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~~MID~~
~~PHYSICS MUL~~

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

MID SEMESTER EXAMINATION (Oct. 2016)

1st SEM B. Tech. (Sections: A,B,C,D,E,F,G)

SUBJECT: ENGLISH FOR COMMUNICATION

TIME: 2 hrs

Full Marks: 20

Answer all questions from Q.1 and any three from the rest

1.

(1 x 5)

- (i) India needs more manpower in Defence to combat infiltration.
(Make the sentence bias free.)
- (ii) The box is containing some valuable books. (Correct the error)
- (iii) There is no reason to believe that his opinion is not acceptable.
(Use plain English)
- (iv) Give two examples of auditory non verbal communication.
would have carried
- (v) If Dana Majhi had been provided with a vehicle, he (carry) his wife's dead body. (Use the correct form of the verb)

(5x 3)

2. (a) What is body language? Explain with examples.

(b) How can we overcome physical barrier in Communication?

3. (a) What do you mean by the process of communication?

(b) Explain the different Channels of Communication with suitable examples.

4. (a) Why should we avoid gender bias in communication?

(b) What are state verbs? *acts or emotions, expressions,*

5. (a) What do you mean by Social function of language?

(b) Why do we make a sentence passive?

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, ODISHA, BURLA
MID SEMESTER EXAMINATION, OCTOBER-2016

SUBJECTS - Basic Electrical Engineering

SEMESTER:
1st

TIME:
2 HOURS

BRANCH: A, B, C,
D, E, F, G

FULL MARKS: 20

Answer any four questions including question no .1
The figure in the right hand margin indicate marks

[1X5]

1 ✓ (a) State Thevenin's theorem.

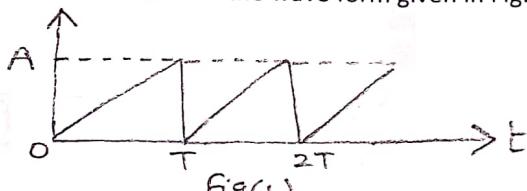
(b) In a single phase ac circuit voltage is a value $V=(100+j100)$ volts and $Z=(3+j4)$ ohms. Express the current in polar form.

(c) Define time constant of a circuit. Draw the curve for the rise of current in an R-L circuit.

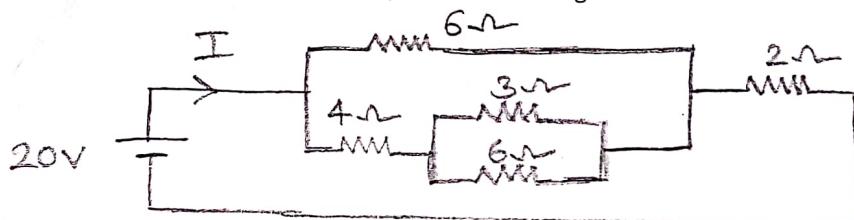
(d) An inductance of 1 henry is in series with a capacitance of 1 micro-farad. Find the impedance of the circuit when the frequency is (i) 50 Hz and (ii) 500 Hz.

(e) If a toaster rated at 1000 watt is operated for 30 minutes, determine the energy consumed.

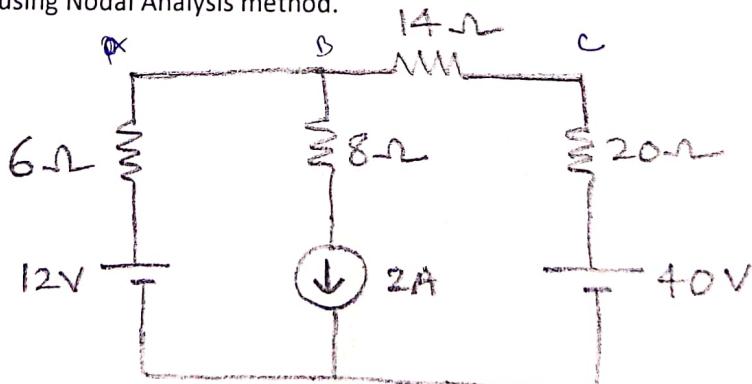
2 ✓ (i) Find the form factor of the wave form given in Fig. 1. [2X2.5]



