S3 CS

Nov 2015

M 27887

Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015

(2007 Admn. Onwards)

PT2K6/2K6 CE/ME/EE/EC/AE 1/CS/IT 301 : ENGINEERING MATHEMATICS – II

Time : 3 Hours Max. Marks : 100

PART – A

1. Test the convergence of $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \ldots\ldots\ldots\ldots$

2. Obtain the Maclaurin's series expansion of log (1 + x).

3. Find the rank of the matrix

$$A = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 1 & 2 \\ -1 & 2 & 2 \end{bmatrix}.$$

4. Solve x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6 using Gauss elimination method.

5. Find the work done when a force $\bar{F} = (x^2 - y^2 + x)\,\bar{i} - (2xy + y)\,\bar{j}$ moves a particle in the xy plane from (0, 0) to (1, 1) along the parabola $y = x^2$.

6. Using Green's theorem evaluate $\oint_C (x^2 - y^2)dx + (2y - x)dy$ where C is boundary of the region in the 1st quadrant bounded by $y = x^2$ and $y = x^3$.

7. Show that the set of all ordered pairs of real numbers is a vector space over R.

8. Show that $T : R^2 \rightarrow R$ given by T(x, y) = 3x – 5y is a linear transformation from $R^2 \rightarrow R$.

(8×5=40)

P.T.O.

PART – B

9. If $y = (\sin^{-1}x)^2$ prove that $(1 - x^2)\, y_{n+2} - x\,(2n + 1)\, y_{n+1} - n^2 y_n = 0$.

OR

10. Test the convergence of $x - \frac{x^2}{\sqrt{2}} + \frac{x^3}{\sqrt{3}} - \frac{x^4}{\sqrt{4}} + \ldots\ldots$ and find the interval of convergence.

11. Find the eigen values and eigen vectors of $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

OR

12. Investigate the values of λ and μ such that the equations $x + y + z = 6$; $x + 2y + 3z = 10$ and $x + 2y + \lambda z = \mu$ have i) no solution (ii) a unique solution (iii) infinite number of solutions.

13. Verify Green's theorem for the integral $\int_C xydx + x^2dy$ where C is the boundary of the area enclosed by $y = x^2$ and $y = x$.

OR

14. Verify divergence theorem for $\bar{F} = y\bar{i} + x\bar{j} + z^2\bar{k}$ over the cylindrical region bounded by $x^2 + y^2 = a^2$, $z = 0$ & $z = h$.

15. a) Find a homogeneous system whose solution set w is generated by $\{(1, -2, 0, 3), (1, -1, -1, 4) (1, 0, -2, 5)\}$.

    b) Check whether $w = \{(a, b, c)/a, b, c \in Q\}$ is a subspace of R^3.

OR

16. a) Find T(a, b) where $T : R^2 \rightarrow R^3$ is defined by $T(1, 2) = (3, 2, 1)$ $T(3, 4) = (6, 5, 4)$.

    b) Let w be generated by the polynomials $v_1 = t^3 - 2t^2 + 4t + 1$; $v_2 = 2t^3 - 3t^2 + 9t - 1$ $v_3 = t^3 + 6t - 5$; $v_4 = 2t^3 - 5t^2 + 7t + 5$. Find the basis and dimension of w.

(15×4=60)

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015

(2006 and Earlier Admn.)

CE/PTCE/EE/PTEE/EC/PTEC/ME/PTME/AI2K 301 : ENGINEERING MATHEMATICS – III

Time : 3 Hours Max. Marks : 100

Instruction : ***Statistical tables*** *may be issued to the students.*

I. a) Define the following and cite one example for each :
   i) linearly dependent vectors
   ii) linearly independent vectors.

   b) Check whether the transformation $f : R^3 \to R$ defined by $f(x, y, z) = 4xyz$ is linear or not.

   c) Define :
   i) The quadratic form
   ii) Positive definite
   iii) Negative definite form of a matrix.

