D 93403 **(Pages : 3)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2020

(CBCSS)

Electronics

ELS 1C 04—ADVANCED DIGITAL SYSTEM DESIGN

(2019 Admissions)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A

Answer any **four** *questions.*
Each question carries weightage 2.

1. State and prove Consensus Theorem.
2. Find the equivalent decimal number of the octal numbers :

   (i) 2374_8 ; and (ii) 761.12_8.

3. Explain linear separability of threshold functions.
4. Explain isomorphic sequential machines.
5. Describe Moore machine with an example.
6. What is an ASM chart ? Draw the ASM chart for 2 bit up-down counter.
7. What is FPGA ? What are its advantages ?

(4 × 2 = 8 weightage)

Turn over

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Part B

Answer any **four** *questions.*
Each question carries weightage 3.

8. (a) Reduce the function F = AB + A′ BC′ D + A′ BCD + AB′ C′D′ using K-map.

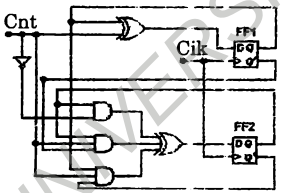
   (b) Explain static hazards in logic circuits.

9. Realize the given function using a single T-gate

   F = CD + A'D + B'D + A'B'C.

10. Identify if the function $F(A, B, C, D) = \sum(0, 3, 5, 8, 10, 12, 13, 15)$ is symmetric. Express the function in symmetric notation.

11. Derive the state table and state diagram of the circuit shown below.



12. Explain state minimization of incompletely specified machines.

13. Explain the structure of :

    (a) Standard PLD.

    (b) Complex PLD.

14. Compare Actel ACT2 family with Xilinx XC4000 family.

(4 × 3 = 12 weightage)

Part C

Answer any **two** *questions.*
Each question carries weightage 5.

15. (a) Design a modulo-5 counter.

    (b) Briefly explain Reed-Muller expansion of a Boolean function.

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16. (a) Is threshold gate a universal gate ? Explain.

    (b) Simplify the function :

    $f(a, b, c, d) = \Sigma_m (2, 3, 7, 9, 11, 13) + \Sigma_d (1, 10, 15)$

    using McClukey method.

17. Design a binary multiplier using ASM chart as a design tool.

18. Explain the programmable interconnect in Xilinx XC3000 series in detail.

(2 × 5 = 10 weightage)

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D 93402 **(Pages : 2)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2020

(CBCSS)

Electronics

ELS 1C 03—MODERN DIGITAL AND OPTICAL COMMUNICATION

(2019 Admissions)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A (Short Answer Type)

Answer any **four** *questions.*
Each question carries a weightage of 2.

1. Describe WAN.
2. What is data link layer ? Explain its working.
3. Explain about unbounded media.
4. Differentiate between bridge and router in computer network.
5. What are the Benefits of Structured Cabling System ?
6. What does optical switch do ?
7. What is group velocity in optical fibers ?

(4 × 2 = 8 weightage)

Section B (Short Essay Type)

Answer any **four** *questions.*
Each question carries a weightage of 3.

8. What are the key design issues of a computer Network ?
9. Differentiate between connection oriented and connection less services.

Turn over

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10. Which layers are network support layers ? Explain each layer.
11. Describe a) switch. b) hub. c) router. d) bridge.
12. What is the use of optical switch ?
13. Differentiate EDFA and FRA.
14. How do optical amplifiers work ?

(4 × 3 = 12 weightage)

Section C (Long Essay Type)

Answer any **two** *questions.*
Each question carries a weightage of 5.

15. Explain TCP/IP model. Write the function of each layer.
16. What is data link layer ? Explain the services provided by data link layer to network layer
17. What are the different types of transmission media ? Explain them in detail.
18. Explain the optical fiber communication system with its block diagram.

(2 × 5 = 10 weightage)

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D 93401 **(Pages : 2)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2020

(CBCSS)

Electronics

ELS 1C 02—MICROCONTROLLER BASED SYSTEM DESIGN

(2019 Admissions)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A (Short Answer Type)

Answer any **four** *questions.*
Each question carries a weightage of 2.

