac{z^2 - 2z}{(z+1)^2 (z^2+1)}$.

(d) Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(X^2 + a^2)^3} dx$.

(e) Form the partial differential equation by eliminating the arbitrary function from $F(xy + z^2, x + y + z) = 0$.

(f) Solve $p + q = pq$.

(g) Derive one dimensional heat equation.

(h) Solve one dimensional wave equation.

PART B

$(4 \times 15 = 60)$

II. (a) If $u - v = (x-y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$ find $f(z)$ in terms of z. (9)

(b) Show that an analytic function with a constant modulus is constant. (6)

OR

III. (a) Discuss the mapping properties of $w = Cos\ z$. (8)

(b) Show that $w = z^2$ maps the circle $|z-1| = 1$ into the cardiod $\rho = 2(1 + \cos\phi)$. (7)

(P.T.O.)

IV. (a) Evaluate $\int_{|z|=3} \frac{e^z}{(z+2)(z+1)^2} dz$ (7)

(b) Expand $f(z) = \frac{z}{(z^2-1)(z^2+4)}$ in the region

$|z|<1$ (ii) $1<|z|<2$, (iii) $|z|>2$ (8)

OR

V. (a) Show that $\int_0^{2\pi} \frac{d\theta}{(5-3\cos\theta)^2} = \frac{5\pi}{32}$. (7)

(b) Show that $\int_0^{\infty} \frac{\sin mx}{x} dx = \frac{\pi}{2}$ (8)

VI. Solve (3 × 5 = 15)

(i) $(x^2-y^2-z^2)p+2xyq=2xz.$

(ii) $z^2(p^2+q^2+1)=a^2$

(iii) $z^2(p^2+q^2)=x^2+y^2$

OR

VII. Solve (3 × 5 = 15)

(i) $(D^2+4DD'-5D'^2)z=\sin(2x+3y)$

(ii) $(D^2+3DD'+2D'^2)z=5xy$

(iii) $(4D^2+12DD'+9D'^2)z=e^{3x-2y}$

VIII. (a) A tightly stretched string with fixed end points $x=0$ and $x=1$ is initially in a position given by $y=y_0 Sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from this position find the displacement $y(x,t)$. (10)

(b) Solve using method of separation of variables (5)

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$$

OR

IX. (a) Obtain D' Alembert's solution of wave equation. (7)

(b) An insulated rod of length l has its ends A and B maintained at 0°C and 100°C respectively until steady state conditions prevail. If B is suddenly reduced to 0°C and maintained at 0°C, find the temperature at a distance x from A at a time t. (8)

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C

B.Tech. Degree IV Semester Special Supplementary Examination September 2014

EE 1402 DIGITAL ELECTRONICS

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 =40)

I. (a) Design and implement a 4:1 MUX using NAND gates only.

(b) Simplify the following Boolean expressions:

$(i)\ (A+B)(\overline{A}\overline{C}+C)(\overline{\overline{B}+AC})$ $(ii)\ \overline{\overline{A\overline{B}+ABC+A(B+A\overline{B})}}$

(c) Explain the working of a monostable multivibrator.

(d) Design a half adder using NOR gates only.

(e) Convert a JK flipflop to T flipflop.

(f) Differentiate between PLA and PAL.

(g) Explain the working of CMOS NAND gate.

(h) Define the terms:

(i) Noise-margin

(ii) Fan-out

(iii) Figure of merit

(iv) Propagation delay

PART B

(4 x 15 = 60)

II. (a) Perform the following conversions: (10)

$(i)\ (4163)_8=(\quad)_{16}$ $(ii)\ (649)_{16}=(\quad)_2$

$(iii)\ (367)_{10}=(\quad)_8$ $(iv)\ (10111.1011)_2=(\quad)_8$ $(v)\ (11010)_2=(\quad)_{gray}$

(b) Perform the following using 2's complement. (5)

$(i)\ (28)_d-(19)_d$ $(ii)\ (-57)_d-(-33)_d$

OR

III. (a) Minimize the four variable logic function using K-Map and implement it using NAND gates. (6)

$F(A,B,C,D)=\sum m(0,1,2,5,8,9,10)$

(b) Design a 4-bit gray to binary converter. (9)

IV. (a) Explain the working of serial adder. (8)

(b) Explain the logic of carry look ahead adder. (7)

OR

(P.T.O.)

