BTS – V(SS) – 06.14 – 0508 Reg. No. [ ]

C

B.Tech. Degree V Semester Special Supplementary Examination June 2014

IT/CS/CE/SE/ME/EE/EB/EC/EI/FT 501 ENGINEERING MATHEMATICS IV

(*2006 Scheme*)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) Find the mean and variance of a random variable having density function $f(x) = \begin{cases} 12x^2(1-x), & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$

(b) For a binomial distribution with $n = 6$, the third term is nine times the fifth term. Find 'P'.

(c) A random sample of 900 items with mean 3.5 and standard deviation 2.61 is drawn from a normal population. Determine a 95% C.I. for μ.

(d) Briefly explain the procedure for testing of hypothesis.

(e) Prove that $1 + \mu^2\delta^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$.

(f) From the following table find the missing value

x:	2	3	4	5	6
y:	45.0	49.2	54.1	-	67.4

(g) Solve $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ at $x = 0.1$ using Taylor series method.

(h) Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ using Trapezoidal rule taking $h = 0.2$.

PART B

$(4 \times 15 = 60)$

II. (a) Between the hours of 2 and 4 p.m. the average number of phone calls per minute coming into the switch board of a company is 2.5. Find the probability that during one particular minute there will be

(i) no phone call at all

(ii) exactly 2 calls

(iii) at least 5 calls

(b) In a competitive examination 5000 students have appeared for a paper in Statistics. Their average mark was 62 and standard deviation was 12. If there are only 100 vacancies find the minimum marks that one should score in order to get selected.

OR

III. (a) Find the rank correlation coefficient for the following data

x:	100	101	102	100	100	99	97	98	96	95
y:	98	99	99	97	95	96	95	94	90	96

(b) Fit a good straight line to the following data. Also calculate y when $x = 14$.

x:	10	11	12	13	16	17	20	25
y:	10	22	24	27	29	28	33	37

(P.T.O.)

IV. (a) A stenographer claims that she can take dictations at the rate of more than 120 words per minute. Of the 12 tests given to her she could perform an average of 135 words with a standard deviation of 40. Is her claim valid? $(\alpha = .01.)$

(b) Ten soldiers visit a rifle range for 2 consecutive weeks. For the first week, their scores are $67, 24, 57, 55, 63, 54, 56, 68, 33, 43$ and during second week, they score in the same order $70, 38, 58, 58, 56, 67, 68, 72, 42, 38$. Examine, if there is significant difference in their performance.

OR

V. (a) For a sample of 100 labourers from Kerala, the average daily wages is ₹10.50 with S.D. ₹1.50. For a sample of 150 labourers from Tamil Nadu the corresponding figures are ₹8.00 and ₹1.00 respectively. Can you conclude that average wages of workers in Kerala are more than that of workers in Tamil Nadu?

(b) The time taken by workers in performing a job by method I and method II are given below:

Method I:	20	16	26	25	23	
Method II:	28	33	42	35	52	34

Does the data show that variance of time distribution by 2 methods do differ significantly?

VI. (a) Using Stirlings formula find $y(35)$ from the following:

x:	20	30	40	50
y:	512	439	346	243

(b) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using

(i) Simpson's 1/3 rule
(ii) Simpson's 3/8 rule

OR

VII. (a) Using Lagrange interpolation find $y(10)$ from the following

x :	5	6	9	11
y :	12	13	14	16

(b) Find $f'(10)$ and $f''(10)$ from the following:

x :	10	11	12	13	14
$f(x)$:	40.62	60.80	79.95	103.56	132.65

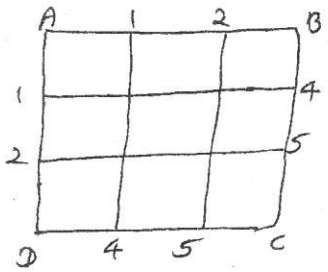
VIII. (a) Use Range-kutta method to find the value of y when $x = 0.2$ in steps of 0.1 if $\frac{dy}{dx} = x^2 + 2y,\ y(0) = 0.$

(b) Solve $U_{xx} - 2U_t = 0$, given $u(0,t) = 0,\ u(4,t) = 0,\ u(x,0) = x(4-x)$. Assume $h = k = 1$. Find the values of u upto $t = 5$.

