Enrolment No. | | | | | | | | |

S_3(All Branch):ALL

B. TECH 3rd SEMESTER END-TERM EXAMINATION – 2018

Subject Name: Engineering Mathematics – III

Subject code: UCH/CE/PE03C14/UCS/EC/EE/EI03C13/UME03C12

Full Marks: 100 **Time: 3 Hours**

Symbols used here have their usual meanings

Group A

Answer any five of the following questions

Marks: $5 \times 10 = 50$

1. Three newspapers A, B and C are published in a certain city. It is estimated from a survey that of the adult population: 20% read A, 16% read B, 14% read C, 8 % read both A and B, 5% read both A and C, 4% read both B and C, 2% read all three. Find what percentage read at least one of the papers.

2. A vessel containing 3 white and 5 black balls, 4 balls are transferred into an empty vessel. From this vessel a ball is drawn and is found to be white. What is the probability that out of four balls transferred 3 white and 1 is black?

3. In a continuous distribution whose relative frequency density is given by: $f(x) = y_0\{x(2-x)\}, 0 \le x \le 2$, find the mean, variance and mode of the distribution and also show that for the distribution $\mu_{2n+1} = 0$.

4. A multiple choice test consists of 8 questions with 3 answers to each question (of which only one is correct). A student answers each questions by rolling a die and checking the first answer if he gets 1 or 2, the second answer if he gets 3 or 4 and the third answer if he gets 5 or 6. To get a distinction, the student must secure at least 75% correct answer. If there is no negative marking, what is the probability by using Binomial Distribution that the student secures a distinction?

5. In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.

6. The random variable X and Y are jointly normally distributed and U and V are defined by $U = X\cos\alpha + Y\sin\alpha, V = Y\cos\alpha - X\sin\alpha$.
Show that U and V will be uncorrelated if

$$\tan 2\alpha = \frac{2r\sigma_x\sigma_y}{{\sigma_x}^2 - {\sigma_y}^2}$$

Where $r = corr.(X,Y)$; ${\sigma_x}^2 = Var(X)$ and ${\sigma_y}^2 = Var(Y)$. Are U and V independent?

7. In a partially destroyed laboratory, records of an analysis of correlation data, the following results only are legible:
Variance of $X = 9$; Regression equations: $8X - 10Y + 66 = 0$ and $40X - 18Y = 214$.
What are **(i)** the mean values of X and Y,
(ii) the correlation coefficient between X and Y,
(iii) the standard deviation of Y.

P.T.O

8. The variables X and Y are connected by the equation $aX + bY + c = 0$. Show that the correlation between them is -1 if the sign of a and b are alike and $+1$ if they are different.

9. Establish the **Poisson distribution** from the **Binomial distribution**.

10. The local authorities in a certain city install 10,000 electric lamps in the streets of the city. If these lamps have an average life of 1,000 burning hours with a standard deviation of 200 hours, assuming normality what number of lamps might be expected to fail (i) in the first 800 burning hours? (ii) between 800 and 1,200 burning hours? After what period of burning hours would you expect that 10% of the lamps would fail?

Group B

Answer all the following questions

Marks: 50

1. (a) Define Homogeneous and Non-homogeneous linear equation with constant co-efficient along with suitable examples.

   (b) Solve: $(D^2 - 3DD' + 2D'^2)z = e^{2x-y} + e^{x+y} + \cos(x + 2y)$.

   [4+6]

2. (a) Find the half range cosine series for $f(x) = \left(-\frac{x}{l}\right) + 1, 0 \le x \le l$.

   (b) Find a complete integral of $yzp^2 - q = 0$.

   [5+5]

3. (a) Solve: $(3x + y - z)p + (x + y - z)q = 2(z - y)$.

   (b) Find the complete integral of $pq = px + qy$.

   [5+5]

4. (a) Find the Fourier series of $f(x) = \begin{cases} -\left(\frac{\pi+x}{2}\right), & -\pi < x < 0 \\ \frac{\pi-x}{2}, & 0 < x < \pi \end{cases}$

   (b) Solve: $\left(D^2 + DD' - 6D'^2\right) z = x^2 \sin(x + y)$.

   [4+6]

5. (a) Form a partial differential equation by eliminating the function f from $z = x^n f\left(\frac{y}{x}\right)$.

   (b) An insulated rod of length l has its ends A and B maintained at $0°C$ and $100°C$ respectively until steady state conditions prevail. If the temperature at B is suddenly reduced to $0°C$ and kept so while that of A is maintained at $0°C$, find the temperature at a distance x from A at any time t.