1. How do the banks in 8051 microcontrollers are accessed ?
2. Give the advantages and disadvantages of absolute and linear address decoding ?
3. Write a program to convert an ASCII number '47' to packed BCD and display them on P1.
4. Write a note on the interrupt priorities in 8051 microcontroller.
5. Explain how PWM can be used to control a DC motor.
6. What is signal conditioning ? How is it achieved ?
7. List the features of Arduino Uno.

(4 × 2 = 8 weightage)

Section B (Short Essay Type)

Answer any **four** *questions.*
Each question carries a weightage of 3.

8. Explain the Program Status Word in 8051 microcontroller.
9. Differentiate between memory mapped I/O and I/O mapped I/O.

Turn over

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10. Write a program for the 8051 to receive bytes of data serially, and put them in P1, set the baud rate at 4800. 8-bit data, and 1 stop bit.

11. Write the programming steps to interface Timers in Mode 1.

12. Briefly explain the features of an RTC DS12887.

13. Write a sketch to control an LED according to the status of a switch.

14. Write a note on the serial communication protocols supported by Raspberry Pi.

(4 × 3 = 12 weightage)

Section C (Long Essay Type)

Answer any **two** *questions.*

Each question carries a weightage of 5.

15. Draw the pinout diagram of 8051 microcontroller and explain the pins.

16. Explain the interrupts in 8051 microcontroller.

17. Explain the interfacing of an LCD with necessary circuit diagram and flow chart.

18. Interface a temperature sensor with an Arduino and write a program to monitor the analog value sent by the sensor over the serial monitor.

(2 × 5 = 10 weightage)

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D 93400 **(Pages : 2)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2020

(CBCSS)

Electronics

ELS 1C 01—APPLIED MATHEMATICS

(2019 Admissions)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A

Answer any **four** *questions.*
Each question carries weightage 2.

1. Define transcendental equation. Give an example of a transcendental equation.
2. What is the advantage of Gauss Jordan method over Gauss Elimination method ?
3. The next iterative value of the root of $2x^2 - 3 = 0$ using the Newton-Raphson method, if the initial guess is 2, is :
4. Find the degree and order of differential equation $y' + ay^2 = 0$
5. Distinguish between transportation and assignment problem.
6. Define Poisson distribution. And state the assumptions under which binomial distribution tends to Poisson distribution ?
7. Define eigen values and eigen vectors.

(4 × 2 = 8 weightage)

Part B

Answer any **four** *questions.*
Each question carries weightage 3.

8. What is the importance of Secant method over Newton-Raphson method ?
9. Define Euler's method and comment the accuracy of Euler's method.

Turn over

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10. Answer briefly :

    a) Scope of Operations Research. b) Duality.

    c) Degeneracy. d) Unbalanced assignment problem.

11. 1 An article is manufactured by a company consists of two parts A and B. In the process of manufacture of part A, 9 out of 100 are likely to be defective. Similarly 5 out of 100 are likely to be defective in the manufacture of part B. Calculate the probability that the assembled part will not be defective ?

12. For a normal population with mean 12 and standard deviation 2 find :

    a) $P[9.6 \leq X \leq 13.8]$

    b) $P[X \geq 15]$

13. Define geometric distribution and derive its mean and variance.

14. Prove that any two characteristic vectors corresponding to two distinct characteristic roots of a unitary matrix are orthogonal.

(4 × 3 = 12 weightage)

Part C

Answer any **two** *questions.*
Each question carries weightage 5.

15. Use Gauss elimination process find the inverse of the matrix :

$$A = \begin{matrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{matrix}.$$

16. Find the eigen values and the corresponding Eigen vectors of the matrix :

$$A = \begin{matrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{matrix}.$$

17. Solve the following L.P.P

Maximise $Z = X_1 + 2X_2 + 3X_3$

Subject to $X_1 - X_2 + X_3 \geq 4$

$X_1 + X_2 + 2X_3 \leq 8$

$X_1 + X_3 \geq 2.$

$X_1, X_2, X_3 \geq 0.$

18. a) State and prove Baye's theorem.

    b) Three identical boxes contain two balls each. One has both red, one has one red and one black, and the third has two black balls. A person chooses a box at random and takes out a ball. If the ball is red find the probability that the other ball is also red.

