SE| SEM III / CBSGS | Comp-IT / AM III 12|5|16

QP Code : 30557

(3 Hours) **[Total Marks : 80**

1) Question No. **1** is compulsory.

2) Attempt any **THREE** of the remaining.

3) **Figures** to the **right** indicate **full** marks.

Q 1.A) If $\int_0^\infty e^{-2t}\sin(t+\alpha)\cos(t-\alpha)dt = \frac{1}{4}$, find α (5)

B) Find half range Fourier cosine series for f(x) = x, 0 < x < 2 (5)

C) If u(x,y) is a harmonic function then prove that f(z) = $u_x - iu_y$ is an analytic function. (5)

D) Prove that $\nabla f(r) = f'(r)\frac{\bar{r}}{r}$ (5)

Q.2) A) If v= e^x siny, prove that v is a harmonic function. Also find the corresponding analytic function. (6)

B) Find Z-transform of f(k) = b^k, k≥ 0 (6)

C) Obtain Fourier series for f(x) = $\frac{3x^2-6x\pi+2\pi^2}{12}$ in $(0, 2\pi)$, where $f(x+2\pi) = f(x)$. Hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots.$ (8)

Q.3) A) Find inverse Laplace of $\frac{(s+3)^2}{(s^2+6s+5)^2}$ using Convolution theorem (6)

B) Show that the set of functions {sinx, sin3x, sin5x,.....} is orthogonal over $[0, \pi/2]$. Hence construct orthonormal set of functions (6)

C) Verify Green's theorem for $\int_c \frac{1}{y}dx + \frac{1}{x}dy$ where C is the boundary of region defined by x = 1, x = 4, y = 1 and y = $\sqrt{x}$ (8)

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Q.4) Find $Z\{k^2 a^{k-1} U(k-1)\}$ **(6)**

B) Show that the map of the real axis of the z- plane is a circle under the transformation $w = \frac{z}{z+i}$. Find its centre and the radius. **(6)**

C) Express the function $f(x) = \begin{cases} \sin x & |x| < \pi \\ 0 & |x| > \pi \end{cases}$ as Fourier sine Integral. **(8)**

Q.5) A) Using Gauss Divergence theorem evaluate $\iint_S \bar{N}.\bar{F}\,ds$ where $\bar{F} = x^2 i + zj + yzk$ and S is the cube bounded by x = 0, x = 1, y = 0, y = 1, z = 0, z = 1 **(6)**

B) Find inverse Z-transform of $F(z) = \frac{z}{(z-1)(z-2)}$, $|z| > 2$ **(6)**

C) Solve $(D^2+3D+2)y = e^{-2t}\sin t$, with y(0)= 0 and y'(0)= 0 **(8)**

Q.6) A) Find Fourier expansion of $f(x) = 4 - x^2$ in the interval (0,2) **(6)**

B) A vector field is given by $\bar{F} = (x^2 + xy^2)\, i + (y^2 + x^2 y)\, j$. Show that $\bar{F}$ is irrotational and find its scalar potential. **(6)**

C) Find (i) $L^{-1}\left\{\tan^{-1}\left(\frac{a}{s}\right)\right\}$

(ii) $L^{-1}\left(\frac{e^{-\pi s}}{s^2-2s+2}\right)$ **(8)**

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SE/Sem III/Comp/CBSGS/DS 24/05/2016

QP Code : 30654

Duration: 3 hrs

Total Marks: 80

N.B: (1) Question No. 1 is Compulsory
(2) Attempt any **three** questions of the remaining **five** questions
(3) **Figures** to the **right** indicate **full** marks
(4) Make suitable assumptions wherever necessary with proper justifications

1. (a) Define ADT with an example (03)
(b)What are the advantages of using linked lists over arrays? (05)
(c) Describe Expression Tree with an example. (05)
(d) Write a program in C to implement Insertion Sort (07)

2. (a) Discuss file I/O in C language with different library functions. (10)
(b)Explain recursion as an application of stack with examples. (10)

3. (a) Write a menu driven program in C to implement QUEUE ADT. The program should perform the following operations: (12)
    - (i) Inserting an Element in the Queue
    - (ii) Deleting an Element from the Queue
    - (iii) Displaying the Queue
    - (iv) Exiting the program