V.	(a)	Design and implement a full subtractor using NAND gates only.	(7)
	(b)	Explain binary multiplication.	(8)
VI.	(a)	What is race-around condition? How can it be eliminated?	(7)
	(b)	Design a synchronous counter to generate the sequence 0,1,3,5,7,0,1,3,5,7,.....	(8)

OR

VII.	(a)	Explain the working of static RAM cell.	(10)
	(b)	With necessary waveforms explain a 4-bit Ring Counter.	(5)
VIII.	(a)	Explain the working of 2-input TTL NAND gate.	(9)
	(b)	Explain TTL to CMOS Interfacing.	(6)

OR

IX.	(a)	Explain the operation of Tristate TTL Inverter.	(7)
	(b)	Explain the working of ECL NOR/OR gate.	(8)

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B

B. Tech. Degree IV Semester Special Supplementary Examination September 2014

EE 1403 ELECTRICAL MACHINES I

(2012 *Scheme*)

Time: 3 Hours Maximum Marks: 100

PART A

(Answer *ALL* questions)

I. (a) Explain the following terms as applied to DC armature winding: (8 x 5 = 40)

(i) Coil span (ii) Pole pitch (iii) Winding pitch (iv) Commutator pitch

(b) Derive the emf equation of a DC generator.

(c) Explain the term reactance emf.

(d) Explain the conditions parallel operation of DC shunt generator.

(e) Derive the torque equation of DC motor.

(f) "A DC series motor should never be started on no load". Why?

(g) "A transformer is a constant flux machine". Explain.

(h) Write short note on tertiary winding of a transformer.

PART B

(4 x 15=60)

II. (a) Give the materials and functions of the following parts of a DC machine. (10)
(i) Yoke (ii) Field poles (iii) Armature (iv) Commutator (v) Brush

(b) An 8 pole lap connected generator has 960 armature conductors, a flux of 40 mWb and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the same machine is wave wound, at what speed must it be driven to generate 400 V. (5)

OR

III. (a) Classify DC generator based on the method of excitation. Also give an application of each machine. (7)

(b) A short shunt compound generator has armature, field and shunt field resistances of 0.06Ω, 0.04Ω and 100Ω respectively. If supplies 125 lamps each rated at 250V, 40W. Find the generated emf and armature current. Assume contact drop/brush is 1 V. (8)

IV. (a) Explain voltage build up in a self excited generator. (5)

(b) The open circuit characteristics (OCC) of a 4 pole 250V shunt generator at 750 r.p.m. is as follows: (10)

Field current A	:	0	0.5	1.0	2.0	3.0	4.0	5.0
E.m.f. V	:	10	50	100	175	220	245	262

Calculate (i) critical field resistance (ii) no load voltage (iii) critical speed for a field resistance of 80 Ω (iv) additional resistance to be included in the field circuit to reduce the no load voltage to 175 V.

OR

(P.T.O.)

V. (a) "DC series generator can be used to power a constant current variable voltage circuit". Explain on the basis of external characteristics. (8)

(b) A compound generator has an armature, series field and shunt field resistances of $0.04\,\Omega$, $0.025\,\Omega$ and $250\,\Omega$ respectively. It supplies a load current of 180 A at 500 V. Calculate the generated e.m.f. if the machine is connected (i) long shunt (ii) short shunt. (7)

VI. (a) Explain the function of commutator in DC motor. (5)

(b) Explain the need of starter in DC motor. Draw and explain 3 point starter. (10)

OR

VII. (a) Explain how does DC motor automatically adjust input to match the mechanical load on the motor. (5)

(b) Derive the condition for maximum power developed in a DC motor. (5)

(c) A 220 V DC shunt motor draws a no load armature current of 3A when running at 1500 r.p.m. Determine its speed when taking an armature current of 60A, if the flux is weakened by 3% due to armature reaction. (5)

VIII. (a) Derive the condition for maximum efficiency of a transformer. (5)

(b) A 10 kVA, 450 V/120 V, 50 Hz transformer gave the following test datas: (10)

OC test (on lv. side)	:	120 V	4.2 A	80 W
SC test (on h.v. side)	:	9.65 V	22.2 A	120 W

Calculate : (i) the equivalent circuit referred to low voltage side
(ii) efficiency and regulation for 0.8 lagging power factor load
(iii) efficiency at half the full load and 0.8 pf lagging

OR

IX. (a) Define all day efficiency. (5)

(b) Write a short note on Scott connection and open delta connection. (5)

(c) Explain briefly Sumpner's back to back test. (5)

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A

B.Tech. Degree IV Semester Special Supplementary Examination September 2014

EE 1404 CIRCUITS, SIGNALS AND SYSTEMS II

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 =40)

I. (a) What are the basic signals used for analysis of continuous time systems? Explain.

(b) Derive a relationship for convolution integral for continuous time signals and explain the significance of impulse response.