OR

IX. (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$, with $y = 1$ for $x = 0$. Find y approximately for $x = 0.1$ by Euler's method taking $h = 0.02$.

(b) Solve the elliptical equation $U_{xx} + U_{yy} = 0$.



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C

B.Tech. Degree V Semester Special Supplementary Examination June 2014

EC 502 ELECTROMAGNETIC THEORY

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 =40)

I. (a) Gives the vector $\vec{A} = 3ax + 4ay + 5az$ in rectangular coordinate system. Transform them to cylindrical coordinate system.

(b) State and explain Stoke's theorem.

(c) State and explain Gauss's law.

(d) Derive continuity equation and relaxation time.

(e) State Biot Savart's law and Ampere's circuital law.

(f) Explain magnetic scales and vector potentials.

(g) State and explain Poyntings theorem.

(h) Explain reflection of uniform plane waves at normal incidence.

PART B

(4 x 15 = 60)

II. (a) State and explain divergence theorem in Cartesian coordinate system. (10)

(b) Verify the vector field $A = yzax + zxay + x^2 yaz$ is both irrotational and solenoidal. (5)

OR

III. (a) Transform vector field $A = yax + (z+y)ay + \frac{x^2}{\sqrt{x^2 y^2}} az$ to cylindrical coordinate system. (10)

(b) Explain classification of vector fields. (5)

IV. (a) Derive electric field intensity and expression for electric field at any point due to 'n' changes (10)

(b) Derive relationship between E and V. (5)

OR

(P.T.O.)

V. (a) State and explain boundary condition for electric field. (10)

(b) Four identical charges are placed at corners of square of side 'a'. Find resultant force on charge. (5)

VI. Obtain Maxwells equation for time varying field. How these equations get modified for static electric field. Explain Maxwells equations in integral form. (15)

OR

VII. (a) Using Biot Savart's law find 'H' on axis of circular current loop of radius 'a'. Determine 'H' at centre of loop. (10)

(b) Write note on displacement current with equation (5)

VIII. (a) Derive equation for free space starting from Maxwells equations. (7)

(b) Define Brewsters angle and final Brewsters angle for parallel polarized wave traveling from one medium to another with $E_r = 7.0$ (5)

(c) If $E = Em\ Sin(\varpi t - \beta x)ay$, find H. (3)

OR

IX. (a) Explain skin effect. (8)

(b) Derive expression for reflection coefficient and transmission coefficient for obliquely incident wave having parallel polarization. (7)

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B

B.Tech. Degree V Semester Special Supplementary Examination June 2014

EC/EI 503 DIGITAL SYSTEM DESIGN

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

$(8 \times 5 = 40)$

I. (a) Implement a 2 input decoder using one input decoders using coincident decoding method.

(b) Implement a full adder using PLA.

(c) Draw the state diagram of a sequential system with output

$$2(t) = \begin{cases} 1 \ if \ x(t-3, t) = 1001 \\ 0 \ otherwise \end{cases}$$

where $x(t)$ is the input.

(d) Convert the given Mealy machine into Moore machine.

	x(i/p)	
PS	0	1
S_0	S_0,0	S_1,1
S_1	S_1,0	S_0,1
	NS/o/p	

(e) Explain content addressable momory.

(f) Using mod 16 counter, implement a 4 to 11 counter.

(g) A sequential system has one input and one output. The output is 1 whenever $x(t).x(t-2).x(t-7) = 1$. Implement the systems using shift registers and logic gates.

