Enrolment No. 17UEI005

B. TECH 3rd SEMESTER END-TERM EXAMINATION – 2018 S3(All Branch):ALL

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 $f(x) = \begin{cases} -\left(\frac{\pi+x}{2}\right), & -\pi < x < 0 \\ \frac{\pi-x}{2}, & 0 < x < \pi \end{cases}$

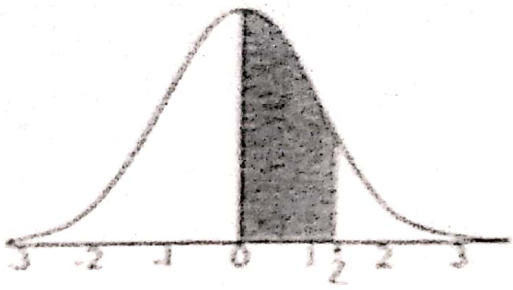
   (b) Solve: $\left(D^2 + DD' - 6D'^2\right)z = x^2 \sin(x + y)$.

   [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]



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

z	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. 17UEI065

B.TECH III SEMESTER, END TERM EXAMINATION 2018

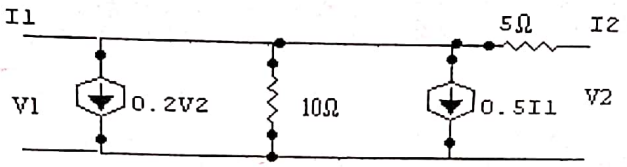
NETWORK ANALYSIS AND SYNTHESIS
UEI03B02

Full Marks: 100 Time: 3 hrs

The figure in the margin indicate full marks for the questions
(Symbols have their usual meaning)

1. (a) Derive the expression for the Y-parameters in terms of ABCD-parameters for a two port network.

(b) Find the Y parameters of the two port network shown in Fig.1.



[5+5=10]

Fig.1

2. (a) In the network of Fig. 2(a) , find the power loss in 10 Ω resistor.

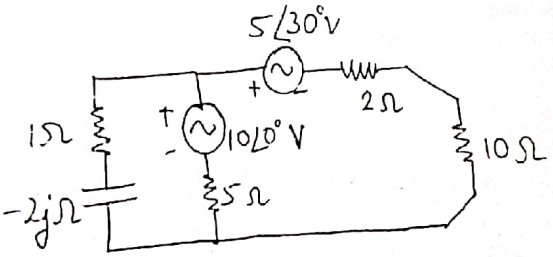


Fig.2 (a)

(b) Find V_L in the circuit of Fig. 2(b) using Superposition theorem

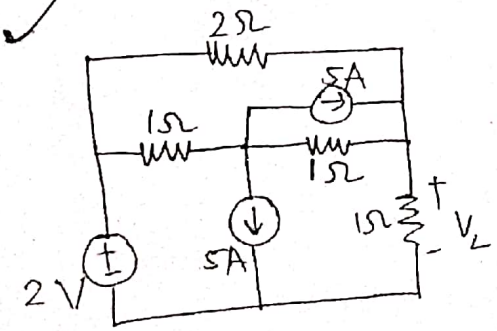


Fig.2(b)

[5+5=10]

3. (a) State any four necessary conditions for transfer functions with common factors in numerator and denominator cancelled

(b) Derive the inter-relationship among following matrices.

(i) Reduced incidence matrix and Tieset matrix

(ii) Reduced incidence matrix and fundamental Cut-set matrix

(iii) Link voltages and Twig voltages

(iv) Twig currents and link currents

[2+(2+2+2+2)]

4.(a) For an RC series circuit shown in Fig.8(a)with R=50 Ω & C = 1F and the capacitor is initially in relax condition, at t=0 switch K is closed, find expression for the resulting current in the circuit for t≥0.

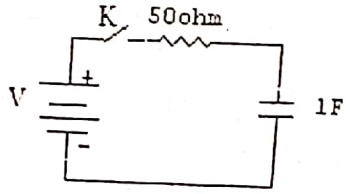


Fig.3(a)

(b) In the circuit given in Fig.3(b), the steady state exists when the switch S is in position 'a' for a considerable period of time. Find the current response after throwing the switch from position 'a' to 'b'. What will be the steady state value of the current?