   d) Prove that the characteristic values of a Hermitian matrix are all real.

   e) Define gamma distribution. Obtain its mean.

   f) Find the value of C such that

$$f(x) = \begin{cases} \frac{x}{6} + c, & 0 \le x \le 3 \\ 0, & \text{otherwise} \end{cases}$$ is a p.d.f. Also find $P(1 \le x \le 2)$.

   g) If $\overline{X}$ is the mean of a random sample of size n with mean μ and variance σ^2, find $E(\overline{X})$ and $V(\overline{X})$.

   h) Let $\overline{X}$ be the mean of a random sample of size n form a distribution which is $N(\mu, q)$. Find n such that $P[\overline{X} - 1 < \mu < \overline{X} + 1] = 0.9$. (8×5=40)

P.T.O.

II. a) Define subspace of a vector space. Determine the subspace of R^3 spanned by (1, 1, 1), (2, 1, 0) and (1, 1, –1). 7

b) A linear space V is spanned by the vectors $u_1 = (1, 2, 1, -2)$, $u_2 = (2, 3, 2, -3)$, $u_3 = (2, 5, 2, -5)$, $u_4 = (3, 4, 3, -4)$ and $u_5 = (3, 5, 3, -5)$. Find a basis for V and the dimension of V. 8

OR

c) Using Schmidt's process, construct an orthonormal basis from $\vec{a}_1 = (2, 3, 0)$, $\vec{a}_2 = (6, 1, 0)$ and $\vec{a}_3 = (0, 2, 4)$. 7

d) The matrix $A = \begin{bmatrix} 3 & -9 \\ -2 & 6 \end{bmatrix}$; $v = \begin{bmatrix} -5 \\ -2 \end{bmatrix}$ is a linear transformation on R^2. Find :

i) The image of the given vector v

ii) Kernel of each transformation. 8

III. a) Find a congruence transformation which will simultaneously diagonalize $\begin{bmatrix} -2 & 1 \\ 1 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix}$. 7

b) Solve the matrix equation $X^3 = \begin{bmatrix} -6 & 14 \\ -7 & 15 \end{bmatrix}$. 8

OR

c) Show that the matrix equation $X^2 - 2X - 3I_2 = \begin{bmatrix} -4 & 1 \\ 0 & -4 \end{bmatrix}$ has no solution. 7

d) Prove that if $X_1, X_2, \ldots, X_m$, $m \leq n$ are characteristic vectors corresponding to the characteristic values $\lambda_1, \lambda_2, \ldots, \lambda_m$ respectively of an $n \times n$ matrix A, then $X_1, X_2, \ldots, X_m$ are linearly independent. 8

IV. a) Use Chebyshev's inequality to find a lower bound on $P(-4 < X < 20)$ where the random variable X has a mean 8 and variance 9. 7

b) Suppose that X has $N(\mu, \sigma^2)$ distribution. Determine c as a function of μ and σ such that $P(X \leq c) = 2P(X > c)$. 8

OR

c) The daily consumption of milk in a town, in excess of 30000 litres is distributed as a gamma distribution with parameters $\alpha = 2, \beta = 10000$. The town has a daily stock of 40000 litres. Find the probability that the stock is adequate on a particular day. 7

d) Show that the mean and variance of a Poisson distribution are the same. 8

V. a) A survey of 320 families with 5 children each revealed the following distribution.

No. of boys :	5	4	3	2	1	0
No. of girls :	0	1	2	3	4	5
No. of families :	14	56	110	88	40	12

Is the result consistent with the hypothesis that the male and female births are equally probable ? 7

b) If $(x_1, x_2, \ldots, x_n)$ is a random sample from a distribution having p.d.f.

$$f(x, \theta) = \begin{cases} \theta . x^{\theta-1}, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}$$

Show that a best critical region to test $H_0 : \theta = 1$ against $H_1 : \theta = 2$ is

$$C = \left\{ (x_1, x_2, \ldots, x_n); C \le \prod_{i=1}^{n} x_i \right\}. \quad 8$$

OR

c) Suppose that X has $N(\mu, 4)$. A sample of size 25 yields $\bar{X} = 78.3$. Obtain a 99% confidence interval for μ. 7

d) Let (X_1, X_2) be a random sample of size 2 from a distribution having p.d.f.