(2 × 5 = 10 weightage)

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D 93230 **(Pages : 2)** **Name.....**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION NOVEMBER 2020

(CUCSS)

Electronics

DSIC04—ADVANCED DIGITAL SYSTEM DESIGN

(2010 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *fourteen questions.*

Each question carries a weightage of 1.

1. State consensus theorem.
2. Define dynamic hazard free.
3. Discuss about sequential logic circuit.
4. List the features of FPGA.
5. Discuss CPLD with its structure.
6. Define symmetric function.
7. Define single gate threshold network.
8. What is an AOI diagram ?
9. What is the use of PLA logic structure.
10. What is the difference between PAL and PLA devices ?
11. Mention the use of Gale Expander.
12. What is CPLD and discuss its structure.
13. Mention the use of Buffer and Gate.
14. Discuss logic cell array.

(14 × 1 = 14 weightage)

Turn over

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Part B

Answer any **seven** *questions.*
Each question carries a weightage of 2.

15. Explain the designing roles for FPGA.
16. State Unger's Theorem.
17. Explain the Basic combinational circuits.
18. Write different between Programmable logical device and Microcontrollers.
19. Mention advantage of look table in PLA.
20. Explain, how the logic function can be implemented using look up table ?
21. Explain the features of sequential circuits.
22. Explain the functions of ASM.
23. Write short note on consensus theorem.
24. Explain the use of IOB in Xilinx XC 3000.

(7 × 2 = 14 weightage)

Part C

Answer any **two** *questions.*
Each question carries a weightage of 4.

25. Describe the various programming technologies used in LCA
26. Draw the block diagram and explain the features of Xilinx XC 3000.
27. Explain the Mc-Cluskey method of decomposition.
28. Discuss the working principle of CPLD and explain with a neat diagram.

(2 × 4 = 8 weightage)

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D 93229 **(Pages : 2)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION NOVEMBER 2020

(CUCSS)

Electronics

DC IC 03—MODERN DIGITAL AND OPTICAL COMMUNICATION

(2010 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer all **fourteen** *questions.*
Each question carries a weightage of 1.

1. Write about routing algorithm ?
2. Define Directional Coupler ?
3. What do you mean Network protocol ?
4. Give the list of LAN characteristics ?
5. List the different network layers ?
6. What are the important protocols in the internet ?
7. What is TCP ?
8. How do you brief the bidirectional WDM ?
9. What is unbounded media ?
10. Define a connectionless network ?
11. DNS uses UDP or TCP ? Justify.
12. Write a short note on router ?
13. What do you mean by a structured cabling ?
14. What is Bit Error Rate ?

(14 × 1 = 14 weightage)

Turn over

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Part B

Answer any **seven** *questions.*
Each question carries a weightage of 2.

15. Discuss about Directional Couplers.
16. Give the list the uses of Routers.
17. Give a short note on Quantum Limit of a network.
18. Enumerate the applications of Optical Amplifiers.
19. Explain about WAN.
20. Explain the specifications of Bounded Media.
21. Explain about the timers used in TCP ?
22. Write short notes on OS Model.
23. List the features of Data Link Layer.
24. Discuss briefly how bit error rate is evaluated ?

(7 × 2 = 14 weightage)

Part C

Answer any **two** *questions.*
Each question carries a weightage of 4.

25. Explain about optical link design.
26. Draw neat diagram of OSI / TCP/ IP reference model and give its various functions.
27. Explain in detail about the common architectures used for network applications ?
28. Discuss about network equipment used in wired-LANS.

(2 × 4 = 8 weightage)

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D 93228 **(Pages : 4)** **Name**.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION NOVEMBER 2020

(CUCSS)

Electronics

AM 1C 01—APPLIED MATHEMATICS

(2010 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*
Each question carries a weightage of 1.

1. Let $f(x) = -x^3 - \cos x$. With $p_0 = -1$ and $p_1 = 0$ find p_3 by the Secant method.

2. Estimate $\sqrt{2}$ using Newton's method in three iterations.

3. Find the solution at $x = 1, t = 1$ of the partial differential equation, $\frac{\partial^2 u}{\partial x^2} = 25\frac{\partial^2 u}{\partial t^2}$.

   Subject to initial condition of $u(0) = 3x$. $\frac{\partial u}{\partial t}(0) = 3$.