(ii) Find the current (I) drawn by the circuit of Fig. 2

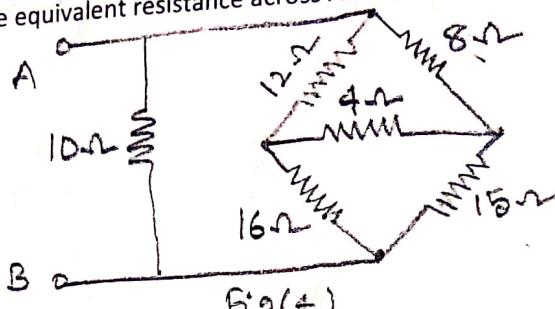


3 ✓ (i) Find the voltage across the resistance of 20 ohm in the circuit shown in Fig.3 [2X2.5] using Nodal Analysis method.



Fig(3)

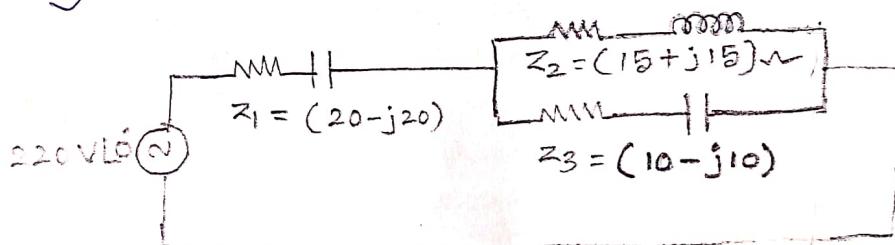
(iii) Find the equivalent resistance across A and B of Fig.4 below.



Fig(4)

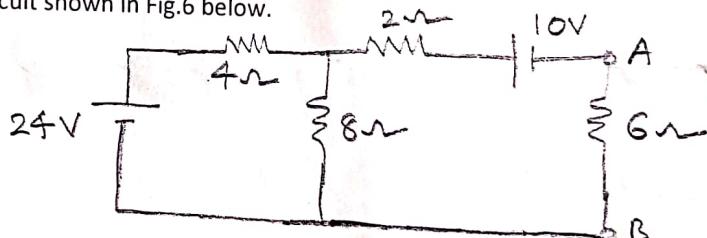
✓ 4 (i) Find the current in a series R-L circuit having $R=2$ ohm and $L=12$ henry. While a DC voltage of 100 volts is applied, what is the value of this current after 6 seconds of the switching. [2X2.5]

(ii) Determine the current in each branch of the circuit shown in Fig.5 below.



Fig(5)

✗ 5 (i) State Norton's theorem and find the current through 6 ohm resistor of the circuit shown in Fig.6 below. [2X2.5]



(ii) What is resonance in series RLC circuit? Show the variation of I, Z, R, X with frequency for a series RLC circuit.
Find the relationship of line and phase voltage of star connected load.

[2X2.5]

(i) A 440 volts line voltage supply is given to a star connected 3-phase load having impedance $(10+j9)$ ohm. Find the total power consumed and power factor of

*****END*****

1A⁶ A⁵

(Answer Any Four Including Question No.1)

- 1.(a) Define principle of transmissibility & Free Body Diagram (FBD) and draw FBD of Hinged, Fixed & Roller support.
 (b) State Lami's theorem with a sketch.
 (c) Write the equations of equilibrium of a coplanar system of forces.
 (d) Differentiate between 'Resultant' and 'Equilibrant'
 (e) State Varignon's theorem.

- 2.(a) Two identical rollers each of weight 50N are supported by an inclined plane and a vertical wall as shown in figure-1. Find the reactions at the points of supports A, B, and C. [2.5]
 (b) A weight of 40 kN is suspended by two cables as shown in the figure-2. Find the tensions T_1 & T_2 in the cables. [2.5]