(c) Write Z parameter equation of a two port network and draw its equivalent circuit.

(d) Explain cascade connection of two port network with a neat diagram.

(e) Derive the expression for cut off frequency of a constant K low pass filter.

(f) List the properties of positive real functions.

(g) Define for a discrete time system (i) a causal system (ii) a time invariant system (iii) stable system

(h) State and explain any three properties of Z transform.

PART B

(4 x 15 = 60)

II. (a) What are the basic operations on signals? Explain with example. (6)

(b) Determine whether the following systems are linear time invariant or not. (9)

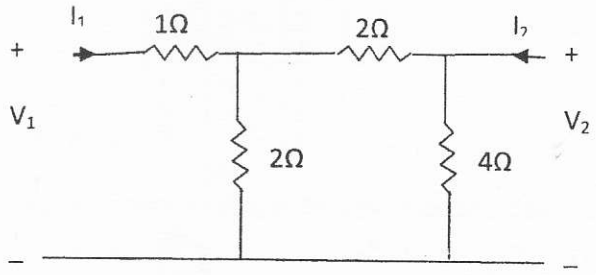
$(i)\ y(t) = x(t)\sin\omega t \quad (ii)\ y(t) = t^2 x(t) \quad (iii)\ y(t) = x(4t)$

OR

III. (a) Explain stability and causality of a linear time invariant system (5)

(b) The impulse response of two systems are $(i)\ h(t) = te^{-at}u(t)$ $(ii)\ h(t) = u(t) - u(t-4)$. Find the step response of the systems. (10)

IV. (a) Find the h parameters of the network shown: (8)



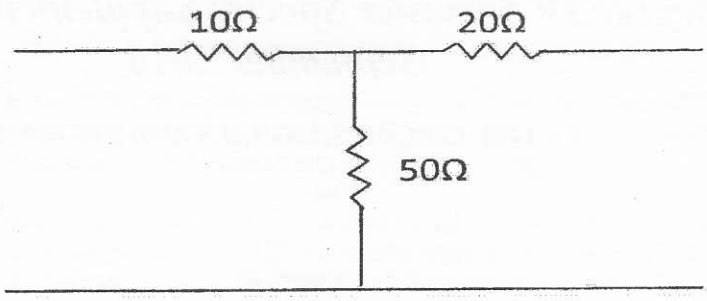
(b) Obtain the condition for reciprocity and symmetry of a two port network in terms of T parameters. (7)

OR

(P.T.O.)

V. (a) Define characteristics impedance and propagation constant of a two port network. (5)

(b) Determine the image parameters of the T network shown: (10)



VI. (a) Design a constant K high pass filter (both T and π networks) having a cut off frequency of 2kHz with a load resistance of 300 Ω (8)

(b) Design m derived T network low pass filter with nominal characteristics impedance $R_0 = 900\Omega$, cut off frequency $f_c = 0.9kHz$ and infinite attenuation frequency $f_\alpha = 1kHz$. (7)

OR

VII. An impedance function is given by $Z(S) = \dfrac{(s+1)(s+4)}{s(s+2)(s+5)}$. Find the RC representation of (i) Foster I and II forms (ii) Cauer I and II forms. (15)

VIII. (a) State and explain sampling theorem. Explain Nyquist rate. (5)

(b) Check whether the following systems are linear, causal and shift invariant (10)

(i) $y(n) = ax(n-1) + bx(n-2)$ (ii) $y(n) = n[x(n)]^2$

OR

IX. (a) Define system function and find the system function of the LSI system (7)
$y(n) = x(n) + 3x(n-1) + 2y(n-1) - y(n-2)$

(b) Find Z-transform of the signals and find ROC (8)
(i) $x(n) = [3(3)^n - 4(2)^n]u(n)$ (ii) $x(n) = na^n u(n)$

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D

B.Tech. Degree IV Semester Special Supplementary Examination September 2014

EE 1405 ANALOG COMMUNICATION

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) Draw the block diagram for TRF radio receiver and briefly describe its operation.

(b) Define and describe ISB systems.

(c) Explain pre-emphasis and de-emphasis.

(d) Briefly explain FM stereo transmission system.