   [3+7]

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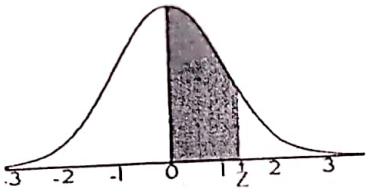
STANDARD NORMAL TABLE (Z)



Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985.	0.4986	0
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0

Enrolment No. 16v9s062

S_3 (UCS03C13) CSE

B.Tech 3rd Semester End Term Examination-2017

Department of Computer Science & Engineering

Digital Circuits & Logic Design

UCS03C13

Full Marks: 100 Marks **Time: 3 Hrs**

Instructions:

1] Figures to the right indicate full marks.

2] Illustrate your answer with neat sketches wherever necessary.

Q1. a) A 7 bit Hamming Code received by the receiver is 1111101.Assume the even parity. state whether the received code is correct or wrong. If wrong, locate the bit having error.

b) Design a circuit to convert 4 bit Octal code to its corresponding Binary code and explain.

c) A combinational circuit is defined by the following two functions:

$F_1(x, y) = \sum(0, 3)$

$F_2(x, y) = \sum(1, 2, 3)$

Implement the combinational circuit by means of Decoder and external NAND gates.

(6+8+6=20)

Q2. a) State the differences between Latch and Flipflop. Draw and explain clocked RS flipflop using NAND gates.

b) Design a circuit that can convert 4 bit Binary coded Decimal to Gray code and viceversa using truth table, K maps, and logic circuits.

c) Design a synchronous counter that will go through states 1,3,7,6,1,... using bush condition.

((2+4)+7+7=20)

Q3. a) A combinational circuit has 3 inputs A, B, C and output F. F is true for following input combinations.

A is False, B is True

A is False, C is True

A, B, C are False

A, B, C are True

(i) Write the Truth table for F. Use the convention True=1 and False = 0.

(ii) Write the simplified expression for F in SOP form.

(iii) Write the simplified expression for F in POS form.

(iv) Draw logic circuit using minimum number of 2-input NAND gates.

b) State the differences between Multiplexer and Demultiplexer.
Design a Half Subtractor using Multiplexer.

c) What is register? Write down types of registers on the basis of input output data transfer. Discuss the working principle any one of them with an example.

(6+(2+4)+(2+2+4)) 20

Q4. a) You are given a specific sequence and you need to design a counter according to the sequence using T Flip Flop.

Q2	Q1	Q0
0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
0	0	0

b) Draw and explain the block diagram of 3-bit Binary Parallel Adder and explain its limitations.

c) Solve the Boolean Expression by using 3 variable Mapping:

$$Y = Dm_3 + m_2 + m_4 + d(m_0 + Dm_1)$$

(10+6+4=20)

Q5. a) What do you mean by Programmable Logic Devices? Compare the features of PLA, PAL and PROM.

b) Use a PAL16L8 to implement the four functions mapped in the below figures. Generate the fuse map information for the equations manually (PAL sheet attached).

