B.Tech 3rd Semester End Term Examination, 2019
Name of Subject: Object Oriented Programming
Paper code: UEE03C14

Full Marks-100 **Time: 3:00 Hrs**

The figures in the margin indicate full marks for the questions

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Answer all questions

Section A **10X2=20**

1. Define manipulators.
2. Name one access specifier that has added advantage in inheritance.
3. Differentiate between static and runtime binding.
4. List one difference between class and object.
5. Write the use of copy constructor.
6. Suppose void fname() is there. Overload it.
7. Write any two uses of generic function.
8. Define copy constructor with format.
9. Differentiate concrete class and abstract class.
10. What is a file?

Section B **8X5=40**

1. Describe the types of inheritance.
2. Write characteristics of OOP.
3. Explain Data conversion with one example.
4. How can you make a friend class? Give example.
5. How can you achieve dynamic polymorphism. Give example.
6. Write definition of virtual, friend and inline function, virtual base class. Give example.
7. Explain method overriding with example.
8. Write 4 differences between procedural and object oriented programming.

Section C **5X8=40**

1. Write a program to overload '+' operator.
2. Sample() is a function in both base and derived classes. Write a program to override Sample().
3. B is base class. A and C have been derived from B. D has been derived from A and C. Implement the structure using inheritance concept.
4. Base class constructor takes two arguments. Derived class constructor takes three arguments. Write the program using single inheritance concept to show the output of member data.
5. Write a program to write and read from a file.

Enrolment No. 1 8 4 8 0 3 4

S_3 (All): All branches

B.Tech. 3rd Semester End-Term Examination - 2019
Name of Subject: Engineering Mathematics-III/Mathematics - III
Subject Code: UCE03C14/UME03C12/UEE03C13/C16/UCS03C15/C10/UEC03B07/UEI03C13/UPE03C14/ UCH03C17/UBE03C15

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

Symbols used here have their usual meanings

Group-A

Marks: 50

Answer all the following questions:

1. A factory produces a certain type of outputs by three types of machine. The respective daily production figures are, Machine-I: 3,000 units; Machine-II: 2,500 units; Machine-III: 4,500 units. Past experience shows that 1% of the output produced by Machine-I is defective. The corresponding fractions of defective for the other two machines are 1.2% and 2% respectively. An item is drawn at random from the day's production run and is found to be defective. What is the probability that
   (i) It comes from the output of Machine-I
   (ii) It comes from the output of Machine-II
   (iii) It comes from the output of Machine-III? **[5]**

2. Two dice are rolled. Let X denote the random variable which counts the total number of points on the upturned faces, Construct a table giving the non-zero values of the probability mass function. Also find the distribution function of X? **[5]**

3. The amount of bread (in hundreds of pounds) x that a certain bakery is able to sell in a day is found to be a numerical valued random phenomenon, with a probability function specified by the $p.d.f.\ f(x)$, given by:

$$f(x) = \begin{cases} k.x, & for\ 0 \le x < 5 \\ k.(10-x), & for\ 5 \le x < 10 \\ 0, & otherwise \end{cases}$$

   a) Find the value of k such that $f(x)$ is a $p.d.f.$
   b) What is the probability that the number of pounds of bread that will be sold tomorrow is:
      (i) more than 500 pounds,
      (ii) less than 500 pounds, and
      (iii) between 250 and 750 pound? **[5]**

4. A department in a works has 10 machines which may need adjustment from time to time during the day. Three of these machines are old; each having a probability of $\frac{1}{11}$ of needing adjustment during the day, and 7 are new, having corresponding probabilities of $\frac{1}{21}$. Assuming that no machine needs adjustment twice on the same day, determine the probabilities that on a particular day,
   (i) Just 2 old and no new machines need adjustment.
   (ii) If just 2 machines need adjustment, they are of the same type. **[5]**

5. A manufacturer, who produces machine bottles, find that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Find how many boxes will contain: (a) no defective and (b) at least two defectives. **[5]**

6. Find the mean and variance of normal distribution. **[5]**

P.T.O

7. X is a normal variate with mean 30 and standard deviation 5. Find the probabilities of the following:

(i) $26 \leq X \leq 40$
(ii) $X \geq 45$
(iii) $|X - 30| > 5$. [5]

8. X and Y are two random variables with variances σ^2_X and σ^2_Y respectively and r is the coefficient of correlation between them. If $U = X + kY$ and $V = X + \left(\frac{\sigma_X}{\sigma_Y}\right)Y$, find the value of k so that U and V are un-correlated. [5]

9. a) Show that correlation coefficient is the geometric mean between regression coefficients.
b) Obtain the equation of two lines of regression for the following data. Also obtain the estimate of Y for $X = 61$.

X:	59	65	45	52	60	62	70	55	45	49
Y:	75	70	55	65	60	69	80	65	59	61

$[2 + 8 = 10]$

Group-B

Marks: 50

Answer all the following questions:

1. Find the complete integral of $z^2(p^2z^2 + q^2) = 1$.
2. Find the half range cosine series of $f(x)$ where $f(x) = \begin{cases} kx, & 0 \leq x \leq \frac{l}{2} \\ k(l-x), & \frac{l}{2} \leq x \leq l \end{cases}$

   Hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$
3. Find the complete integral of $2xz - px^2 - 2qxy + pq = 0$.
4. Solve: $z(z^2 + xy)(px - qy) = x^4$.
5. Solve: $\left(D^3 - 3D^2D' + 2DD'^2\right)z = 0$.
6. Solve: $\left(D^3 - 3DD'^2 - 2D'^3\right)z = \cos(x + 2y)$.
7. Solve: $\left(D^2 + 2DD' + D'^2\right)z = 2cosy - xsiny$.
8. An insulated rod of length l has its ends A and B maintained at $0°C$ and $100°C$ until steady state conditions prevail. If 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.
9. Find the Fourier series for $f(x) = 4 - x^2$ in the interval $(0, 2)$.