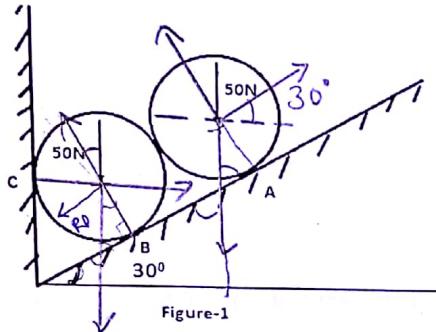


Figure-1

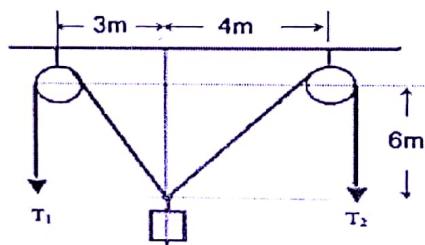


Figure-2

- 3.(a) A ball of weight $Q = 53.4$ N rest in a right-angle trough, as shown in figure- 3. Determine reactions at D & E if all surface are perfectly smooth. [2.5]
 (b) Two roller of weights "P" = 222.5N and "Q" = 445N are connected by a rigid bar at its ends & supported inside a circular ring in a vertical plane as shown in figure-4. The length of the bar "AB" is such that radii "AC" and "BC" form right-angle at center of the circular ring "C". Neglecting friction and weight of the bar, find the compressive force in the bar "AB". [2.5]

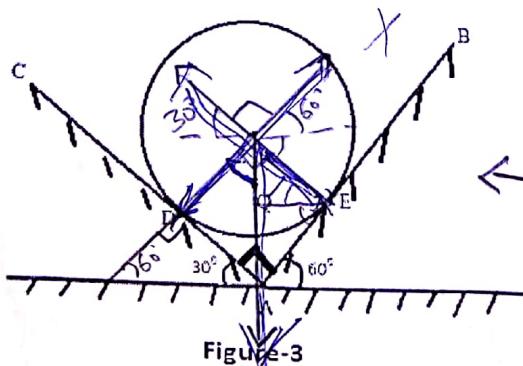
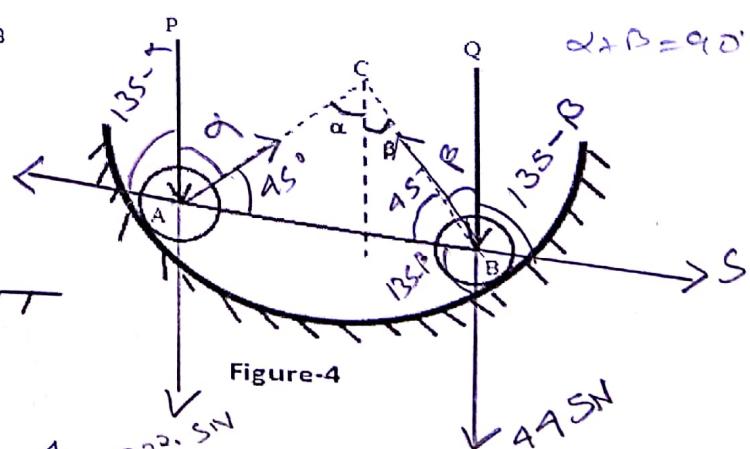


Figure-3



- 4.(a) In figure. C. weights "P" & "Q" are suspended in a vertical plane by string 1, 2, 3 arranged shown in figure-5. Find tension in each string if $P = 2225\text{N}$ and $Q = 4450\text{N}$. [2.5]

- (b) A 667.5N man stand on the middle rung of a 222.5N ladder, as shown in figure-6. Assuming end "B" rest on the corner of the wall and stop at "A" to prevent slipping, find the reaction at "A" & "B". [2.5]