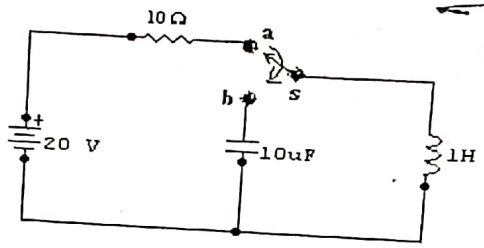


Fig.3(b)

[4+6=10]

5. (a) For the periodic Gate function shown in Fig.4(a), (i) find the trigonometric Fourier series, (ii) find the exponential Fourier series of the function, (iii) draw the spectrum of the function.

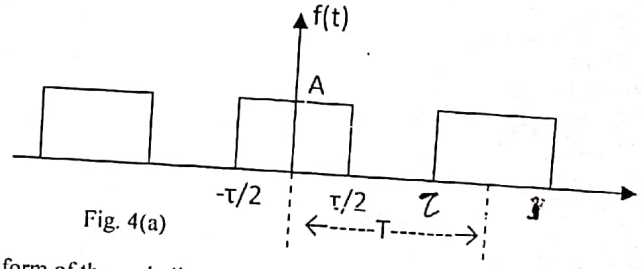


Fig. 4(a)

(b) Determine the Laplace transform of the periodic square pulse train of amplitude A as shown in Fig.4(b)

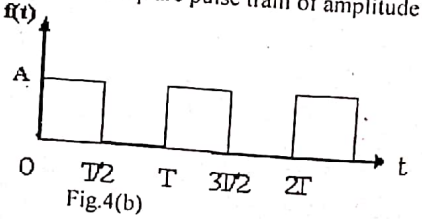


Fig.4(b)

6.(a) Define Fourier Transform of a function f (t). What will be the Fourier Transform of the time-scaled function f (at), a>0 ?

[6+4=10]

(b) Find the Fourier transform of the gate function given below:

v(t)= A for $\frac{-\tau}{2} < t < \frac{\tau}{2}$

=0 otherwise

7.(a) Find the inverse Fourier transform of $\delta(\omega-\omega_0)$

[4+6=10]

(b) Find the first Cauer form of the driving point function given by:

$$Z(s) = \frac{(s+3)(s+7)}{(s+2)(s+4)}$$

[4+6=10]

8.(a) Find the first Cauer form of driving point function given by.

$$Z(s) = \frac{10s^4 + 12s^2 + 1}{2s^3 + 2s}$$

(b) Find the second Foster form of RC network for the function given by:

$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

[5+5=10]

9. For both symmetrical T and π-filter networks, derive the expressions for Characteristic Impedance [5+5=10]

10. (a) For the circuit shown in Fig 5,determine the network transfer functions

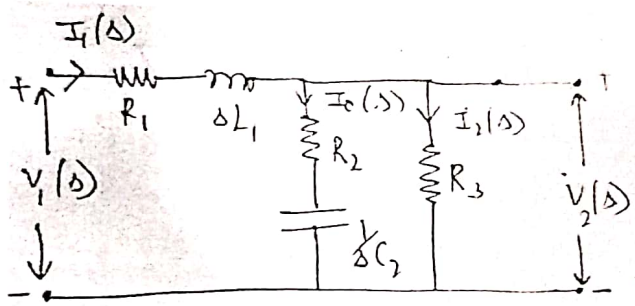


Fig 5

(b) Obtain the pole-zero locations of the following functions.

(1) cos ωt

(2) e^{-at} cos ωt

[8+2]

B.Tech 3rd Semester End Term Examination, 2018

Name of Subject: Programming in C

Paper code: UEI03C14

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

The figures in the margin indicate full marks for the questions

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Answer all the questions

((2+4)+6+(2+4)+6+6+4=34)

1.

(a) What is an operator? Explain the arithmetic, relational, logical, and assignment operators in C language.

(b) Discuss the different types of loops used in C with example.

(c) What do you mean by user defined function? Discuss the concept of function call by reference with appropriate program.

(d) Explain different string handling functions available in C language.

(e) What is the difference between recursive and non-recursive functions? Give their merits and demerits.

(f) Demonstrate goto statement in C using example.