$[6 + (4 + 2) + 6 + 5 + 3 + 5 + 6 + 8 + 5] = 50$

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The following table gives the shaded area in the diagram, viz., $P(0 < Z < z)$ for different values of z.

TABLE OF AREAS

z ↓	0	1	2	3	4	5	6	7	8	9
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0759
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2703	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3655	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4678	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4959	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

8+8+4)

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S3(UEE03B03)EE

B.Tech 3rd Semester End-Term Examination, 2019

SUBJECT: **NETWORK ANALYSIS**

CODE NO: - UEE03B03

Time: 3 Hrs

Full Marks: 100

Answer Q-1 and any four (04) from rest of questions

1. (5x4=20)

a. Find R in fig-1a

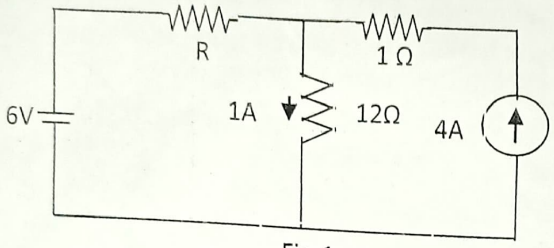


Fig-1a

b. Write the descriptive name of response of fig. 1b.

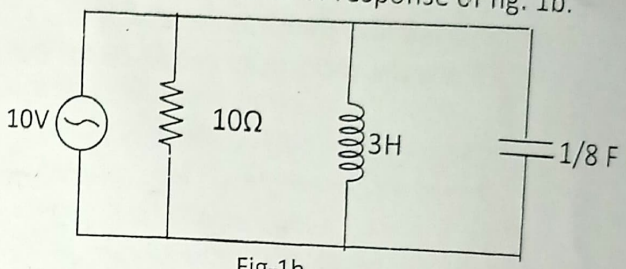


Fig-1b

c. Find time constant(τ) in fig-1c

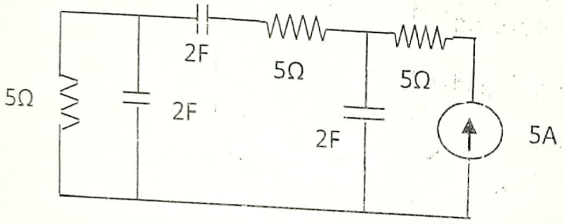


Fig-1c

d. If $y_{11}=6\mho$, $y_{12}=y_{21}=-2\mho$ & $y_{22}=4\ \mho$ of fig-1d, then Z_a=?, Z_b=? & Z_c=?

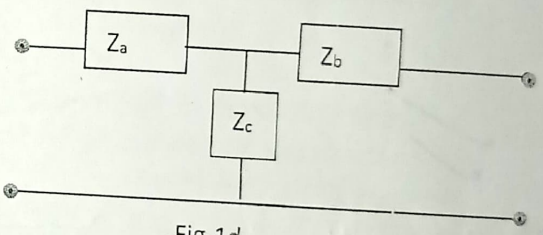


Fig-1d

e. The current in a 0.2F capacitor is shown in fig-1e, sketch the waveform of capacitor voltage V.

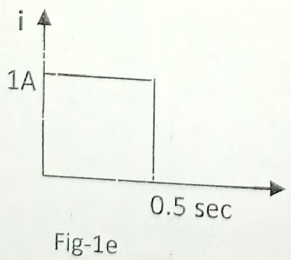


Fig-1e

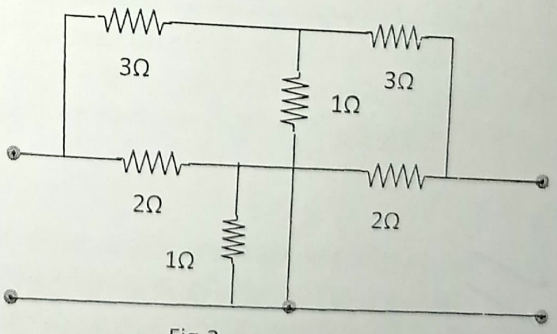


Fig-2

2.

a. Find equivalent π-network for the circuit shown in fig-2.

b. Given $[t]=\begin{bmatrix}6.4 & 4\\ 0.4 & 2\end{bmatrix}$ find (i) [t] and (ii) [h] for two identical network connected in cascaded.

c. Show the perfect connection of paparallel interconnection of two port network. (8+8+4)

3.

a. The fundamental cut-set matrix is given in Table-1, draw the oriented graph of the network, obtain the incidence matrix, find number of possible trees from the oriented graph and draw any three nos of tree.

b. A filter section is to have a characteristics impedance at zero frequency of 500Ω and cut-off frequency of 1kHz. Design (i) a low pass T section filter and (ii) a low pass π section filter to meet these requirements.

c. Draw T & π network of band pass filter.