(b)Write a function to implement Indexed Sequential Search. Explain with an Example (08)

4. (a) Write a C program to implement a Doubly Linked List which performs the following operations: (12)
    - (i) Inserting element in the beginning
    - (ii) Inserting element in the end
    - (iii) Inserting element after an element
    - (iv) Deleting a particular element
    - (v) Displaying the list

(b) Apply Huffman Coding for the word "MALAYALAM". Give the Huffman code for each symbol. (08)

5. (a) Explain any one application of linked list with an example. (08)
(b)Write a program in C to delete a node from a Binary Search Tree. The program should consider all the possible cases. (12)

6. (a) Write a program in C to implement the BFS traversal of a graph. Explain the code with an example. (10)
(b) Hash the following in a table of size 11. Use any two collision resolution techniques: (10)
23, 55, 10, 71, 67, 32, 100, 18, 10, 90, 44.

SE sem III Computer DLDA 30/5/16

QP Code : 30702

(3 Hours) **[Total Marks : 80**

N.B. (1) Question No. 1 is compulsory
(2)Assume suitable data if necessary
(3)Attempt any three questions from remaining questions

1
(a) Convert $(532.125)_8$ into decimal, binary and hexadecimal. (3)
(b) Convert $(47.3)_7$ BCD, Excess-3 and Gray code. (3)
(c) Subtract using 1's and 2's complement method $(56)_{10} - (76)_{10}$. (4)
(d) Obtain odd parity Hamming code for 1011. (2)
(e) Implement Ex-OR gate using NOR gate only. (2)
(f) Perform the following operations without changing the base. (4)
i) $(314)_8 + (737)_8$ ii) $(312.40)_5 + (214.33)_5$
(g) State and prove Demorgans theorem. (2)

2 (a) Reduce equation using Quine McCluskey method and realize circuit using basic gates. (10)
$F(A,B,C,D) = \sum m\ (1, 3,7,9,10,11,13,15)$.
(b) Design 8 bit BCD adder. (10)

3 (a) Design a logic circuit to convert Gray to BCD code. (10)
(b) Implement the following using only one 8:1 Mux and few gates. (5)
$F(A,B,C,D) = \sum m\ (0,3,5,7,9,,13,15)$
(c) Design a full adder circuit using half adders and some gates. (5)

4 (a) Compare TTL and CMOS logic. (5)
(b) Implement Full subtractor using Demultiplexer. (5)
(c) Explain 4 bit Universal shift register. (10)

5 (a) Design mod 5 asynchronous UP counter. (10)
(b) Convert SR flipflop to JK flipflop and D flipflop. (10)

6 Write short note on (any four):- (20)
(a) VHDL
(b) Decade Counter
(c) State table
(d) 4-bit Magnitude comparator
(e) Multivibrators

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S.E / Sem III / Comp / CGSGS / DIS (18)

QP Code : 30745

(3 Hours) **[Total Marks :80**

N.B. : (1) Question no. **1** is **compulsory.**
(2) Attempt any **three** questions from the remaining **five** questions.
(3) **All** questions carry equal marks as indicated by **figures** to the **right**.
(4) Assumptions made should be clearly stated.

1. (a) Find how many integers between 1and 60 are not divisible by 2 nor by 3 and nor by 5 respectively. **6**

(b) By using mathematical induction prove that $1+a+a^2+....a^n=\frac{1-a^{n+1}}{1-a}$,where $n \geq 0$ **6**

(c) Let A={1,2,3,4,5}and R be the relation defined by a R b if and only if a < b. Compute R, R^2 and R^3 .Draw digraph of R, R^2 and R^3 . **8**

2. (a) Show that a group G is Ablian,if and only if $(ab)^2 = a^2 b^2$ for all elements a and b in G. **6**

(b) Let A={1,2,3,4,6}=B,a R b if and only if a is multiple of b. Find R. Find each of the Following (i) R(4) (ii) R(G) (iii) R({2,4,6}) **6**

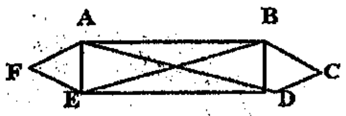
(c) Show that the (2,5)encoding function e: $B^2 \to B^5$ defined by e (00) = 00000 e (01) = 01110 e (10) = 10101 e (11) = 11011is a group code. How many errors will it detect and correct? **8**