2. (2x8=16)

Find the output of the given code and explain in support of your answer:

(a)

```
#include<stdio.h>
int main()
{
   int p, q = 10;
   p = -q--;
   printf("p = %d, q = %d",
p, q);
   return 0;
}
```

p = -10
q = 9.

(b)

```
#include<stdio.h>
int main()
{
 char a [] = "NIT AGARTALA";
 printf("%d", sizeof(a));
 return 0;
}
```

(c)

```
#include<stdio.h>
int fun(int *p)
{
 int q = 15;
 p = &q;
 return *p;
}

int main()
{
 int r = 50,s;
 int *p = &r;
 s=fun(p);
 printf("%d", *p);
 return 0;
}
```

50 - inside main

(d)

```
#include<stdio.h>
int main()
{
 int num = 126;
 int rem;
 if(num)
  rem = num % 5 == 0 ? 5 : num % 5 ;
 else
  rem = 0;
  printf("%d", rem);
return 0;
}
```

(e)

```
#include<stdio.h>
int main(){
int a[]={12,22,33,44,55};
int b[]={12,22,33,44,55};
if(a==b){
printf("yes");
}
else{
printf("no");
}
return 0;
}
```

Error

(f)

```
#include<stdio.h>
int main()
{
int a=2, b=3, c=4;
if(a||b||c)
c=10;
else
c=20;
printf("\na=%d  b=%d
c=%d", a,b,c);
return 0;
}
```

(g)

```
#include<stdio.h>
int main()
{
int i=10;
do
{
printf("%d",i);
}while(i>0);
return 0;
}
```

(h)

```
#include<stdio.h>
int main()
{
int a=2, b=3, c=4;
a=b=c;
printf("\n a = %d   b = %d",a,b);
return 0;
}
```

3. (6x5=30)

(a) Write a program to print the file contents into the screen.
(b) Write a program to create an integer array using calloc() and print the values.
(c) Write a program to extract the last n characters of a string and store this in another string.
(d) Write a program to display the information of ten students using array of structure.
(e) Write a program to find the largest of n numbers in an array using pointer.

(5x4=20)

4.

Write short note on the following:

(a) Scope of variables.
(b) Pointer in C.
(c) Structure and union.
(d) Break and continue statement.

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B.TECH III SEMESTER, END TERM EXAMINATION 2018

Enrolment No. 17UEI005

ANALOG ELECTRONIC CIRCUITS
UEI03B04

Full Marks: 100 Time: 3Hrs

The figure in the margin indicate full marks for the questions
(Symbols have their usual meaning)

ANSWER QUESTION NO. 1(COMPULSORY) AND ANY SIX FROM THE REST

1. **Choose the correct alternative from the followings (any TEN):** *10X1=10*

(i) The Q-point is at cut off for class _____ operation.
(a) A, (b) B, (c) C, (d) AB

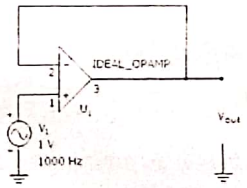
(ii) How many transistors must be used in a class B power amplifier to obtain the output for the full cycle of the signal?
(a) 0, (b) 1, (c) 2, (d) 3

(iii) Which of the following describe(s) a power amplifier?
(a) It can handle large power, (b) It can handle large current, (c) It does not provide much voltage gain, (d) All of the above

(iv) For an Op-amp with negative feedback, the output is
(a) equal to the input, (b) increased, (c) fed back to the inverting input.
(d) fed back to the non-inverting input

(v) A certain non-inverting amplifier has R_i of 1 kΩ and R_f of 100 kΩ. The closed-loop voltage gain is
(a) 100,000, (b) 1000, (c) 101, (d) 100

(vi) What is the output waveform?
(a) sine wave, (b) square wave,
(c) +15 V, (d) –15 V



(vii) If the input to a comparator is a sine wave, the output is a:
(a) ramp voltage, (b) sine wave, (c) rectangular wave, (d) sawtooth wave

(viii) When voltage feedback (negative) is applied to an amplifier, its input impedance
(a) is decreased. (b) is increased, (c) remains the same, (d)none of the above

(ix) Emitter follower is used for
(a) Current gain, (b) Impedance matching, (c) Voltage gain, (d) None of the above