Table-1

cut-set	Twigs			Links			
	1	5	7	2	3	4	6
1	1	0	0	-1	0	1	0
5	0	1	0	0	0	0	-1
7	0	0	1	0	1	-1	1

(10+8+2)

4.

a. Obtain the transmission parameters for the network shown in fig-4a

b. Show the reciprocity condition for the network shown in fig-4b by using short circuit parameter.

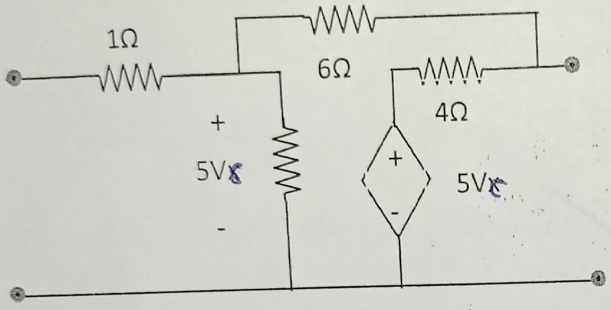


Fig-4a

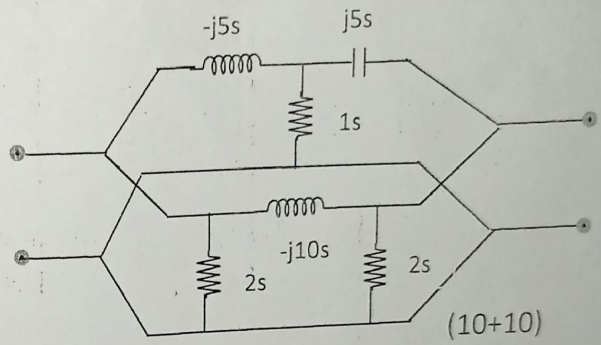


Fig-4b

(10+10)

5.

a. A series RL circuit of fig-5b excited by a waveform shown in fig-5a, find i(t).

b. In the network shown in fig-5c, find how long it takes after the key is closed before the total current from supply reaches 25mA.

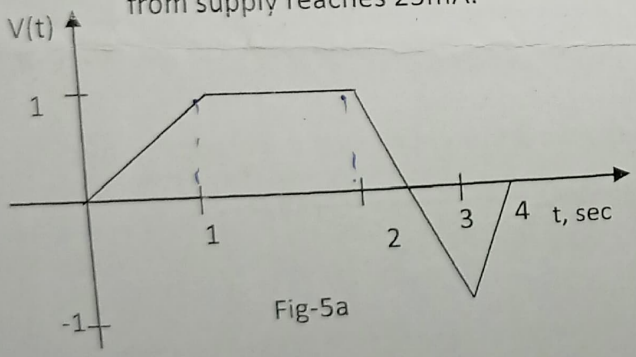


Fig-5a

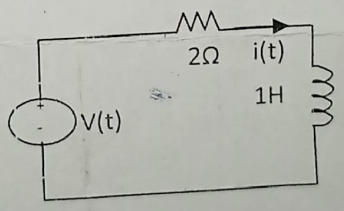


Fig-5b

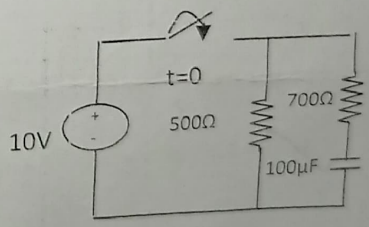


Fig-5c

(10+10)

6.

a. Find $i_2(t)$ for t>0 of the circuit shown in fig-6a if M=1H.

b. Derive Z_0 of high pass filter using open circuit and short circuit condition of operation.

c. Determine inverse hybrid parameter for the network shown in fig-6b

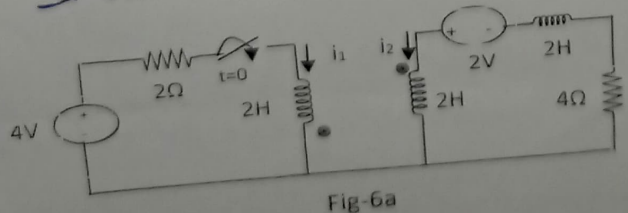


Fig-6a

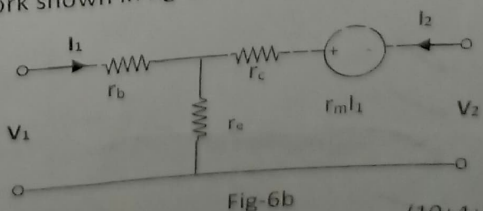


Fig-6b

(10+4+6)

CODE NO:-UEE03B08 Measuring Instruments

Total Marks: 50

Time: 2 Hours

Answer Question No. 1 and any three from rest

1. (a) How is gravity control inferior to spring control? What are the materials, which are used for control springs? [2×10=20]

(b) Why dynamometer type instruments are most suitable as transfer instruments?

(c) What are the main conditions that must be fulfilled by ammeter shunts so that readings independent of frequency and temperature are obtained?

(d) Discuss the shape of the scale of an electrodynamometer type instruments.

(e) The inductance of a moving iron ammeter is given by the expression $L=20+10\theta-3\theta^2$ μH, where θ is the deflection in radians from zero position. Determine the deflection of ammeter for a current of 10 A, if the spring constant is 8×10^{-6} Nm / rad.