3. (a) State pigeon hole and extended pigeon hole principle. Show that 7 colors are used to paint 50 bicycles ,at least 8 bicycle will be of same color. **6**

(b) Define distributive lattice .Show that in a bounded distributive lattice, if a complement exists ,its unique . **6**

(c) Functions f,g, h are defined on a set,X= {1,2,3} as f= {(1,2) (2,3) (3,1)} g = {(1,2} (2,1) {3,3)} h = {(1,1) (2,2) (3,1)} (i) Find f o g, g o f are they equal ? (ii) Find f o g o h and f o h o g . **8**

4. (a) Define Eular path and Eular circuit,determine whether the given graph has Eular path and Eular circuit. **6**



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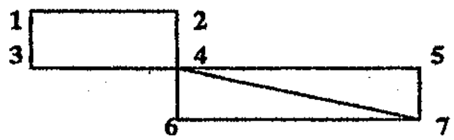
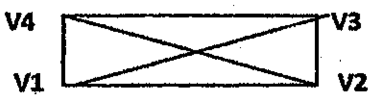
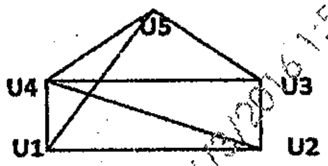
(b) Define Hamiltonian path and Hamiltonian circuit,determine whether the given graph has Hamiltonian path and Hamiltonian circuit . 6



(c) Define isomorphic graphs. Show that the following two graphs are isomorphic. 8



Fig(a)



Fig(b)

5. (a) What is an Universal and existential quantifiers? Prove the distribution law. 6
$(p \vee q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

(b) Let A={1,2,3,4}and let R={(1,2) (2,3)(3,4)(2,1)}Find transitive closure of R by using Warshall's algorithm. 6

(c) Prove that the set A={0,1,2,3,4,5} is a finite Abelian group under addition modulo 6. 8

6. (a) Find the ordinary generating functions for the given sequences: 6
(i){1, 2 ,3,4,5 ----} (ii) {2,2,2,2 ----}(iii) {1,1,1,1----}

(b) Define group, monoid, semigroup. 6

(c) Solve the following recurrence relation: $a_n - 7a_{n-1} + 10\, a_{n-2} = 0$ with initial condition $a_0 = 1$, $a_2 = 6$ 8

SE/SEM III/ [struck out] OLD/COMP/AM III 12/5/16

Exam

QP Code : 28662

DATE:

TIME:

MAX. MARKS:100

DURATION: 3 HRS.

Instructions:

1) Question No. **1** is compulsory.
2) Attempt any **FOUR** of the remaining.
3) **Figures** to the **right** indicate **full** marks.

Q. 1) A) Find $L\{e^{3t}.\sin^2 t\}$ 05

B) Show that every square matrix can be uniquely expressed as the sum of a Symmetric and a skew–Symmetric matrix. 05

C) Find a Z – transform and the region of convergence of $f(k) = 2^k$, where $k \geq 0$. 05

D) Find the Fourier series expansion of $f(x) = x^2$, where $-\pi \leq x \leq \pi$. 05

Q. 2) A) Prove that the matrix, $A = \frac{1}{9}\begin{bmatrix} -8 & 4 & 1 \\ 1 & 4 & -8 \\ 4 & 7 & 4 \end{bmatrix}$ is orthogonal and hence find its inverse. 06

B) Find $L^{-1}\left\{\frac{s+2}{(s^2+4s+5)^2}\right\}$. 06

C) Obtain the Fourier series expansion of $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x + 2\pi) = f(x)$.

