2/6/18

Sem III – ID, CBSGS, May 2018

ADC

Q. P. Code: 36192

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

N.B.: (1) Question No. **1** is **compulsory.**
(2) Solve any **three** questions out of remaining **five.**
(3) Figures to **right** indicate **full** marks.
(4) Assume suitable **data** where **necessary.**

Q1. Solve

a) i) Convert $(13.078125)_{10}$ to binary.
ii) Convert $(B73D)_H$ into octal.
iii) Convert $(436)_8$ into hexadecimal.
iv) Convert $(845)_{10}$ into gray code. (4)

b) Sketch typical illumination characteristics for a photodiode and explain the theory of device. (4)

c) Derive the equation of stability factor for voltage divider bias circuit. (4)

d) Implement a full adder using 8:1 Demultiplexer. (4)

e) Write truth table and excitation table of JK flip flop. (4)

2. a) Explain inverting summing amplifier using op-amp. Derive the expression for output voltage. (8)

b) What are different methods used to improve CMRR in differential amplifier. (8)

c) Draw circuit diagram & waveforms of monostable multivibtrator using IC555. (4)

3. a) Design 2 bit magnitude comparator. (10)
b) Using K-map realize the following expression
$Y = \sum m\,(1, 3, 4, 5, 7, 9, 11, 13, 15)$ (5)

(c) Convert JK FF to D FF. (5)

4.a) With the help of neat circuit diagram explain the operation of Zener diode regulator for variable input voltage and variable load. (8)
b) Explain dataflow modeling style with suitable example. (6)
c) Compare schottky diode with PN junction diode (3 points) (6)

5. (a) Design a MOD-12 Asynchronous down counter. (8)
(b) What do you mean by operational amplifier? Explain the block diagram of opamp. (8)
(c) Write VHDL for full adder. (4)

6.(a) Write a short note on ASCII code and Excess-3 code. (8)
(b) What do you mean by universal gate? Implement NOT,AND,OR gates using NAND gates only. (8)
(c) Explain the difference between the integrator & differentiator .Give one application of each. (4)

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Sem III Choice base, May 2018.
IT – Am=III

8/5/18

QP CODE : 24396

(3 Hours) **Marks: 80**

Note: 1. Question no. **1** is compulsory.
2. Attempt any **three** questions out of remaining **five** questions.

Q.1.[a] Determine the constants a, b, c, d so that the function [5]
$f(z) = x^2 + axy + by^2 + i(cx^2 + dxy + y^2)$ is analytic.

[b] Let $A = \{1, 2, 3, 4\}, B = \{1, 2, 3, 4\}$ and "aRb if and only if a is not [5]
equal to b". Find R and its digraph.

[c] For the sets A, B, C given that $A \cap B = A \cap C$ and $\bar{A} \cap B = \bar{A} \cap C$. Is [5]
it necessary that B = C? Justify.

[d] Find Laplace transform of [5]

$$f(t) = t \quad \text{for } 0 < t < 1$$
$$= 0 \quad \text{for } 1 < t < 2, \ f(t+2) = f(t).$$

Q.2.[a] 75 Children went to an amusement park where they can ride on the merry-go-round, roller coaster and ferris wheel. It is known that 20 of them have taken all 3 rides, and 55 of them have taken at least two of the 3 rides. Each ride costs 0.50 Rs and the total receipt of the amusement park was 70 Rs. Determine the number of children who did not try any of the rides. [6]

[b] Evaluate [6]

$$\int_0^\infty te^{-3t} J_0(4t)dt = \frac{3}{125} \text{ if } L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}.$$

[c] (i) Functions f, g and h are defined as follows : [4]
$f: R \to R$, $g: R \to R$, $h: R \to R$, $f(x) = x + 4$, $g(x) = x - 4$
$h(x) = 4x$ for $x \in R$, where R is the set of real numbers.
Compute $f \circ g$; $g \circ f$; $f \circ g \circ h$; $h \circ h$.

(ii) Show that using Venn diagram $P \cap (Q - R) = (P \cap Q) - (P \cap R)$. [4]

Q.3.[a] If $f(z)$ and $|f(z)|$ are both analytic then show that $f(z)$ is constant. [6]

[b] Let R be a binary relation on the set of positive integers such that [6]
R = {(a,b) / a-b is an odd positive integer }. Is R reflexive ?
Symmetric ? Antisymmetric ? Transitive ? An equivalence relation ?
A partial ordering set ?