(f) How the error due to inductance of pressure coil is compensated in a dynamometer type wattmeter?

(g) What is the importance of the value of Earth's resistance?

(h) In what way Varley loop test is advantageous over Murray loop test.

(i) A 3-phase balanced load connected across a 3 phase, 400 V ac supply draws a line current of 10 A. Two wattmeters are used to measure input power. The ratio of two wattmeter readings is 2:1. Find the readings of two wattmeters.

(j) Define the terms:- (i) Recording instrument (ii) Secondary instrument.

2. (a) Derive the torque equation for an electrodynamometer type of wattmeter.

(b) Discuss the main source of errors in electrodynamometer type instruments.

(c) In an electrodynamometer instrument, the total resistance of the voltage coil circuit is 8200 Ω and the mutual inductance changes uniformly from -173 μH at zero deflection to +175 μH at full scale, the angle of full scale being 95°. If a potential difference of 100 V is applied across the voltage circuit, and a current of 3 A at a power factor of 0.75 is passed through the current coil, what will be the deflection, if the spring constant is 4.63×10^{-6} Nm/rad. [3+ 4 +3]

3. (a) Derive the expression for capacitance to be connected across the multiplier of a moving iron voltmeter so as to make its circuit non-inductive for frequencies upto 125 Hz.

(b) A moving iron instrument, whose resistance is 5 Ω and whose working current is 0.015 A, is to be used, with a manganin shunt, to measure 100 A. Calculate the error caused by a 10 °C rise in temperature, if the temperature coefficient of copper and manganin are 0.004/°C and 0.00015/°C respectively.

(c) Calculate the constant of a shunt to extend the range of 0-5 A moving iron ammeter to 0-50 A. The instrument constant are R=0.09 Ω and L=90 μH. If the shunt is made non-inductive and the combination is correct on dc. Find the full scale error at 60 Hz. [3 +4+3]

P.T.O.

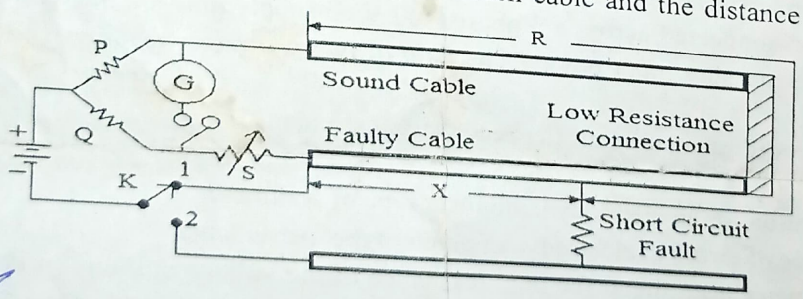
4. (a) Derive the expressions for resistances of different sections of a universal shunt used for a 3-range ammeter.

(b) Describe the Varley loop test for localization of ground fault in cables.

(c) A 3-phase, 3 wire balanced load with a lagging power factor is supplied at 400 V (between lines). A single phase wattmeter (scaled in kW) when connected with its current coil in the R line and voltage coil between R and Y lines gives a reading of 6 kW. When the same terminals of the voltage coil are switched over to Y and B lines, the current coil connections remaining the same, the reading of the wattmeter remains unchanged. Calculate the line current and the power factor of the load. Phase sequence is RYB.

5. (a) Draw the circuit of a Kelvin's Double Bridge used for measurement of low resistances. Derive the condition for balance. [3+3+4]

(b) A short circuit fault is located by Varley loop test. The circuit shown in figure below is used for the purpose. The ratio arms are set at P=5 Ω and Q=10 Ω and the values of variable resistance S are 16 Ω for position 1of switch K and 7 Ω for position 2. The sound and faulty cables are identical and have a resistance of 0.4 Ω/km. Determine the length of each cable and the distance of the fault from the test end.



(c) A moving coil ammeter has a fixed shunt of 0.02 Ω. With a coil resistance of R=1000 Ω and a potential difference of 500 mV across it, full scale deflection is obtained: (i) To what shunted current does this correspond? (ii) Calculate the value of R to give full scale deflection when shunted current I is 10 A and (iii) With what value of R is 40% deflection obtained with I=100 A?

[3+ 3+ 4]

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S.(UEE03C14):B.Tech

B. Tech. 3rd Semester, Mid-Term Examination -2019 S_3 (All): All

Name of Subject: Engineering Mathematics – III / Mathematics – III

Subject Code: UCE03C14/UME03C12/UEE03C 3/C16/UCS03B02/C10/UEC03B07/UEI03C13/UPE03C14/ UCH03C17/UBE03C15

Full Marks: 50 Time: 2 hours

Symbols used here have their usual meanings

Group-A

Answer the following questions: $25\ Marks$

1. Find the Fourier series of $f(x) = xsinx$ in $(0\ 2\pi)$.
2. Expand the function $f(x) = x + x^2$ into Fourier Series in the interval $(-\pi, \pi)$ and hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$
3. Find the half range sine series for $f(x) = \begin{cases} \frac{1}{4} - x, & 0 < x < \frac{1}{2} \\ x - \frac{3}{4}, & \frac{1}{2} < x < 1 \end{cases}$
4. a) Write down **Dirichilet's conditions** for expansion of $f(x)$ into Fourier series.

   b) Solve the partial differential equation: $(x^2 - y^2 - z^2)p + 2xyq = 2xz$.
5. Form a partial differential equation by eliminating the arbitrary function ϕ from $\phi(x^2 + y^2 + z^2, z^2 - 2xy) = 0$.