4. Derive the equation for the vibration of a stretched string.

5. A string with L = 2 and $c = 3$ is given the initial shape :

   $f(x) = \begin{cases} 0 & \text{if } 0 \le x \le 1 \\ (x-1)(2-x) & \text{if } 1 < x \le 2. \end{cases}$ It is released with zero initial velocity. How long does it take before the point $x = \frac{1}{5}$ begins to vibrate ?

6. Prove the recurrence formulae $\frac{d}{dx}\left[x^n J_n(x)\right] = x^n J_{n-1}(x)$.

7. Show that $P_n(-x) = (-1)^n P_n(x)$.

Turn over

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8. Compute $J_o(2)$ correct to three decimal places.

9. Four coins are tossed. What i s the expectation of the member of heads ?

10. A coin is tossed twice. Let X be the random variable that represents the number of the heads that come up. Assuming that the coin is fair, find the probability function corresponding to X.

11. Find 'a' and 'b' if $Y = a X + b$ has mean 6 and variance unity where X is a random variable with mean 8 and variance 16.

12. The number of customers arriving at a grocery store is a Poisson random variable. On an average 10 customers arrive per hour. Let X be the number of customers arriving from 2 pm to 3:30 pm. What is $P(10 < X \leq 15)$?

13. Consider an M/M/1 model with arrival rate X and service time following exponential distribution with mean $\frac{1}{\mu}$ such that $\lambda < \mu$. What is the expected number of customers in the system ?

14. Define priority queues.

(14 × 1 = 14 weightage)

Part B

Answer any **seven** *questions.*
Each question carries weightage of 2.

15. Find the root of $2x^3 - 2.5x - 5 = 0$ in [1,2] by Newton Raphson method.

16. Find the root of the given equation using bisection method upto two decimal places $x^3 - 5x + 1 = 0$ which lies between 2 and 3.

17. In a self sendee store with one cashier, 8 customers arrive on an average of every 5 minutes and the cashier can serve 10 in 5 mins. If both arrival and service time are exponentially distributed, then determine :
    i) Average number of customers waiting in the queue.
    ii) Expected waiting time in the queue.
    iii) The probability of having more than 6 customers in the system.

18. Show that the solution to the vibrating string problem is periodic in time, with period 2L/c.

19. Express $J_5(x)$ in terms of $J_0(x)$ and $J_1(x)$.

20. Express $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomials.

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21. A horizontal line of length 5 units is divided by a point chosen at random into two parts. If the length of the first part is X, find $E[X(5-X)]$. Also, find the moment generating function (m.g.f) of X and get the mean and variance of X from it.

22. The probability function of a random variable $f(x) = \begin{cases} 2^{-x} & x = 1,2,3,.., \\ 0 & \text{otherwise} \end{cases}$. Find the probability function for the random variable $U = X^4 + 1$.

23. The arrival and departure rates in a public telephone booth with a single phone are $\frac{1}{12}$ and $\frac{1}{14}$ respectively, find the probability that the phone is busy.

24. Consider the following single-server queue : The inter arrival time is exponentially distributed with a mean of 10 minutes and the service time has the uniform distribution with a maximum of 9 minutes and a minimum of 7 minutes. Find :

    (a) Mean wait in the queue.

    (b) Mean number in the queue.

    (c) Mean wait in the system.

    (d) Mean number in the system.

(7 × 2 = 14 weightage)

Part C

Answer any **two** *questions.*
Each question carries a weightage of 4.

25. Solve the system of equations :

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4.$$

by applying (i) Gauss elimination method ; (ii) Gauss - Jordan method.

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

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27. The joint probability function of two discrete random variables X and Y is given by $f(x,y) = c(2x+y)$ where x and y can assume all integers such that $0 \le x \le 2$, $0 \le y \le 3$, and $f(x,y) = 0$ otherwise.

    (a) Find the value of the constant c.

    (b) Find P (X = 2, Y = 1).

    (c) Find $P(X \ge 1, Y \le 2)$.

28. (a) If $f(x) = \begin{cases} 0, & -1 < x \le 0 \\ 1, & 0 < x < 1. \end{cases}$ Show that :

$$f(x) = \frac{1}{2}P_0(x) + \frac{3}{4}P_1(x) - \frac{7}{16}P_3(x) + ...$$

    (b) Explain Bessel functions. What are its properties.

(2 × 4 = 8 weightage)

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