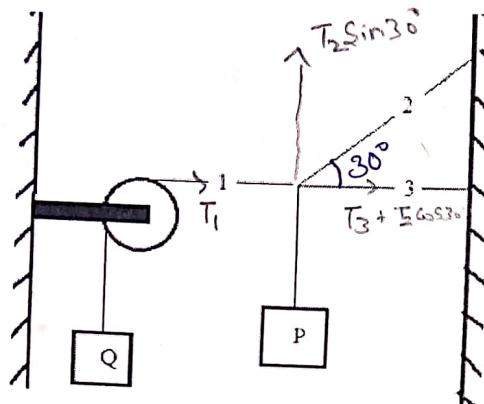


Figure-5

$$T_2 = 2P$$

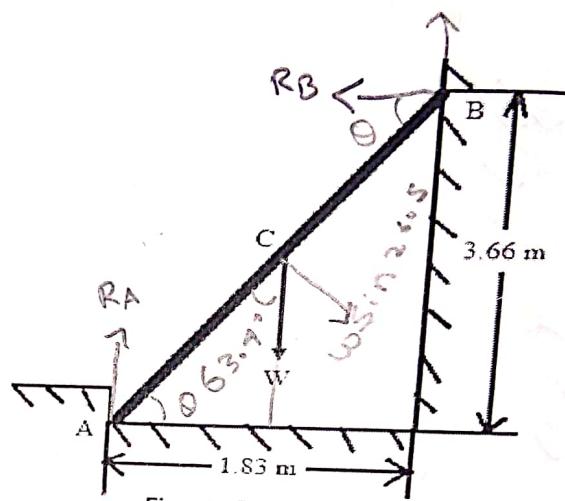


Figure-6

5. (a) A smooth cylinder of radius 500 mm rests on a horizontal plane and is kept from rolling by a rope OA of 1000 mm length. A bar AB of length 1500 mm and weight 1000 N is hinged at point A and placed against the cylinder of negligible weight as shown in figure-7. Determine the tension in the rope.

- (b) A roller of weight 500 N has a radius of 120 mm and is pulled over a step of height 60 mm by a horizontal force P. Find magnitudes of P to just start the roller over the step.

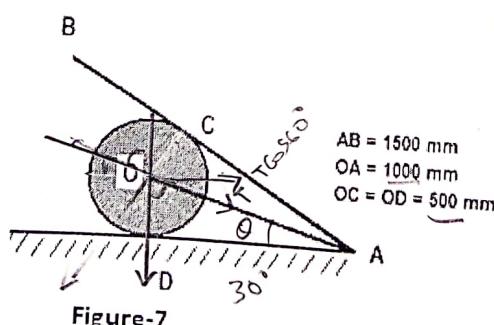


Figure-7

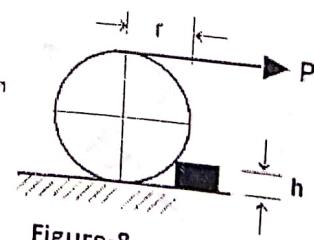


Figure-8

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

1st Semester B.Tech Mid-Semester Examination: 2016

Sub: Mathematics-I (All Branches)

Full Marks: 20 Time: 02.00 Hours

Answer any Four questions including question no. 1.

[1×5]

1 Answer all the questions.

(i) Find the interior of sets $[0, 1] \cap \mathbb{Q}$ and $[1, 2] \cup [3, 4]$.

(ii) Evaluate $\lim_{x \rightarrow 0} x \left[\frac{1}{x} \right]$.

(iii) Prove or disprove that the intersection of an arbitrary family of open sets is an open set.

(iv) Find the derived set of the set $\{\pm 1\frac{1}{n}, n \in \mathbb{N}\}$.

(v) Give an example of a function which is continuous everywhere on \mathbb{R} except one point.

2 (a) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = x^2 \sin \frac{1}{x}$ when $x \neq 0$ and $f(0) = 0$.

Show that f is differentiable at $x = 0$ but its derivative is not continuous at $x = 0$. [2.5]

(b) Establish the inequality $\frac{y-x}{1+y^2} < \tan^{-1} y - \tan^{-1} x < \frac{y-x}{1+x^2}$, $0 < x < y$. [2.5]

3 (a) Prove that between any two real roots of $e^{-x} - \sin x = 0$, there is at least one root of $e^x \cos x + 1 = 0$. [2.5]

(b) Show that $\lim_{x \rightarrow 2} \frac{x^3 - 4}{x^2 + 1} = \frac{4}{5}$ by using $\epsilon - \delta$ definition. [2.5]

4 (a) Examine the function $(x-3)^5(x+1)^4$ for extreme values. [2.5]

(b) Show that the function $f(x) = |x| + |x-1|$ for all $x \in \mathbb{R}$ is continuous but not derivable at $x = 0$ and $x = 1$. [2.5]

5 (a) Show that $\tan^{-1} x$ lies between $\frac{x}{1+x^2}$ and x for all $x > 0$. [2.5]

(b) Obtain the points of discontinuity of the function f , defined on $[0, 1]$ as follows:

$$f(0) = 0, f(x) = \frac{1}{2} - x, \text{ if } 0 < x < \frac{1}{2},$$

$$f(\frac{1}{2}) = \frac{1}{2}, f(x) = \frac{3}{2} - x, \text{ if } \frac{1}{2} < x < 1,$$

$$f(1) = 1.$$

Also examine the kind of discontinuities. [2.5]

6 (a) Find the closure of the interior and interior of the closure of $\mathbb{R} - \mathbb{N}$. [2.5]