$[5 + (4 + 2) + 4 + (2 + 4) + 4] = 25$

Group-B

Answer the following questions: $5 \times 5 = 25\ Marks$

1. A manager has two assistants and he bases his decision on information supplied independently by each one of them. The probability that he makes a mistake in his thinking is 0.005: The probability that an assistant gives wrong information is 0.3. Assuming that the mistakes made by the manager are independent of the information given by the assistants, find the probability that he reaches a wrong decision.

2. (a) State **Bayes' theorem**.

   (b) The contents of urns 1, 2 and 3 are as follows:

	No. of white balls	No. of black balls	No. of red balls
Urn 1	1	2	3
Urn 2	2	1	1
Urn 3	4	5	3

One urn is chosen at random and two balls drawn from it. They happen to be white and red. What is the probability that they comes from (i) urn 1, (ii) urn 2 and (iii) urn 3?

P.T.O

3. The following is the probability distribution of a discrete random variable X:

x	0	1	2	3	4	5	6	7	8
$p(x)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$	$15k$	$17k$

(i) Find the value of k,
(ii) Find the distribution function of X,
(iii) Find the smallest value of x such that $P(X \leq x) > 0.5$

4. In a continuous distribution whose relative frequency density is given by:

$$f(x) = a.x(2 - x), 0 \leq x \leq 2$$

Find the mean, variance, median, mean deviation about mean and mode of the distribution.

5. 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 that the student secures a distinction?

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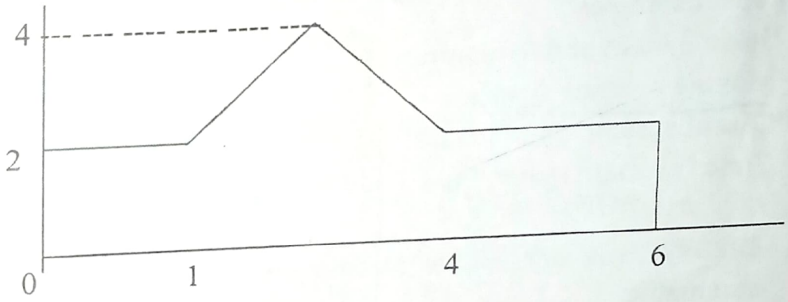
B.TECH 3RD SEMESTER, MID-TERM EXAMINATION 2019
NAME OF SUBJECT: SIGNALS AND SYSTEMS
CODE NO:-UEE03B06

Full Marks : 50 **Time: 2 Hrs**

(A) Answer any ten [10] of the following questions: 1X10=10

1. Define **signal** with proper examples. Define **system** with appropriate examples.
2. Define **analog signal and digital signal** with proper examples.
3. Define **energy signal and power signal** with appropriate examples.
4. Find energy of the following signal (**Show all of your work**)–

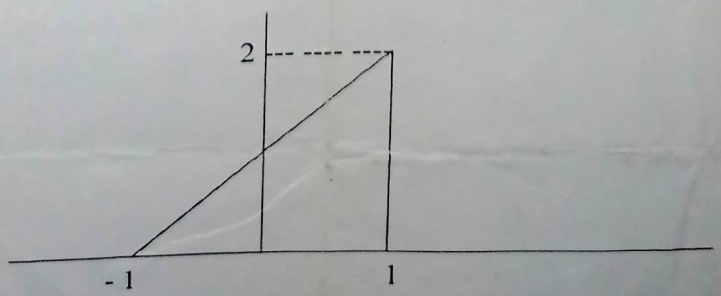


5. Find **power** of the signal $x(t) = ACos(2\pi f_0 t + \varphi)$. **Show all of your work.**
6. $y(n) - 0.4y(n-1) = x(n)$. Find the **causal impulse response** $(h(n) = 0, for\ n < 0)$. **Show all of your work.**
7. $y(n) = \frac{1}{3}\{x(n+1) + x(n) + x(n-1)\}$, Find the given system is **stable or not. Show all of your work.**
8. $x(n) = u(n)$ and $h(n) = \alpha^n u(n), \alpha < 1$. Find $y(n)$. **Show your work.**
9. Find the **Laplace transform** (with ROC) of **unit step function** $u(t)$. **Show all of your work.**
10. What is **unilateral z – transform**. Show its **time shifting property**.
11. Find the **period** of the signal $h(n) = Cos^2(\frac{\pi}{8}n)$.
12. Given $x(n) = \{1,0,1,1,0,1\}$, Find $X(z)$. **Show your work.**

(B) Answer any **Ten (10)** of the following questions. 10X4=40

0.5+0.5+1.5+1.5

1. If $x(n)$ is



Draw (i) $x(2t-6)$ (ii) $x(1-t)$ (iii) $x(0.5t+0.5)$ (iv) $2x(-\frac{t}{3}+\frac{2}{3})$

2. Given $x(n) = \{2,3,4,5,6,7\}$ 0.5+0.5+1+1+1

Find (i) $x(n-3)$ (ii) $x(n+2)$ (iii) $x(-n)$ (iv) $x(-n+1)$ (v) $x(-n-2)$

3. Given $x(n) = \{1,2,5,-1\}$ 1+1+2

Find $x\left(\frac{n}{3}\right)$ using (i) Zero Interpolation (ii) Step Interpolation (iii) Linear Interpolation

4. Define with proper examples 1+1+1+1

(i) Static system and dynamic system

(ii) Moving average system

(iii) Causal system, anti – causal system, Non – causal system

(iv) Time Invariant system and Time varying system.