(h) Implement a 8×2 RAM using 4×2 RAMS.

PART B

$(4 \times 15 = 60)$

II. (a) Design a 3 bit binary to gray converter using ROM. (7)

(b) Implement a 4×4 multiplier module using 4×2 multiplier modules. (8)

OR

III. (a) Implement the function $f(A, B, C, D) = \sum m(1, 4, 8, 10, 15)$ using a 4×1 MUX and NAND gates. (8)

(b) Implement an 8 bit 3 shifter using barrel shifter. (7)

(P.T.O.)

IV. (a) Draw the state diagram of a sequential code converter for the given code. (7)
$a = 0,\ b = 1,\ c = 20,\ d = 21,\ e = 220,\ f = 221.$

(b) Minimize the given state table. (8)

Present state	Input		
	a	b	c
A	E,0	D,1	B, 0
B	F,0	D,0	A,1
C	E,0	B,1	D,1
D	F,0	B,0	C,0
E	C,1	F,1	F,0
F	B,0	C,0	F,1
	NS/ o/p		

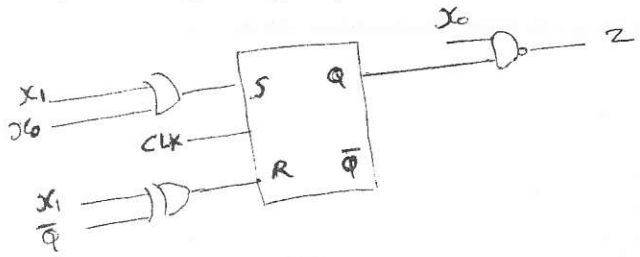
OR

V. (a) Draw the state diagram of a pattern recognizer for the pattern 11001. (7)

(b) A sequential system has one input with values a and b. It has one o/p with values p and q. The output is p when even number of a and even number of b has occurred at the input. Otherwise o/p is q. Draw the state diagram of the system. (8)

VI. (a) Design JK flip-flop using D flip-flop. (7)

(b) Draw the state diagram of the given digital system. (8)



OR

VII. (a) Design a counter to count the sequence 0,3,5,7,2,1,0,3,5,7,2,1,.... using T Flip-flop. (9)

(b) Explain the structure of PSA. (6)

VIII. Design a pattern recogniser to recognize 111 using

(a) counter module (8)

(b) ROM. (7)

OR

IX. (a) Draw the implementation of mod P^3 counter using mod P counter modules. (7)

(b) Design a mod 4 counter using a suitable PSA. (8)

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D

B.Tech. Degree V Semester Special Supplementary Examination June 2014

EC/E1 505 MICROELECTRONICS AND INTEGRATED CIRCUITS

(2006 Scheme)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 x 5 = 40)

I. (a) What is CMRR? Explain its significance.

(b) Explain the working of integrator using Op-amp.

(c) Draw and explain the circuit of a peak detector.

(d) Design a first order low pass Butterworth filter at a cut off frequency of 1KHz with a pass band gain of 2.

(e) Draw the block diagram of PLL and explain each block.

(f) Compare R-2R DAC with binary weighted resistor type DAC.

(g) Explain the fabrication of monolithic bipolar npn transistor.

(h) Compare monolithic and hybrid ICS.

PART B

(4 x 15 = 60)

II. Draw the circuit and derive the expression for overall voltage gain of an instrumentation amplifier. (15)

OR

III. (a) Derive the expression for voltage gain of a non-inverting feedback amplifier. (10)

(b) Explain the concept of virtual ground. (5)

IV. Explain the working of RC phase shift oscillator using op-amp. Derive the expression for frequency of oscillation and gain. (15)

OR

V. (a) Derive the expression for the frequency response of a 2nd order low pass Butterworth filter. (10)

(b) Design a 2nd order Butterworth filter having a cut-off frequency of 1KHz. (5)