(b) Show that $\lim_{x \rightarrow 0} \frac{1}{x} \cos \frac{1}{x}$ does not exist. [2.5]

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
MID - SEM EXAMINATION
SUB: PHYSICS
B.Tech. First Semester
Section: A-G

Full Mark-20

Time: 2hr

Answer any four questions including Q.No.1

1. a) Calculate the sharpness of the fringes if the ratio of the amplitude of the two waves propagating in a homogeneous medium, is 1:4 [1x5]
- b) In a thin film, between points X and Y six fringes are seen with a light of wavelength 6300 \AA . If the light used is of wavelength 5400 \AA , how many fringes are observed between X and Y.
- c) A plane transmission grating and glass look resemblance to each other. In which way it can be different from that of the plane glass plate.
- d) A monochromatic light of wave length $5860 \times 10^{-8} \text{ cm}$ is incident normally on a 2 cm wide grating. The first-order spectrum is produced at an angle of 20° with respect to the normal. Determine the total number of lines on the grating.
- e) Why Newton's rings are circular?
2. Write the importance of principle of superposition. As an application of principle of superposition, explain the necessary theory for interference in parallel thin film for both reflected and transmitted light. [1.5+3.5]
3. a) Are the Newton's rings of equal thickness or equal inclination? Show that the diameter of Newton's dark ring and bright ring are proportional to square root of natural and odd natural number respectively.
- b) In a Newton's ring experimental set up, the diameter of the 9th ring changes from 1.42 to 1.28 cm when a liquid replaces air in the space between the lens and the plate. Determine the refractive index of the liquid. [3.5+1.5]
4. a) Distinguish between the interference and diffraction. Explain how the wave length of monochromatic light can be determined using plane transmission grating. [2.5+1.5+1]
- b) Prove that the intensity of the secondary maxima formed for Fraunhofer diffraction at a single slit is of the decreasing order.
- c) A diffraction pattern is observed using a beam of red light. What happens if the red light is replaced by blue light?
5. a) Determine the minimum number of lines in a grating that are just able to resolve the sodium lines of wavelengths 5890 \AA and 5896 \AA . [2+3]
- b) Discuss the Fraunhofer diffraction due to plane transmission grating and discuss the position for maxima and minima with intensity distribution curve.
6. a) Write a short note on absent spectra. [2.5]
- b) What do you mean by coherent sources? Discuss the different methods of production of coherent sources. [2.5]

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

MID TERM Examination-2017

Sub: CHEMISTRY

F.M.-20

Branches: A, B, C, D, E, F, G

Sem: 2nd, Time- 2 hrs.

Answer any four questions including question No: -1, which is compulsory

1. (i) What are fundamental bands and overtones bands [1×5]
(ii) A solution shows transmittance of 10% when taken in a cell of 2.5 cm thickness. ✓
Calculate the concentration if the molar absorption is 12,000 dm³/mol/cm.
(iii) Write down the Schrödinger time independent wave equation. Explain the terms.. ✓
(iv) Calculate the entropy change accompanying the transfer of 10460 joules from a gas at 300 K to a gas at 600 K.
(v) Predict the types of transition taking place in (i) Cl₂ molecule and (ii) acetone in electronic spectroscopy.
2. What is chemical potential? What is its physical significance? Write an expression for the variation of chemical potential with temperature. [1+1+3]
3. (i) Prove that $(\delta T / \delta V)_S = -(\delta P / \delta S)_V$
(ii) One mole of an ideal gas is heated from 100 K to 300 K. Calculate the change in entropy when volume is kept constant. [C_v=3/2 R] [3+2]
(iii) Show the entropy change of a reversible process is zero. ✓
(iv) Write the condition of normalization and orthogonality. ✓ [3+2]
4. (i) The separation lines in the micro wave spectra of CO was found to be 298 m⁻¹. Calculate the bond length of CO. [m_c=12, m_o=15.994, 1 amu=1.66×10⁻²⁷ kg]
(ii) The wave number of the fundamental vibration of ³⁵Cl₂ is 564 cm⁻¹. Calculate the force constant. (1 amu=1.66×10⁻²⁷ kg) ✓ ✓ [3+2]
5. (i) What are fluorescence and phosphorescence? Discuss the mechanism of both.
(ii) An electron is moving with a speed of 10⁶ m/s in a 1D box of length 10cm. Find out the kinetic energy and value of n corresponding to the energy. [2.5×2]

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY
MID SEMESTER EXAMINATION MARCH 2017

Subject: Computer Programming
2nd Semester (B.Tech) – Sec: A,B,C,D,E,F,G

Time: 2 Hours
Max Marks: 20

Q1 is compulsory. Answer any 3 from the rest.