5. Prove that 2+2

(i) LTI systems are **stable if and only if** impulse response is absolutely summable.

(ii) The response of LTI system to **periodic signals** is also periodic with identical period.

6. $y(n) - 3y(n-1) - 4y(n-2) = 0$, determine **zero input response** of the system, given $y(-2) = 0$ *and* $y(-1) = 5$ 4

7. Compute the **linear convolution** of $h(n) = \{1,2,1\}$ and $x(n) = \{1,-1,2,1,2-1,1,3,1\}$ using (i) over – lap add (ii) over – lap save method. 2+2

8. Compute the **linear convolution** of $h(n) = \{2,5,0,4\}$ and $x(n) = \{4,1,3\}$ using (i) sliding rule method (ii) z – transform method.

9. Write any **eight (8)** properties (with ROC) of **Laplace Transform**. 4

10. Prepare **Routh's array** for **stability analysis of LTI system**. 4

11. Find the **z – transform** (with ROC) of $x(n) = -a^n u(-n-1)$, **Show all of your work.** 2

Write any **four (4)** properties of **ROC of z – transform**. 2

12. What are the **necessary conditions** for **stability of discrete time LTI system**? 1

Establish the relationship between **Laplace transform and z – transform** 3

B.TECH 3rd SEMESTER, MIDTERM EXAMINATION 2019
NAME OF SUBJECT: Digital Electronics
CODE NO: - UEE03B04

Full Marks: 50 Total Time: 2 hours

Section A: (answer *any ten questions*) (2 marks x 10 = 20 marks)

1. State De-Morgan's law.
2. Draw the circuit diagram of a full subtractor.
3. Design a full adder using two half adders.
4. Compare between BCD and Excess 3 code.
5. Convert 177 and 225 to hexadecimal code.
6. What is the significance of S_1 and S_2 in 4:1 Multiplexer?
7. Using K-Map, simplify the function F = x'y + y'z +xz'
8. Write the symbol, Boolean expression and truth table for X-NOR gate.
9. What are the minimum number of gates required to design the circuit for the expression {(AB'C)' + (A'BC)'}'
10. Using truth table, prove associative law.
11. What are the disadvantages of decimal system over binary system?
12. Which gates are called Universal gates and why? Explain with an example.

Section B: (Answer *any three questions*) (10 marks x 3 = 30 marks)

13. Realize NOT, OR and AND gates using Universal Gates. Prove De-morgan's theorem using truth table with suitable circuit. (7+3)

14. (i) Simplify the following Boolean functions using properties of Boolean algebra:

(a) x'y'z +x'yz +xy' = $\bar{x}z + x\bar{y}$

(b) xyz + x'z + yz = $yz + \bar{x}z$

(ii) Convert the following decimals to binary: 255, 127, 1096, 9999

(iii) Convert the following decimals to BCD: 199, 76, 12345, 555

(iv) Convert the following Binary to Excess 3 code: 1101100, 10110101, 111101, 10110 (4+2+2+2)

15. (i) With suitable circuit diagram, explain 4:1 MUX and DEMUX.

(ii) Draw the circuit for the function: ABC' + A'BC + A'B'C' (8+2)

16. Design a 2 bit comparator using suitable circuit diagram. Explain the applications of MUX, DEMUX and Comparator. (7+3)

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B.TECH 3rd SEMESTER, ENDTERM EXAMINATION 2019
NAME OF SUBJECT: **Digital Electronics**
CODE NO: - **UEE03B04**

Part A *(2 marks X 10 Questions = 20 Marks)*

1. What are Universal gates and why?
2. Construct OR gate using NAND gate.
3. Convert 1022 and 510 to Binary code.
4. Convert 11011 and 1010110 from Binary to BCD code.
5. Write two applications of MUX .
6. What is the difference between carry bit and borrow bit?
7. Which flip flop is also called bistable multivibrator and why? RS
8. Is there any difference between SR and RS flip flop? If yes, state the difference.
9. What is TTL Logic Family?
10. Compare sequential and combinational logic circuits.

Part B *(16 marks X 5 Questions = 80 marks)*

11. Simplify the following Boolean function F using Karnaugh map method:

(i) $F(A, B, C, D) = \sum (1,4,5,6,12,14,15)$ (4)
(ii) $F(A, B, C, D) = \sum (0,1,2,4,5,7,11,15)$ (4)
(iii) $F(A, B, C, D) = \sum (2,3,10,11,12,13,14,15)$ (4)
(iv) $F(A, B, C, D) = \sum (0,2,4,5,6,7,8,10,13,15)$ (4)

OR

12. Simplify The Following Boolean Expressions To A Minimum Number Of Literals:

(i) $A\bar{C} + ABC + \bar{A}C$ (2)
(ii) $XYZ + X\bar{Y} + X\bar{Y}Z$ (2)
(iii) $X\bar{Y} + Y\bar{Z} + \bar{X}Y\bar{Z}$ (2)
(iv) $\bar{A}B + AB\bar{D} + ABCD + AC\bar{D} + AB\bar{C}$ (5) $+A\bar{B}D$.
(v) $B\bar{D} + BC\bar{D} + \bar{A}\bar{B}\bar{C}D$ (5)