[c] Evaluate (i) $L[te^{3t}\sin 4t]$ (ii) $L\left[\int_0^t\int_0^t\int_0^t t\sin t\,dt\,dt\,dt\right]$ [8]

Q.4. [a] Evaluate using Convolution theorem $L^{-1}\left[\frac{(s+2)}{(s^2+4s+8)^2}\right]$. [6]

[b] Find the transitive closure of R where R be the relation [6]

represented by $\begin{bmatrix}0&1&0&0\\0&0&1&0\\0&1&0&1\\0&0&0&0\end{bmatrix}$

[c] Find analytic function $f(z)=u+iv$ where $v=e^x(x\sin y+y\cos y)$.. [8]

Q.5.[a] Solve $\frac{dy}{dt}+2y+\int_0^t y\,dt=\sin t$ with $y(0)=1$. [6]

[b] Find bilinear transformation which maps the points z = 1,i,-1 onto $w=0,1,\infty$. Further show that under this transformation the unit circle In w plane is mapped onto a straight line in the z plane.

[c] In a bolt factory machines A, B, and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C? [8]

Q.6. [a] It is known that at the university 60% of the professors play tennis, 50% of them play bridge, 70% jog, 20% play tennis and bridge, 30% play tennis and jog, 40% play bridge and jog. If someone claimed that 20% of the professors jog and play bridge and tennis, would you believe this claim? Why? [6]

[b] Suppose repetitions are not permitted. [6]

(i) How many four- digit numbers can be formed from the digits 1, 2, 3, 5, 7, 8?

(ii) How many of the numbers in part (a) are less than 4000?

(iii) How many of the numbers in part (a) are odd ?

(iv) How many of the numbers in part (a) are multiples of 5?

[c] Evaluate (i) $L^{-1}\left[2\tanh^{-1}s\right]$ (ii) $L^{-1}\left[\frac{e^{4-3s}}{(s+4)^{\frac{5}{2}}}\right]$ [8]

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(16) 2/6/18.

Sem III IT (CBCGS) May 2018

DMS

Q. P. Code: 37783

(3 Hours) **Marks : 80**

N.B. : 1. Question **no. 1** is **compulsory**.

2. Solve any **Three** questions out of remaining **Five** questions.sss

Q 1 a Explain Role of DBA ? 5

b List all the functional dependencies satisfied by the relation. 5

X	Y	Z
X1	Y1	Z1
X1	Y2	Z1
X2	Y2	Z1
X2	Y2	Z1

c What is the difference between unique key and primary key? 5

d Explain different types of attributes with examples? 5

Q 2 a Explain static hashing technique with example? 10

b Define Normalization? Explain 1NF, 2NF and 3NF with examples? 10

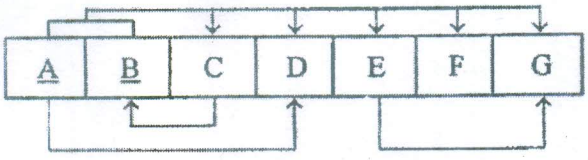
Q 3 a Consider the following employee database. 10

Employee(empname, street, city, date_of_joining)
Works(empname, company_name, salary)
Company(company_name, city)
Manages(empname, manager_name)
Write SQL queries for the following statements:

i) Modify the database so that employee "Sachin " now lives in "Mumbai"
ii) Find number of employees in each city with date_of_joining as "01-Aug-2017"
iii) List the name of companies starting with letter "A"
iv) Display empname , manager_name , city of those employees whose date_of_joining is greater than "01-01-2014"

b Explain DBMS architecture 10

Q 4 a Construct a dependency diagram of relation R and normalize it up to the BCNF Normal form 10



b Explain different types of relational algebra operations. 10

Q 5 a Explain Cursors and its types with example 10

b Draw EER diagram for Hospital Management System showing constraints on generalisation and specialisation 10

Q 6 Write a short note on:

a Types of Entities 5

b Authorization in SQL 5

c Views in SQL 5

d B- tree 5

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(13) 16/5/18 Sem III Choice Base, May 2018 IT – LD

Q. P. Code : 37942

(3 Hours) (Total Marks : 80)

Please check whether you have the right question paper.

N.B.: 1) Questions **No. 1** is **compulsory**.
2) Solve **any three** question out of remaining **five** questions.
3) Assume suitable **data** if **necessary**.
4) **Figures** to the **right** indicate **full marks**.

1 Solve any **four** out of five : **(20)**

a) Explain Input and Output characteristics of CE configuration of BJT.
b) Convert following decimal number to Binary, Octal, Hexadecimal and Gray code $(154)_{10}$.
c) Design EX-OR gate using only NOR gates.
d) Draw two truth tables illustrating the outputs of a full-adder, one table for the sum output
e) Covert S – R filp-flop to D flip-flop.