$f(x_1, \theta) = \frac{1}{\theta} e^{\frac{-x}{\theta}}$, $0 < x < \infty$. We reject $H_0 : \theta = 2$ and accept $H_1 : \theta = 1$ if the observed values are $\frac{f(x_1, 2) \cdot f(x_2, 2)}{f(x_1, 1) \cdot f(x_2, 1)} \le \frac{1}{2}$. Find the significance level of the test. 8

M 27898

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part-Time) Examination, November 2015
(2007 Admn. Onwards)
PT2K6/2K6 EE/EC/AEI/CS/IT 302 : HUMANITIES

Time: 3 Hours

Max. Marks: 100

PART – A

Answer **all** questions :

I. Fill in the blanks with suitable preposition :

a) The burglar jumped _____ the compound wall.

b) There is nothing new _____ the sun.

II. Point out the verbs in the following sentences and name their mood and tenses :

a) It is time we left.

b) Beware lest something worse happen to you.

III. Insert articles where necessary :

a) Time make worst enemies friends.

b) My favourite flower is rose.

IV. Change the voice :

a) The recitation pleased the inspector.

b) Do not insult the weak.

V. Change the degree of comparison, without changing the meaning :

a) Lead is heavier than any other metal.

b) Very few countries are as rich as England.

VI. Combine the sentences into **one** simple sentence by using participles :

He felt tired. He laid his work aside.

VII. Punctuate the following :

The shepherd finding his flock destroyed exclaimed I have been rightly served. Why did I trust my sheep to a wolf.

P.T.O.

VIII. Report in indirect speech :

"Bring me a drink of milk", said the Swami to the villagers.

IX. Add question tags :

a) Gopal hasn't passed exam _____ ?

b) They will go home soon _____ ?

X. Rewrite the following sentence by improving the arrangements :

I was rather impressed by the manner of the orator than by his matter. **(10×2=20)**

PART – B

Answer **any seven** :

B1. Explain the importance of visual aids in technical communication.

B2. What are the different types of technical report ?

B3. What do you mean by IPR ?

B4. Explain the view of modern thinkers is in science and technology.

B5. Mention the importance of having a scientific temper.

B6. Why is it important that a technical communication be brief ?

B7. Explain the steps involved in obtaining a patent.

B8. What are the effects of improper encoding in communication ?

B9. Explain how copy right is important while preparing a report.

B10. What are contribution of Arabs to science and technology ? **(7×5=35)**

PART – C

C1. Explain the importance of professional ethics in engineering.

OR

C2. Discuss the importance of studying humanities in engineering. **15**

C3. Explain the skills required for technical communication.

OR

C4. What are the different formats for technical reports ? **15**

C5. Explain the role of information technology in the current education system.

OR

C6. Explain the recent advances in communication field in India. **15**

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M 27907

Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015
(2007 Admn. Onwards)
2K6 CS 303 : DISCRETE COMPUTATIONAL STRUCTURES

Time: 3 Hours Max. Marks: 100

Instructions : *1) Answer **all** questions in Part – **A**.*
*2) Answer **one** question from **each** Module in Part – **B**.*

PART – A

I. a) Differentiate between ONE-TO-ONE and ONTO functions. 5

b) Show that for $n \geq 1$

$1.1! + 2.2! + ...+ n.n! = (n+1)! - 1$. 5

c) Describe the logical connectives. 5

d) By constructing a suitable universe of discourse show that

$\exists x(P(x) \rightarrow Q(x)) \leftrightarrow (\exists xP(x) \rightarrow \exists xQ(x))$. 5

e) Define Monoid Homomorphism. 5

f) Define cosets. 5

g) Define rings. 5

h) Complete the table below in such a way that table defines a sub-group. Does it define a Monoid ? 5

*	a	b	c
a	c	a	b
b	a	b	c
c	–	–	a

(8×5=40)

P.T.O.