13. Explain the working of a JK flip flop using necessary diagram, characteristic equation and truth table. What are the advantages of JK flip flop over SR flip flop? Discuss the disadvantage of JK flip flop. (10+4+2)

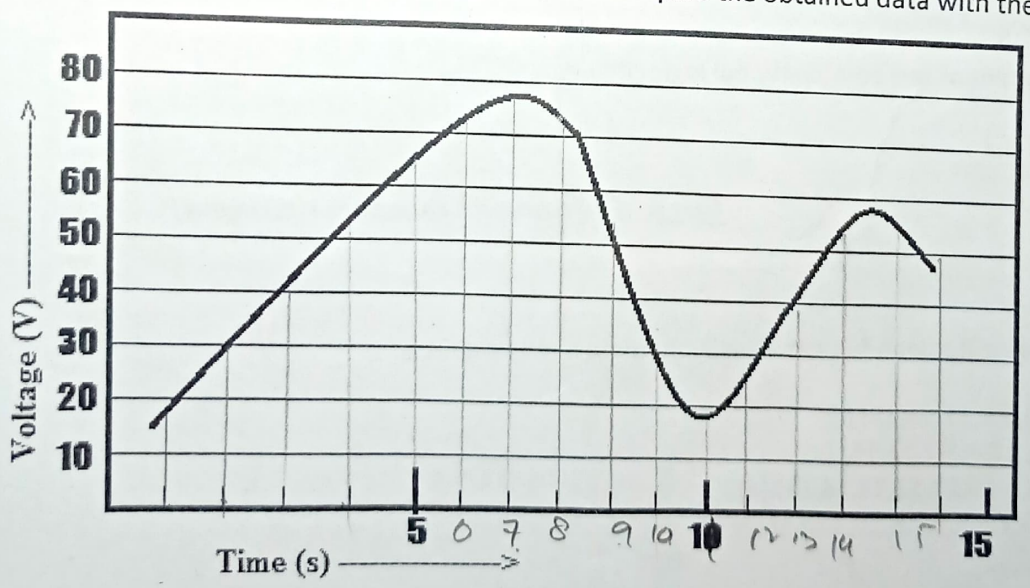
14. Explain the significance of parity bit. Discuss the construction of a parity generator and checker along with necessary diagrams and truth tables. Compare data bit with parity bit. (3+9+4)

15. Compare multiplexer and encoder. How is a T flip flop different from JK flip flop? Construct a D flip flop from RS flip flop. What is the difference between a latch and a flip flop? (4+4+4+4)

OR

16. Compare between ROM, PROM, EPROM and EEPROM. How is ROM different from RAM? What is a Flash Memory? What are PAL and PLA? (8+4+2+2)

17. Convert the following analog signal into digital form. Take n=3, sampling frequency = 1Hz . Then, reconstruct the digital data into analog form, and compare the obtained data with the original data.



Enrolment No.

S_3(UEE03C14):B.Tech

B.Tech 3rd Semester End Term Examination, 2019

Name of Subject: Object Oriented Programming

Paper code: UEE03C14

Full Marks-50

Time: 2:00 Hrs

The figures in the margin indicate full marks for the questions

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Answer all questions

Section A

10X2=20

1. Define objects in object oriented programming.
2. List two advantages of object oriented programming over structured programming.
3. Differentiate between Data encapsulation and Data abstraction.
4. List two differences between constructor and destructor
5. Why destructors cannot be overloaded but constructors can be overloaded.
6. Write two conditions of inline function.
7. Write two advantages of friend function.
8. Define member function and non-member function.
9. Define cout and cin.
10. Give an example to return an object from function.

Section B

6X5=30

1. Prove that constructors are called in order and destructors are called in reverse order.
2. Create a class marksheet. Use a function to input 3 subjects' marks. Use another function to calculate the average. Finally display the grade obtained writing appropriate main().
3. Write two programs using inline keyword and without inline keyword.(Both are inlined functions)
4. Overload date function to print date in string and integer format.
5. Write a program where a function is friend of two classes.
6. Write a class sample. Overload the constructor once to display one member data, another to add two member data and display the summation.

No.

B.TECH 3rd SEMESTER, END TERM EXAMINATION, 2019
SUBJECT: Electrical Measurement & Measuring Instruments
CODE NO:- UEE03B08

Total Marks: 100 **Time: 3 Hours**

Group-A
Answer all the questions

1. Choose the correct alternative from the following questions: [1×10=10]

(a) The smallest change in a measured value to which an instrument will respond is
(i) accuracy (ii) resolution (iii) precision (iv) sensitivity

(b) A 0-250 V voltmeter has a guaranteed accuracy of 1 % full-scale reading (deflection). The voltage measured by this instrument is 100 V. The limiting error is given by
(i) 1.25 % (ii) 25 % (iii) 0.25 % (iv) 2.5 %

(c) An advantage of a PMMC instrument is that
(i) it is free from friction error (ii) it has high torque/weight ratio (iii) it has low torque/weight ratio (iv) it can be used on both ac and dc

(d) If the secondary winding of a current transformer is opened while the primary winding is carrying current then
(i) the transformer will burn immediately (ii) there will be weak flux density in the core (iii) there will be a very high induced voltage in the secondary winding (iv) there will be a high current in the secondary winding