(x) Barkhausen criteria is:
(a) Positive feedback, $A\beta = 1$, $\theta = 0$ or multiple 360
(b) Negative feedback, $A\beta = 1$, $\theta = 0$ or multiple 360
(c) Positive feedback, $A\beta = 0$, $\theta = 0$ or multiple 360
(d) Negative feedback, $A\beta = 1$, $\theta = 180$

(xi) In a phase shift oscillator, we use _____ RC sections
(a) Two, (b) Three, (c) Four, (d) one

(xii) One of the following oscillator types provides extremely stable output frequency:
(a) Colpitt's oscillator. (b) Wein bridge oscillator.
(c) Crystal oscillator. (d) Hartley oscillator.

(xiii) An astable multivibrator is also known as a:
(a) one-shot multivibrator. (b) free-running multivibrator.
(c) bistable multivibrator. (d) monostable multivibrator

(xiv) What controls the output pulse width of a one shot?
(a) the clock frequency. (b) the width of the clock pulse.
(c) an *RL* time constant. (d) an *RC* time constant

2. (a) Draw and explain the circuit diagram for fixed bias circuit considering an n-p-n transistor in the CE configuration. Derive the expression for its stability factors. Mention the demerits of this circuit.
(b) In a fixed bias circuit of a transistor, V_{CC}=15V, R_B= 300 KΩ and R_L= 2 KΩ. If β=100, I_{co}=20 μA. and V_{BE}=0.7V, determine I_B, I_C, and V_{CE}. Also find the stability factor with respect to I_{co}.
(c) What is Thermal runaway? (3+3+2) +2+5=15

3. (a) Draw the circuit for a complementary symmetry class B power amplifier and discuss its working.
(b) Derive an expression for the efficiency of class B power amplifiers.
(c) What do you understand by cross-over distortion? How can it be eliminated -explain with necessary circuit diagram.
(d) For a class B Power amplifier providing a 20 V peak signal to 16 Ω load and a power supply of V_{cc}=30 V. Determine the input power, output power and circuit efficiency. 4+4+4+3=15

4. (a) Explain the effect of negative feedback on Stability, Distinction, and Bandwidth.
(b) Give examples (with circuit diagram) for voltage series and voltage shut feedback topologies.
(c) What are the effects of negative feedback on the input and output impedances of a current series feedback amplifier?
(d) An amplifier without feedback gives fundamental output 36 V with 7% second harmonic distortion: when the input is 0.028 V.
(i) If 1.2% of the output is feedback into the input in a negative voltage series feedback, what is the output voltage?
(ii) If the fundamental output is maintained at 36V but the second harmonic distortion is reduced to 1%, what is the input Voltage? 3+3+4+5=15

5. (a) Describe with circuit diagram and waveforms the working of astable multivibrator using transistor. Find out the frequency of oscillation of an astable multivibrator. Discuss various applications of astable multivibrator.
(b) Design an astable multivibrator with repetition rate of 500 Hz and pulse width is 0.2 ms. Use two transistors with h_{fe} = 50, V_{cc}=V_{BB}= 20 V, R_{c1}=R_{c2}==1kΩ.
(c) Explain bias compensation technique for V_{BE}. 8+4+3=15

6. (a) Draw a neat sketch of a generalized resonant circuit oscillator using three impedances. Find out the condition for oscillation. Explain how this circuit can be used to behalves as Hartley oscillator. Also derive the expression for the frequency of oscillation of Hartley oscillator.
(b) What is Piezo electric crystal? Draw the electrical equipment model of the crystal oscillator. Explain how this crystal can be incorporated in an electrical circuit to form a stable oscillator. (5+5)+ (1+1+3) =15

7. (a) Draw the internal block diagram of IC 555 and explain its operation.
(b) Why timer IC is called IC 555?

(c) Explain IC 555 as monostable multivibrator with circuit diagram and find out the mathematical expression for pulse width. Discuss the various applications of monostable multivibrator.

(d) The 555 timer is used in monostable mode, where R_A= 10kΩ and output pulse width is 2.2 ms. Determine the value 'C' to be required.