2. **a)** Implement following using only one 8: 1 Multiplexer and few gates : **(10)**

$$f(A, B, C, D) = \sum m(1, 2, 3, 5, 6, 9, 10, 11, 14)$$

b) Using Quine McCluskey Method determine Minimal SOP form for **(10)**

$$f(A, B, C, D) = \sum m(1, 3, 5, 6, 8, 9, 12, 14, 15) + \sum d(4, 10, 13)$$

3. **a)** Explain Collector to base bias Circuit with its stability factor. **(10)**
b) With neat diagram explain operation of ALU IC74181. **(10)**

4. **a)** Design a Mod 10 synchronous counter using S-R Flip-flop. **(10)**
b) Minimize the following four variable logic function using K-map : **(10)**

$f(A, B, C, D) = \sum m(0, 2, 3, 5, 6, 7, 8, 10, 11, 14, 15)$ and design using only NAND gates.

5. **a)** Simplify following equation using Boolean algebra and Design using basic gates **(10)**

$f(A, B, C) = A'B + BC' + BC + AB'C'.$

b) Explain Entity in VHDL and Write VHDL program for half subtractor circuit. **(10)**

6. Solve the following **(Any Four)** : **(20)**

a) Explain working of Universal Shift Register.
b) Working of T flip flop.
c) Explain working of Differential Amplifier.
d) Write VHDL program for EX-NOR gate.
e) Explain working of Encoder and Decoder.

16/5/18.

(12) Sem III IT, CBSGS, May 2018

PADC

Q. P. Code : 37358

Time : 3 hours Marks : 80

N.B. (1). Question No.1 is compulsory.

(2). Out of remaining attempt any three.

(3). Assume & mention suitable data wherever required.

(4). Figures to right indicates full marks.

Q.1. Solve any four **[20]**

a). Compare analog modulation and digital modulation.

b). Explain FM noise triangle

c). Compare eye pattern with neat diagram..

d). Explain the process of quantization..

e). Explain bitrate and baud rate.

Q.2 **a).** Explain the following 1). Shot noise 2). Equivalent noise temperature. [5]

b). Derive the formula for equivalent noise temperature. An amplifier has a noise figure of 6dB..Calculate its equivalent noise temperature. [5]

c). State and prove the following properties of Fourier transform with example

i) Time shifting ii) Differentiation in time domain [10]

Q.3. a) The AM Transmitter develops an unmodulated power o/p of 400 Watts across a 50Ω resistive load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.8. Assuming f_m= 5 KHz and f_c= 1MHz.

(i) Obtain the value of carrier amplitude Vc and hence write the expression for AM signal.

(ii) Find the total sideband power..

(iii) Draw the AM wave for the given modulation index. [10]

b). What are the drawbacks of TRF receiver. How it is overcome by super heterodyne receiver. Explain in brief.. **[10]**

Q.4 **a).** With the help of neat block diagram explain in brief indirect method of FM generation. **[10]**

b). what is multiplexing in communication system. Describe the multiplexing hierarchy for digital multiplexing. **[10]**

Q.5. **a).** State sampling theorem and explain anti- aliasing filter. [6]

b).A bandpass signal has a spectral range that extends from 20 KHz to 82KHz. Find the sampling frequency fs. [4]

c). Draw the block diagram of PWM generator. Explain the working giving waveforms at the output of each block. [10]

Q6 **a).**How is adaptive delta modulation is better than linear delta modulation? Draw block diagram of adaptive delta modulation and explain each block in detail. [10].

b) . Explain the generation and detection of FSK signal. [10]

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01/6/18

Sem III - Choice basic, IT, May 2018

(18)

PC

Q. P. Code: 35136

Time: 3 hours Total Marks : 80

N.B. (1). Question No.1 is compulsory.
(2). Out of remaining attempt any three.
(3). Assume & mention suitable data wherever required.
(4). Figures to right indicates full marks.

Q1 Write any **four** of the following 20

a) Explain pre-emphasis & de-emphasis
b) Explain shot noise & transit time noise in brief
c) State drawbacks of delta modulation system & how it is removed
d) Explain principles of Sky wave propagation in brief.
e) State and prove differentiation property in time domain of Fourier transform

Q2

a) Explain PWM generation & degeneration method in detail 10

b) Explain PCM Encoder & PCM decoder with block diagram 10

Q3

a) a sinusoidal carrier has an amplitude of 10 V & a frequency of 100 KHz. It is amplitude Modulated by a sinusoidal voltage of amplitude 3V & a frequency of 500 Hz. Modulated Voltage is developed across 75 Ω.