(e) Kelvin double bridge is chosen to measure low resistance because
(i) it has high sensitivity (ii) thermoelectric emf's can be taken (iii) resistance variation due to temperature can be accounted for (iv) resistance variation due to contact of leads can be eliminated

(f) Dc voltage of the order of a few mV can be measured accurately using an
(i) moving coil voltmeter (ii) null-balancing potentiometer (iii) moving iron voltmeter (iv) electrostatic voltmeter

(g) The equations under balance condition for a bridge are $R_1=R_2R_3/R_4$ and $L_1=R_2R_3C_4$ where R_1 and L_1 are unknown quantities. Which one of the following sets of parameters should be chosen as variables in order to achieve balance?
(i) R_1 and R_3 (ii) R_2 and C_4 (iii) R_4 and C_4 (iv) R_3 and C_4

(h) Dissipation factor of a capacitor can be measured by which bridge?
(i) Anderson bridge (ii) Hay bridge (iii) Schering bridge (iv) Wien bridge

(i) A 1000 Hz sinusoidal voltage is connected to both X and Y inputs of a CRO. Which of the following waveform is seen on CRO
(i) sine wave (ii) circle (iii) ellipse (iv) straight line

(j) Which one of the following is the main cause of creeping in the induction type energy meters?
(i) friction compensation (ii) lag/lead compensation (iii) overload compensation (iv) none of these

2. Fill in the blanks with appropriate words: [1×10=10]

(a) ---------- is a measure of the reproducibility of the measurement.
(b) Energy meter may be classified as a/an---------- instrument.
(c) Swamping resistance is used to compensate the error due to temperature
(d) In CTs turn compensation is provided mainly to reduce the ----------
(e) A megger, when not in operation, indicates a resistance of ----------
(f) ---------- bridge is used in an oscillator.
(g) The Q factor of a coil is given by ----------
(h) An oscilloscope is operated in the X-Y mode. The figure 8 isdisplayed on oscilloscope screen. If the frequency of X input is 1 kHZ, the Y input frequency is ----------
(i) The emf of a standard cell used for standardization of a dc potentiometer is ----------
(j) Two holes are provided in the energy meter rotating disc to avoid Creeping ----------

P.T.O.

Group-B

Answer any 4(four) from the following questions:

1. (a) Derive torque equation of a single phase induction type energy meter.
   (b) Explain how lag adjustment and light load compensation are made in single-phase induction type energy meter.
   (c) An energy meter with constant of 100 revolutions/kWh makes 365 revolutions when connected to a load carrying 40 A at 230V and 0.5 pf (lagging) for an hour. Find the error in measurement. Calculate the power factor of the load, if the number of revolutions made by the meter are 325when operating at 230 V, 5 A for 4 hours.

[6+(4+4)+6]

2. (a) Prove that the true power= $\frac{Cos\phi}{\cos\beta\cos(\phi-\beta)}$ × actual wattmeter reading for electrodynamometer type of wattmeter where cosΦ=power factor of the circuit, β= $\tan^{-1}\omega L/R$ where L and R are the inductance and resistance of the pressure coil of the circuit.
   (b) The coil of a 300 V moving iron voltmeter has a resistance of 500 Ω and an inductance of 0.8 H. The instrument reads correctly on 50 Hz ac supply and takes 100 mA at full-scale deflection. What is the percentage error in instrument reading when it is connected to 200 V dc supply?
   (c) An electrodynamic wattmeter has a voltage circuit of resistance 8000 Ω and inductance 63.6 mH which is connected directly across a load carrying a current of 8A at 50 Hz voltage of 240 V and pf 0.1 lagging. Estimate the percentage error in the wattmeter reading caused by the loading and inductance of the voltage coil circuit

[6 + 7 +7]

3. (a) Derive the equation of balance for a Schering bridge. Draw the phasor diagram for balance conditions..
   (b) An inductance of 0.22 H and 20Ω resistance is measured by comparison with a fixed standard inductance of 0.3 H and 40Ω resistance. The unknown inductance is in arm ab and the standard inductance is in arm bc, a resistance of 650 Ω is connected in arm cd and a resistance whose amount is not known is in arm da. Find the resistance of arm da and show any necessary and practical additions required to achieve both resistive and inductive balance
   (c) Describe with the help of suitable diagrams, how a dc potentiometer can be used for calibration of ammeter.

[(5+5) + 5) +5]

4. (a) Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expression for its ratio error.
   (b) With the help of suitable block diagram, explain the working of an electronic energy meter.
   (c) Define the terms: (i) Sensitivity (ii) systematic errors (iii) standard deviation (iv) random errors

[(5+5) + 6 +4]

5. (a) With the help of suitable diagram, describe the working of a digital storage oscilloscope.
   (b) What is data acquisition? Explain briefly about PC based data acquisition system with the help of a block diagram.
   (c) The arms of a four arm bridge abcd, supplied with sinusoidal voltage, have the following values: Arm ab: A resistance of 200 Ω in parallel with capacitance 1 μF; Arm bc: 400 Ω resistance; Arm cd: 1000 Ω resistance; Arm da: A resistance R_2 in series with a 2 μF capacitance. Determine the value of R_2 and the frequency at which the bridge will balance.
   (d) Write down some applications of a Hall Effect sensor.

[6 +6+6+2]