Enrolment no

S$_3$ (UCS03B04) B.Tech

B.Tech. 3rd Semester End Term Examination, 2017

Discrete Mathematical Structures

UCS03B04

Full Marks: **100** Time: **3 hours**

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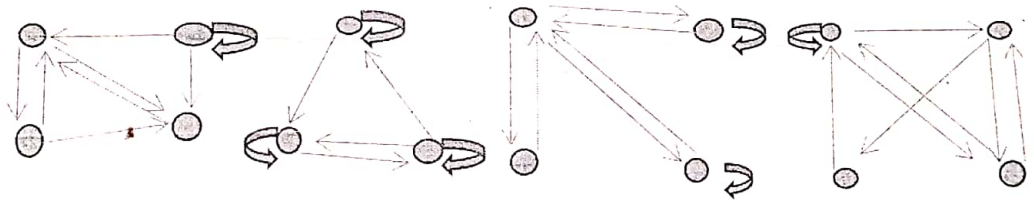
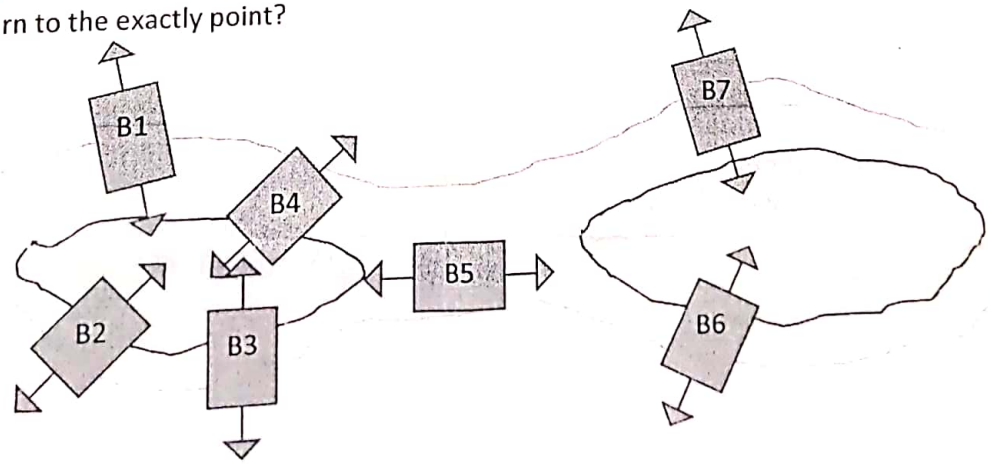
1. How many tree can be formed from three labelled vertices A, B, C. Draw trees to verify your answer? (5)
2. Are the cyclic graphs C_4, C_5, and C_6 bipartite graphs? Give valid evidence to justify your choices. (5)
3. Show that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent. (5)
4. Use quantifiers to express the statement that "There does not exist a woman who has taken a flight on every airline in the world." (5)
5. Determine whether the relation R on the set on all set of integers is reflexive, symmetric, antisymetric and transitive where $(x,y) \in R$ if and only of
   a. $x \neq y$
   b. $xy \geq 1$
   c. $x = y-1$ or $x = y-1$
   d. $x \equiv y \pmod 7$
   e. x is a multiple of y (2*5=10)
6. Determine whether $(P(\{a,b,c\}), \subseteq)$ is a lattice. (5)
7. Define reflexive, symmetric, antisymetric and transitive relation. Determine whether the relations shown by the directed graphs are reflexive, symmetric, antisymetric and transitive. (2+8)



9. The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands which were connected to each other, or to the two mainland portions of the city, by seven bridges(B1, B2, B3, B4, B5, B6, and B7) as shown in the following map. Can someone cross all the bridge shown in this map exactly once and return to the exactly point? (5)



10. (a) Define Planar graph and Hailtonian graph with example. Determine whether the following graphs are Euler, Hamiltonian and Planar. Give views to support your answer.

(i) Wheel Graphs W_3 and W_5

(ii) Complete Graphs K_3 and K_5

(iii) Bipartite graph $K_{3,3}$and $K_{4,5}$

(b) Determine the chromatic number of the following graph

(i) Tripartite graph $K_{2023121,789201,6}$

(ii) Complete Graph $K_{587789785}$

(iii) Cyclic graph $C_{345252355}$

(iv) Wheel Graph $W_{7835834589}$ (8+2=10)

11. Let p, q and r be the propositions:

p: You get an A on the final exam.

q: You do every exercise in this book.

r: You get an A in this class.

Write these propositions using p,q and r and logical connectives.

(a) To get an A in this class, it is necessary for you to get an A on the final.

(b) You get an A in this class, but you do not do every exercise in this book.

(c) You get an A on the final exam, you do every exercise in this book, and you get an A in this class.

(d) You get an A in the final, but you don't do every exercise in this book; nevertheless, you get an A in this class.

(e) Getting an A in the final and doing every exercise in this book is sufficient for getting an A in this class. (5)

12. Prove whether the conclusion is valid or not for the given propositions:

Argument1: If George does not have eight legs, then he is not a spider.

Argument2: George is a spider.

Conclusion: George has eight legs. (5)

13. If $f:R\rightarrow R$ and $g:R\rightarrow R$ be defined by $f(x)=x^3-4x$, $g(x)=1/x^2+1$ and $h(x)=x^4$, find the following composition functions: (f o g o h)(x), (g o g)(x), (h o g o f)(x), (g o h)(x), (f o g)(x) (5)

14. show whether the following Form a Group:

(a) (Z,+) and (Z,-)

(b) (Q, *) and (Q, +)

(c) (R, /) and (R, *)

(d) (G, *), where G is a set of all non zero real numbers and a*b=ab/2

(e) ([0,1], +), where + denotes binary addition (10)

15. What is the cardinality of the set of integers X defined below? $X = \{n \mid 1 \leq n \leq 123$, n is not divisible by either 2, 3 or 5$\}$. Write all the elements of the set (5)

16. Let X= {2, 3, 6, 12, 24}, Let $\leq$ be the partial order defined by $X \leq Y$ if x divides y. Find the number of edges in the Hasse diagram of $(X, \leq)$. Is this POSET a lattice (5)

17. Check whether the operator defined by the following truth table follows the properties of Closure, Associative, Identity, Inverse and Commutative (5)

P	Q	p≠q
0	0	0
0	1	1
1	0	1
1	1	0

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