(i) Write the equation of modulated wave
(ii) Determine modulation index
(iii) Calculate total average power
(iv) Power carried by sidebands
(v) Spectrum of modulated wave 10

b) Explain in detail indirect method of generation of FM with suitable diagram 10

Q4

a) What is multiplexing in communication system? Draw and explain transmitter and Receiver of FDM 10

b) Explain with reference to AM receiver (i) fidelity (ii) selectivity (iii) sensitivity iv) Image frequency and its rejection. (v) Double spotting 10

Q5

a) Draw the ASK, FSK & PSK waveforms for digital data **11010011** 06

b) What do you mean by inter symbol interference & how it is avoided 08

c) What do you mean international standards for communication system?

How frequencies are allocated? 06

Q6 Write short notes on **(any four)** 20

a) friss formula b) sampling theorem c) line codes d) types of communication channel

e) Space wave propagation

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(38) Sem III CMPN & IT, CBSGS, MAY-2018 8/5/18
Am - III.

Q.P. Code :23005

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no. 1 is compulsory.
2. Attempt any three of the remaining.
3. Figures to the right indicate full marks.

Q.1 a) Find the Laplace transform of e^{-4t} sinh t sin t. 05

b) Find half-range sine series for f(x) = $\frac{\pi}{4}$ in (0, π). 05

c) Find the values of Z for which the following function is not analytic. 05
Z= sin hu cos v + i cos hu sinv.

d) Show that $\nabla\left[\frac{(\bar{a}\,.\,\bar{r})}{r^n}\right] = \frac{\bar{a}}{r^n} - \frac{n(\bar{a}\,.\,\bar{r})\bar{r}}{r^{n+2}}$, where $\bar{a}$ is a constant vector. 05

Q.2 a) Find the inverse Z- transform of F(z) = $\frac{1}{(z-3)(z-2)}$ if $|z| < 2$. 06

b) Verify Laplace's equation for u = $\left(r + \frac{a^2}{r}\right)\cos\theta$ also find v and f(z). 06

c) Find the Fourier series for the periodic function 08
$$f(x) = \begin{cases} -\pi & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$
State the value of f(x) at x=0 and hence, deduce that
$$\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$$

Q.3 a) Find $L^{-1}\left[\frac{1}{(S-3)(S-3)^2}\right]$ using convolution theorem. 06

b) Show that the set of functions sin x , sin 2x , sin 3x, ---------- is orthogonal on the interval [0,π] 06

c) Verify Green's Theorem for $\int_C \bar{F}\,.\,d\bar{r}$ where $\bar{F} = x^3i + xyj$ and c is the triangle whose vertices are (0,2) , (2,0) and (4,2) . 08

Q.4

a) Find Laplace transform of $f(t) = \begin{cases} a\ sinp\ t\ , & 0 < t < \frac{\pi}{p} \\ 0\ , & \frac{\pi}{p} < t < \frac{2\pi}{p} \end{cases}$ 06

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

b) Show that $\bar{F} = (y^2\text{-}z^2\text{+}3yz\text{-}2x)i + (3xz\text{+}2xy)j + (3xy\text{-}2xz\text{+}2z)k$ is both solenoidal and irrotational. 06

c) Find half range cosine series for $f(x) = x$, $0<x<2$. 08

Hence deduce that $\frac{\pi^4}{90} = \frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \frac{1}{4^4} + - - - - -$

Q.5

a) Show that $\iint_S (\nabla r^n).\, d\bar{s} = n(n+1) \iiint_V r^{n-2}\, dv$ using Gauss's Divergence theorem. 06

b) Find the Z-transform of $\{k^2 e^{-ak}\}$, $k \geq 0$. 06

c) (i) Find $L^{-1}\left[\frac{s^2+2s+3}{(s^2+2s+2)(s^2+2s+5)}\right]$ 08

(ii) Find $L^{-1}\left[\frac{s^2+a^2}{\sqrt{s+b}}\right]$

Q.6

a) Use Laplace transform to solve, 06

$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 1$ where, $y(0) = 0$, $y'(0) = 1$

b) Find the bilinear transformation which maps the points $z=\infty, i, 0$ onto the points $0,i,\infty$ respectively of w-plane. 06

c) Express the function $f(x) = \begin{cases} \frac{\pi}{2}, for\ 0 < x < \pi \\ 0\ , \quad for\ x > \pi \end{cases}$ 08

for Fourier Sine Integral and Show that

$\int_0^\infty \frac{1-cos\pi w}{w} \sin wx\ dw = \frac{\pi}{2}$ when $0<x<\pi$

**********All THE BEST**********