(e) The noise output of a resistor is amplified by a noiseless amplifier having a gain of 60 and B.W of 20 kHz. A meter connected to the output of amplifier reads 1mVrms. (a) the B.W of amplifier is reduced to 5kHz, its gain remaining constant. What does the meter read now? If the resistor is operated at 80°C, what is its resistance?

(f) Define the terms:
   (i) sensitivity
   (ii) selectivity
   (iii) double spotting

(g) Explain the term call routing.

(h) Explain grade of service and traffic load in telephone systems.

PART B

(4 × 15 = 60)

II. (a) The antenna current of an AM transmitter is 8A when only the carrier is sent, but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation. Determine the antenna current when the percentage of modulation changes to 0.8. (6)

(b) Explain the working of super heterodyne receiver. (9)

OR

III. (a) Explain any two methods of SSB generations. (10)

(b) Write a short note on VSB systems. (5)

IV. (a) When the modulating frequency in an FM system is 400Hz and modulating voltage is 2.4V, the modulation index is 60. Calculate the maximum deviation. What is the modulation index when the modulating frequency is reduced to 250 Hz and the modulating voltage is simultaneously raised to 3.2V? (8)

(b) Compare narrow band and wide band FM. (7)

OR

V. (a) Derive the term modulation index for FM modulation. (5)

(b) Explain foster-seeley discriminators with phasor diagrams. (10)

(P.T.O.)

VI. (a) Discuss the types, causes and effects of various types of noise in communication. (10)

(b) A receiver connected to an antenna whose resistance is $80\,\Omega$ has an equivalent noise temperature of $40\,\Omega$. Calculate the receiver's noise figure in decibels and its equivalent noise temperature. (5)

OR

VII. (a) Explain the importance of AGC circuit in receivers. (7)

(b) Compare the performance of AM and FM receivers. (8)

VIII. (a) Explain different types of signalling. (10)

(b) Write short notes on time division switching. (5)

OR

IX. (a) Define the terms "Busy Hour", "BHCA", "CCR" with regard to telephone traffic engineering. (6)

(b) Explain strowger switch, with neat diagram. Compare "uniselector" and "two motion selector". (9)

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B

B.Tech. Degree IV Semester Special Supplementary Examination September 2014

EE 1406 INDUSTRIAL AND POWER ELECTRONICS

(2012 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) Describe RC full wave trigger circuit for SCR with neat waveforms.

(b) What is hard driving for a thyristor? What are its advantages?

(c) Explain the function of a freewheeling diode with necessary circuit and waveforms. Mention its advantages.

(d) Explain the speed control of DC series motor.

(e) Describe the working of a single phase series inverter with relevant circuit and waveforms.

(f) Explain with appropriate waveforms, the different control strategies used for obtaining variable output voltage from a DC chopper. Which one of these is preferred and why?

(g) Describe DC solid state and AC solid state relays with relevant circuit diagrams.

(h) Explain different types of UPS with the help of block diagram.

PART B

(4 × 15 = 60)

II. Explain problems and their solutions associated with series parallel connection of SCRs. (15)

OR

III. Discuss the two transistor model of a thyristor. Using this model describe the various mechanisms of turning on a thyristor. (15)

IV. Describe the working of a single phase one pulse SCR controlled converter with RLE load through the waveforms of supply voltage load voltage, load current and voltage across SCR. Hence derive an expression for load current. (15)

OR

V. Explain the working of a 3ϕ full wave controlled rectifier with circuit and waveforms for resistive load. (15)

(P.T.O.)

VI. Discuss various PWM techniques. How do these differ from each other? (15)

OR

VII. (a) Explain four quadrant chopper. (10)

(b) For type A chopper, DC source voltage is 230V. Load resistance is 10Ω. Take a voltage drop 2V across chopper when it is on. For duty cycle of 0.4 calculate (5)

(i) Average and rms values of output voltage.

(ii) Chopper efficiency

VIII. Explain operation, principle and application of dielectric heating. (15)

OR

IX. (a) Explain working of buck converter with the help of neat diagrams. (10)

(b) A boost regulator has an input voltage of $V_s = 5V$. The average output voltage $V_a = 15V$ and average load current $I_s = 0.5A$. The switching frequency is 25kHz. If $L = 150\mu H \,\&\, C = 220\mu F$, determine (5)

(i) Duty cycle k

(ii) Ripple current of inductor $\Delta 1$

(iii) The peak inductor current

(iv) Ripple voltage of filter capacitor ΔV_c & (e) critical values of L & C.

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