Also deduce that (i) $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$

and (ii) $\frac{\pi^4}{90} = \frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + \cdots$ 08

Q. 3) A) Investigate for what values of λ and μ, the equations :

$x + y + z = 6$, $x + 2y + 3z = 10$ and $x + 2y + \lambda z = \mu$ have (i) no solution, (ii) a unique solution and (iii) infinite number of solutions. 06

B) Obtain complex form of Fourier series for $f(x) = e^{ax}$ in $(-\pi, \pi)$ where a is not an integer. 06

C) Solve $(D^2 - D - 2)y = 20.\sin(2t)$ with $y(0) = 1$ and $y'(0) = 2$. 08

Q. 4) A) Find the Laplace transform of $(t) = \begin{cases} asinpt & 0 < t < \frac{\pi}{p} \\ 0 & \frac{\pi}{p} < t < \frac{2\pi}{p} \end{cases}$.

and $f(t) = f\left(t + \frac{2\pi}{p}\right)$. 06

B) Find the inverse Z – transform of $F(z) = \frac{1}{(z-3)(z-2)}$, for $|z| > 3$. 06

C) Find the inverse Laplace transform of (i) $\frac{e^{4-3s}}{(s+4)^{\frac{5}{2}}}$ (ii) $\tan^{-1}\left(\frac{2}{s}\right)$ 08

Q. 5) A) Examine whether the following vectors are linearly independent or dependent :

(2, 1, 1), (1, 3, 1) and (1, 2, –1) 06

B) Using the convolution theorem, prove that $L^{-1}\left[\frac{1}{s}\ln\left(\frac{s+a}{s+b}\right)\right] = \int_0^t \frac{[e^{-bu} - e^{-au}]}{u} du$ 06

C) Express the function $f(x) = \begin{cases} sinx & |x| < \pi \\ 0 & |x| > \pi \end{cases}$ as Fourier Sine integral and

evaluate $\frac{1}{\pi}\int_0^{\infty} \frac{sinwx.sin\pi w}{1-w^2} dw$ 08

Q. 6) A) Find the Fourier transform of $f(x) = e^{-|x|}$. 06

B) Find Z{f(t)} where $f(t) = \sin\left(\frac{k\pi}{4} + a\right)$, where $k \geq 0$. 06

C) Find the Fourier expansion of $f(x) = 2x - x^2$, where $0 \leq x \leq 3$. Here f(x) is a periodic function having period 3. 08

Q. 7) A) Reduce the matrix, $A = \begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 11 \end{bmatrix}$ to its normal form. Find its rank. 06

B) Evaluate $\int_0^{\infty} \frac{cos4t - cos3t}{t} dt$ using Laplace transform. 06

C) Show that the set of functions, $S = \left\{\sin\left(\frac{\pi x}{2L}\right), \sin\left(\frac{3\pi x}{2L}\right), \sin\left(\frac{5\pi x}{2L}\right), \ldots\right\}$ is an orthogonal set over (0, L). 08

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S.E./Sem III/old/Comp 15/5/16
EDLC

QP Code : 28703

(3 Hours) [Total Marks : 100

N.B. : (1) Question No.1 is Compulsory.
(2) Attempt any four out of remaining questions.

1. (a) Compare BJT and JFET 5
   (b) Sketch the transfer characteristic curve for P channel JFET with $I_{DSS} = 5mA$, $V_p = 4V$. 5
   (c) Draw and explain the block diagram of OPAMP. 5
   (d) List characteristic features of 555 timer. 5

2. (a) Explain the Graphical determination of the h-parameters using characteristics curves of common emitter amplifier. 10
   (b) Derive the Q point valves (V_{DQ} & I_{DQ}) and current gain Ai for voltage divider Network for CE configuration. 10

3. (a) Derive equations of Zi, Zo, Av for common source configuration using voltage divider network (with unbypassed Rs.) 10
   (b) Explain the construction and working of JFET with its characteristic curves. 10

4. (a) Explain how an Op Amp can be used as: 10
   (i) Integrator
   (ii) Differentiator
   (iii) Summing Amplifier.
   (b) Using practical Op Amp realize the following relation - 10
   $V_0 = 5V_1 + 3V_2 - 5V_3$

5. (a) Explain CMRR and PSRR and an OPAmp. 5
   (b) Explain OP Amp as a ZCD. 5
   (c) Explain instrumentation Amplifier using 3OP - AMPs and Derive the expression for voltage gain. 10

6. (a) Explain IC 555 timer as a monostable multivibrator with neat waveforms 10
   (b) Design a +9V regulator using LM723 for current limit of 100mA. 10

7. Write short notes on (any two): 20
   (a) PLL
   (b) Inverting schmitt trigger
   (c) D/A converter using R 2P resistor.

GE-Con. 10521-16.