PART – B

II. a) i) State and prove well-ordering principle. 7

ii) Prove the validity of the following argument. 8

$$[R(x) \rightarrow \exists y S(x, y)] \rightarrow \exists y[R(x) \rightarrow S(x, y)]$$

OR

b) Find the principal DNF and the principal CNF for α given by $\alpha = (P \rightarrow (Q \rightarrow R)) \rightarrow (P \rightarrow Q) \rightarrow R$?

DNF – Disjunctive Normal Form

CNF – Conjunctive Normal Form. 15

III. a) Show by mathematical induction $F_{n-1} * F_{n+1} - F_n^2 = (-1)^n$ for $n \geq 1$. 15

OR

b) State and prove pigeon hole principle. 15

IV. a) Show that $(P \rightarrow R) \rightarrow ((Q \rightarrow R) \rightarrow (P \vee Q \rightarrow R)$ is a tautology using Quines method. 15

OR

b) Explain Abelian groups and Permutation groups. 15

V. a) i) Write short note on rings. 7

ii) Prove $(Z_n, +_n, X_n)$ is a ring. 8

OR

b) Write short notes on : 15

i) Division algorithm

ii) Cyclic cobs. (15×4=60)

M 27926

Reg. No. : .....

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including-Part time) Examination, November 2015
(2006 and Earlier Admn.)
CS/IT2K 304 : BASIC ELECTRONICS ENGINEERING

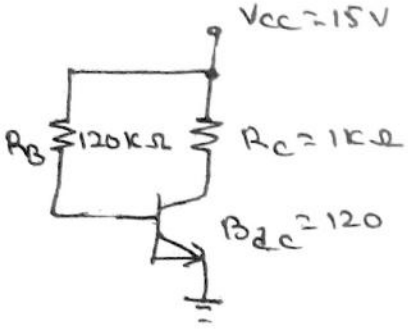
Time : 3 Hours Max. Marks : 100

Instruction *: Answer* ***all*** *questions.*

I. a) Why is the reverse current in a silicon diode is much smaller than that in a comparable germanium diode ? Define
   i) breakdown voltage ii) knee voltage 5

   b) Define α_{dc} and β_{dc} of a transistor. Obtain the relation between them. 5

   c) Determine the resion in which the transistor shown in his below operates. Assume $V_{BE} = 0.2$ V. 5



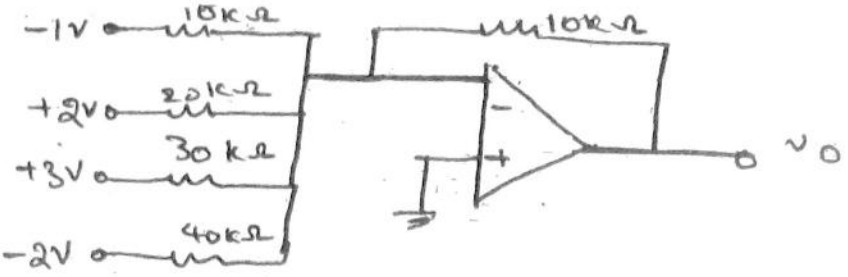
   d) A single stage amplifier is having a gain of 40dB of the input signal of 20 mV. What will be the o/p in midband. 5

   e) What is piezoelectric effect ? Name the crystal which exhibits this effect. Write the equivalent circuit of such vibrating crystal. 5

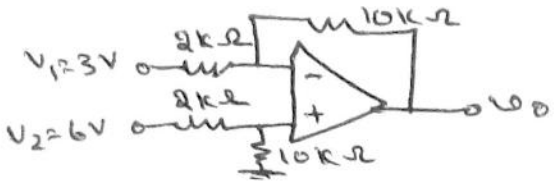
   f) Calculate the harmonic distortion components and total harmonic distortion for an output signal having fundamental amplitude of 3 V, second harmonic amplitude of 0.3 V, third harmonic amplitude of 0.15 V and fourth harmonic amplitude of 0.06 V. 5

P.T.O.