VI. Explain the functional block diagram of 555 timer. How can it be used as monostable multivibrator? (15)

OR

VII. (a) Draw and explain the functional block diagram of a 723 IC regulator. (6)

(b) Explain the operation of successive approximation ADC with the help of a diagram (9)

VIII. Explain bipolar IC fabrication steps with neat sketches. (15)

OR

IX. Explain thick film technology. Explain how resistors and capacitors can be fabricated using thick film technology. (15)

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C

B.Tech. Degree V Semester Special Supplementary Examination June 2014

EC/EI 506 DIGIGITAL SIGNAL PROCESSING

(*2006 Scheme*)

Time : 3 Hours Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

I. (a) State and prove any two properties of DFT.

(b) Explain wavelet transform. Mention some applications.

(c) Explain how FIR filters are designed using Fourier series method.

(d) Compare FIR and IIR filters.

(e) Explain the characteristics of a Butterworth filter.

(f) Write short notes on limit cycle oscillations.

(g) Enumerate the difference between fixed point and floating point processors.

(h) Give details of the instruction types used in a typical DSP processor.

PART B

(4 × 15 = 60)

II. (a) $x(n)=\{1,2,3,4,4,3,2,1\}$ find $X(k)$ using DIT FFT algorithm. (10)

(b) Find the DFT of the sequence $x(n)=\{1,1,0,0\}$ (5)

OR

III. (a) Find the output $y(n)$ of a filter whose impulse response is $h(n)=\{1,1,1\}$ and input signal $x(n)=\{3,-1,0,1,3,2,0,1,2,1\}$ using overlap-save method. (10)

(b) Compute the DFT of the sequence $x(n)=Cos\,\frac{n\pi}{2}$, where N = 4 using DIF FFT algorithm. (5)

IV. Design an ideal high pass filter using hanning window with the frequency response $Hd\left(e^{jw}\right)=1$ for $\pi/4 \le |w| \le \pi$ (15)

$=0$ for $|w| \le \pi/4$ find the values of $h(n)$ for $N=11$, Find $H(2)$.

OR

V. (a) Using frequency sampling method, design a band pass filter with the following specifications (10)

Sampling frequency $F=8000H_z$

Cut off frequencies $Fc_1=1000H_z$

$Fc_2=3000H_z$

Determine the filter coefficients for N = 7.

(b) Realize the system function (5)

$$H(z)=\frac{1}{2}+\frac{1}{3}z^{-1}+Z^{-2}+\frac{1}{4}Z^{-3}+Z^{-4}+\frac{1}{3}Z^{-5}+\frac{1}{2}Z^{-6}$$

(P.T.O.)

VI. (a) Determine H(z) using the impulse invariant technique for the analog system function. (6)

$$H(s)=\frac{1}{(S+0.5)(S^2+0.5S+2)}$$

(b) Apply bilinear transformation to $H(s)=\frac{2}{(S+1)(S+2)}$ with T=1 Sec and find H(z) (4)

(c) Write the steps to design an analog Butterworth low pass filter. Determine the order of the filter for the given specification (5)

$\alpha p = 1dB,\ \alpha s = 30dB,\ \Omega p = 200\,rad/\sec,\ \Omega s = 600\,rad/\sec.$

OR

VII. (a) Determine the direct form II realization for the following system (5)

$$y(n)=-0.1y(n-1)+0.72y(n-2)+0.7x(n)-0.252x(n-2)$$

(b) Obtain the cascade realization of the system characterized by the transfer function (5)

$$H(z)=\frac{2(Z+2)}{Z(Z-0.1)(Z+0.5)(Z+0.4)}$$

(c) Write short notes on finite word length effects in IIR filter design. (5)

VIII. Draw the architecture of TMS320C54X processor and explain the working. (15)

OR

IX. (a) What are the features of share processor? (5)

(b) Write the factors influence the selection of DSPs. (5)

(c) Describe the general DSP architecture. (5)

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