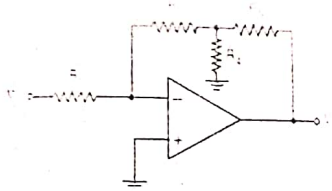
5+1+6+3=15

8. (a) What is Schmitt Trigger? Explain with circuit diagram.

(b) Draw and explain the working of a log amplifier.

(c) Explain how an OP-AMP can be used as current to voltage converter.

(d) For the circuit shown in Figure below, find out the output voltage.



4+4+3+4=15

9. Write short note on (any three): 3x5=15

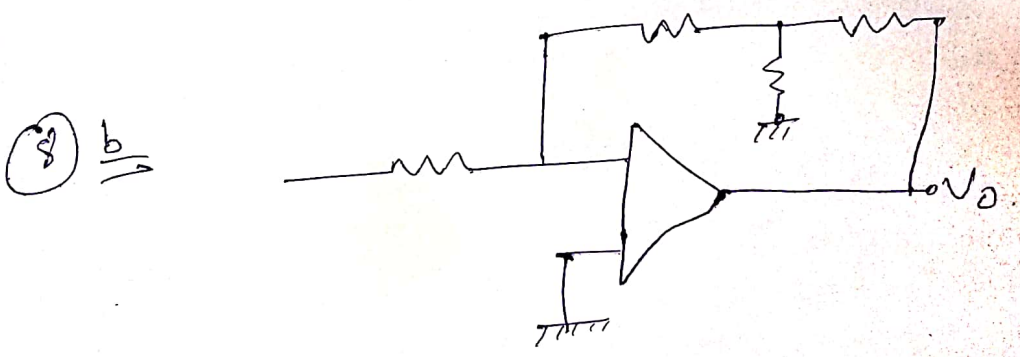
(i) Wien bridge oscillator,

(ii) Regulated Power supply,

(iii) Switched mode power supply,

(iv) High frequency model of transistor,

(v) Instrumentation Amplifier.



Enrolment No. 17UE1005

B. Tech 3rd Semester End Term Examination, 2018
Electrical Measurement and Measuring Instruments
UEI03B03

Full Marks:100 **Time: 3.00 hours**

The figures in the margin indicate full marks for the questions

Candidates are required to give their answers in their own words as far as practicable

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Group-A

Attempt ALL the questions. Each question carries 1 Mark ***[10×1=10]***

1. The high torque to weight ratio in an analog indicating instrument indicates:
   a) High friction loss
   b) Low friction less
   c) Nothing as regards friction loss
   d) none of the above

2. A 1 mA ammeter has a resistance of 100 Ω. It is to be converted to a 1A ammeter. The value of shunt resistance is:
   a) 0.001 Ω b) 0.1001 Ω c) 100000Ω d) 100 Ω

3. In spring controlled moving iron instruments, the scale is:
   a) Uniform
   b) Cramped at the lower end and expanded at the upper end
   c) Expanded at the lower end and cramped at the upper end
   d) Cramped both at the lower and the upper ends

4. An electrodynamometer type of instruments finds its major use as:
   a) Standard instrument only
   b) Transfer instrument only
   c) Both as standard and transfer instrument
   d) An indicator type of instrument

5. Horizontally mounted moving iron instruments use:
   a) Eddy current damping
   b) Electromagnetic damping
   c) Fluid friction damping
   d) Air friction damping

6. In measurement systems, which of the following static characteristics are desirable:
   a) Accuracy b) Sensitivity c) Reproducibility d) All of the above

7. Dynamic response consists of:
   a) two parts, one steady state and the other transient state response
   b) only transient state response

c) only steady state response
d) steady state and transient frequency response

8. A meggar is used for measurement of
a) Low valued resistances
b) Medium valued resistances
c) High valued resistances, particularly insulation resistance
d) All the above

9. Air friction damping should not be used where the deflection torque in the instrument is produced due to
a)Magnetic field
b)Electrostatic field
c)Thermo-electric field
d)None of the above

10. A PMMC meter rated at 50 μA is used in a rectifier type of instrument which uses full wave rectification. What is the sensitivity on sinusoidal a.c.?
a) 20 kΩ/V
b) 9 kΩ/V
c) 22.2 kΩ/V
d) 18 kΩ/V