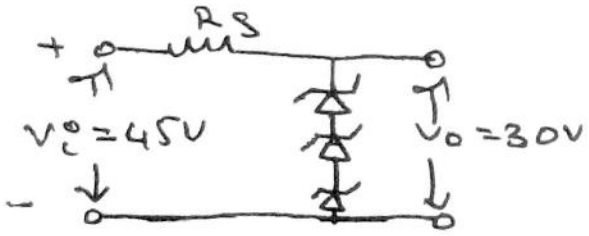
g) For the circuit shown, determine the o/p voltage. 5



h) Calculate the o/p voltage of following op-amp ckt. 5



II. a) i) Explain the working of a zener diode as a voltage regulator. What value of series resistance is required when three 10 w, 10 V, 1000 mA zener diodes are connected in series to obtain a 30 V regulated o/p from a 45 V dc power supply. 10



ii) In a transistor the base current and collector current are 60 mA and 1.75 mA respectively. What will be the emitter current ? Calculate the values of α and β of a transistor. 5

OR

b) Write short note on :

i) Avalanche breakdown

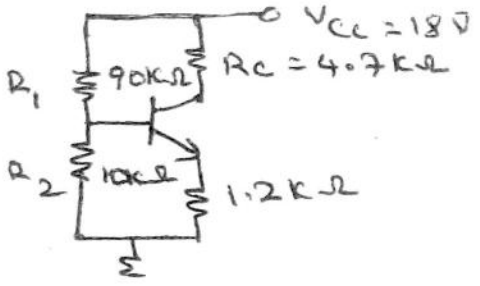
ii) Zener breakdown

iii) Early effect

iv) Thermal run away

v) LED. 15

III. a) i) Calculate V_{CE} in the circuit shown in fig. below, when $I_B = 10$ mA and B = 120 7



ii) Explain how oscillations are setup in a tank ckt. 8

OR

b) Explain the following :

i) Fixed bias

ii) Collector to base bias

iii) Voltage divider bias.

Mention their advantages and disadvantages. 15

IV. a) i) A sinusoidal voltage Vs = 1.75 sin(600t) is fed to power amplifier. The resulting output current is $I_o = 15 \sin 600t + 1.5 \sin 1200t + 1.2 \sin 1800t + 0.5 \sin 2400t$. Calculate the percentage increase in the power due to distortion. 7

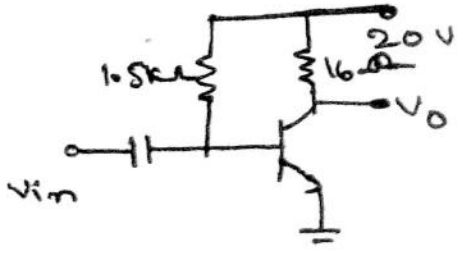
ii) Explain the following :

a) Colpitt's oscillator

b) Crystal oscillator. 8

OR

b) i) A series fed class A amplifier shown in fig. below operates from DC source and applied sinusoidal i/p signal generates peak value of base current of 9 m calculate (a) Quiescent current I_{CQ} (b) Quiescent voltage V_{CEQ} (c) DC i/p power P_{DC} (d) AC o/p Power Pac (e) efficiency. Assume B = 50 and $V_{BE} = 0.7$ V. 8



ii) A Hartleys oscillator is designed with L = 20 mH and $L_2 = 2$ mH and a variable capacitance. Determine the range of capacitance values if fuer of oscillations is varied between 1 MHz to 2.5 MHz. Neglect mutual inductance. 7

V. a) i) There are 3 voltage sources V_1, V_2 and V_3. It is required to obtain the sum of these signals without the change in sign and magnitude. Write a suitable circuit and explain its operation (use one op-amp only). 9

ii) Explain the working of op-amp peak detector ckt. 6

OR

b) Explain the following : 15

i) Logarithmic amplifier

ii) Differentiator

iii) Precision halfwave rectifier.

M 27908

Reg. No. : .....

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015
(2007 Admn. Onwards)
2K6CS/IT 305 – SWITCHING THEORY AND LOGIC DESIGN

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions :

I. a) Explain Quine Mc Clusky algorithm. 5

b) Differentiate between canonical and normal form with the help of examples. 5

c) Implement the function using only NOR gates $f = a(b+ cd) + b\bar{c}$. 5

d) Use a multiplexer having 3 data select inputs to implement the logic for the function $f = \Sigma m (0, 1, 2, 3, 4, 10, 11, 14, 15)$. 5

e) Explain essential prime cube theorem. 5

f) Explain PLA minimisation. 5

g) What is Mealy and Moore machines ? 5

h) Compare synchronous and asynchronous counters. 5

PART – B

II. a) Reduce the following function using Quine Mc Clusky method.

$f = \prod M(0, 1, 4, 5, 9, 11, 13, 15, 16, 17, 25, 27, 28, 29, 31) .d (20, 21, 22, 30)$. 15

OR

b) Reduce the expression

$f (A, B, C, D) = \Sigma m (4, 5, 7, 12, 14, 15) + \Sigma d (3, 8, 10)$ using K map. 15

III. a) Explain encoders and decoders in detail. 15

OR

b) Explain the principle of operation of parallel adders and look ahead adders. 15

P.T.O.

IV. a) Discuss on fault tolerance techniques. 15

OR

b) Write short note on the following :

I) PLA folding. 8

II) Design for testability. 7

V. a) What do you mean by ripple counters ? Design and draw the timing diagram of a 4 bit ripple up counter. 15

OR

b) Write short notes on the following :

I) Triggering of flip flop 8

II) Shift register. 7

M 27909

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Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015
(2007 Admn. Onwards)
2K6 CS/IT 306 : ELECTRONIC CIRCUITS AND SYSTEMS

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. a) Explain how a bootstrap sweep circuit produces a linear sawtooth waveform.
   b) Explain how a diode acts as a switch.
   c) Write the difference between positive logic level and negative logic level.
   d) Explain the working of a MOS flip flop.
   e) What is the difference between volatile memory and non volatile memory ?
   f) Explain about CD-ROM.
   g) Write the different types of internal noise.
   h) Derive the total power transmitted in AM transmission. **(8×5=40)**

PART – B

2. a) i) With a circuit diagram explain the working of a positive clamper clamped at – 2 volts for an input 10V (P – P). 9
   ii) What are the regions of operation of a transistor when it is acting as a switch ? Explain. 6

OR

   b) i) Explain with diagram the working of a schmitt trigger. Also explain hysteresis. 8
   ii) What is a bistable multivibrator ? Explain. 7

P.T.O.

3. a) i) With a neat diagram explain how a TTL can be interfaced with ECL. 9

ii) Compare and contrast between SSI, MSI and LSI. 6

OR

b) i) Explain the working of a CMOS inverter. 8

ii) Write a short note on TTL logic. 7

4. a) With diagrams explain the method by which memory can be expanded. 15

OR

b) i) Using diagram explain the working of dual slope A/D converter. 9

ii) Explain about magnetic bubble memories. 6

5. a) i) Prove that the ideal band width required for transmission of wide band FM is infinity. 10

ii) What is amplitude modulation ? 5

OR

b) i) With a block diagram explain the working of TRF receiver. 10

ii) What is noise figure ? Explain it's significance. 5