$S_{ac} = 0.9\, S_{dc}$

$S_{dc} = \frac{1}{50 \times 10^{-6}}$

Group-B

Attempt ALL the questions from the following. Each question carries 5 marks. ***[6×5=30]***

11. Calculate the value of the multiplier resistor for 10 V_{rms} ac range on the voltmeter in figure below. [5]

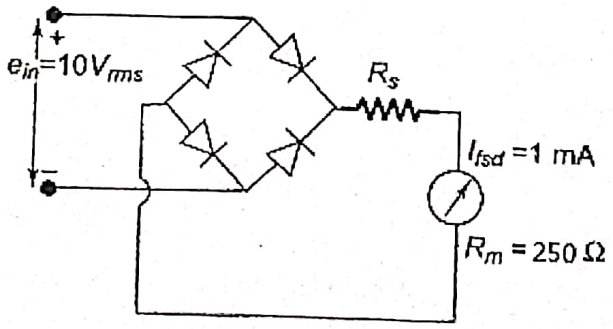

Fig. 11

12. Classify the resistances from the point of view of measurements. Describe the ... test for localization of ground and short circuit faults in cables. [1+4]

13. Describe the substitution method for measurement of medium resistances. List the factors on which the accuracy of the method depends. [4+1]

14. Derive the expression of bridge sensitivity for a Wheatstone bridge with equal arms. [5]

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

16. A Wheatstone bridge has ratio arms of 1000 Ω and 100 Ω and is being used to measure an unknown resistance of 25 Ω. Two galvanometers are available. Galvanometer 'A' has a resistance of 50 Ω and a sensitivity of 200 mm/μA and galvanometer 'B' has values of 600 Ω and 500 mm/μA. Which of the two galvanometers is more sensitive to a small unbalance on the above bridge, and what is the ratio of sensitivities? The galvanometer is connected from the junction of the ratio arms to the opposite corners. Comment upon the results. [5]

Group-C

Attempt any 6 questions from the following. Each question carries 10 marks. ***[6×10=60]***

17. (a) Discuss the static characteristics of a measuring instrument.

(b) Explain clearly the difference between Repeatability and Reproducibility.

Two different voltmeters are used to measure the voltage across R_2 in the circuit given below. The meters are as follows. Meter1: sensitivity of 1000Ω/V and Meter2: sensitivity of 20,000Ω/V. Find which voltmeter will read the accurate value of voltage across R_2. Both the meters are used on the 50 V range.

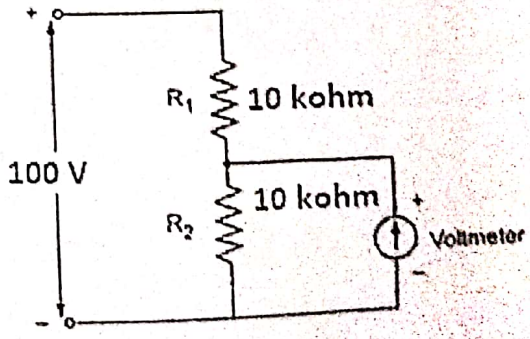

Fig. 17(b)

[3+2+5=10]

18. (a) Describe the working principle of electrodynamometer type of instrument.
(b) Derive the equation for deflection of moving iron instrument if spring control is used. [4+6=10]

19. What are the limitations of Wheatstone bridge method? Explain the working principle of Kelvin's Double Bridge and explain how the effect of contact resistance and resistance of leads is eliminated. Also derive the condition for balance. [2+8]

20. (a) Explain the working of attraction type and repulsion type of moving iron instruments with the help of neat diagrams.
(b) The inductance of a moving iron instrument is given by $L=(10+5\theta-\theta^2)$ μH, where 0 is the deflection in radian from zero position. The spring constant is 12×10-6 N, m/rad. Estimate the deflection for a current of 5 A. [6+4=10]

21. Describe the working of Hay's bridge for measurement of inductance. Derive the equations for balance and draw the phasor diagram under conditions of balance. Why is this bridge suited for measurement of inductance of high Q coils? [2+3+3+2]

22. Derive the equation of balance for an Anderson's bridge. Draw the phasor diagram for conditions under balance. Discuss the advantages and disadvantages of the bridge. [3+3+4]

23. Describe the Ammeter-Voltmeter method in detail for the measurement of medium resistances. [10]