[5 x 1 = 5 Marks]

1. Answer the following.
 - a. Convert the following
 $(01010111)_2 = (?)_8$
 - b. Which operator has the lowest precedence?
 - i. sizeof()
 - ii. Unary
 - iii. Assignment
 - iv. Comma
 - c. Which one of the following is not a valid identifier?
 - i. _exam
 - ii. 1exam
 - iii. exam_c
 - iv. exam1
 - d. What will be the output if you compile and execute the following C code?

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int i=0;
    for(;i<=2;)
        printf(" %d",++i);
}
```

- i. 0 1 2
- ii. 1 2 3
- iii. 0 1 2 3
- iv. Infinite Loop

- e. What will be the output if you compile and execute the following C code?

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=0 ;
    if( a=0)
        printf("No. is wrong");
    else
        printf("No. is right");
}
```

[2 x 2.5 = 5 Marks]

2. a. Describe the block architecture of a computer
b. Draw a flowchart to classify a given triangle ABC as equilateral or isosceles or scalene. Assume that the sides of the triangle are supplied as input.
3. a. Explain the terminologies: - i. Bit ii. Byte iii. Actual Arguments iv. Formal Arguments v. Word-size [2 x 2.5 = 5 Marks]
- b. Write a program to create a function *palindrome*. The function should accept the inputted number *n* as an argument to check whether the given number is a palindrome or not. It should return 1 if it is a match else 0. Display the final result (i.e. palindrome or not) based on the values returned by the function.
4. a. Write a program to print the following pattern:

1
2 3
4 5 6
7 8 9 10

- b. Declare an array of size 10. Accept a number *n* from the user. Search for the number in the array. Also count and display how many times the number *n* occurs in the array. Write a program to perform the mentioned operation. [2 x 2.5 = 5 Marks]

5. a. Write an algorithm to find the sum of 1st 10 even nos.
b. Write a program to find the greatest of three numbers using conditional operator. [2 x 2.5 = 5 Marks]

6. a. Predict the output:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=2, b=3, c=4;
    if(a=b>c)
    {
        c=c+5;
        a=a+5;
    }
    --b;
    printf("a=%d\t b=%d\t c=%d",a,b,c);
}
```

 [2 x 2.5 = 5 Marks]

- b. A cricket kit supplier sells bats, wickets & balls. Write a program to generate the sales bill. Accept the name of the buyer, price of each item & quantity of each item. Calculate the total sales amount & add 17.5 % sales tax if the total sales amount >300,000 or add 12.5 % if the total sales amount is >150,000 or 7 % otherwise. Display the total sales amount, the sales tax & the grand total in the sales bill.

Veer Surendra Sai University of Technology
Department of Electronics and Telecommunication Engineering
Mid Term Examination, March 2017
2nd Semester B.Tech
Sub: Basic Electronics

Time: 2 Hrs.

Full Marks: 20

Answer any four questions including question-1:

[1×5]

1. Short type questions:

- What do you understand by *Forbidden Energy Gap*? What is its value for *Silicon semiconductor*?
- Differentiate between conductors and semiconductors in terms of their respective *temperature coefficients*?
- Complete the number system conversion: $(51.35)_{10} = (\underline{\quad})_7$?
- Give the equivalent circuit for *piecewise linear model* of diode.
- Draw the frequency spectrum of the signal $x(t) = \cos(2\pi 10t) + \cos(2\pi 20t) + \cos(2\pi 30t)$.

2. a) Verify the arithmetical operation $(37)_{10} - (42)_{10} = (5)_{10}$ equivalently in binary using 2's complement method. [2.5]

b) Explain how a *RC-Differentiator* is a special case of *RC-High Pass Filter* circuit with supporting circuit diagram and necessary mathematical expressions. [2.5]

3. a) Determine V_o for the given network. Give details of calculation and reasoning. [2.5]

b) Differentiate between *zener breakdown* and *avalanche breakdown* with at least four differences. [2.5]

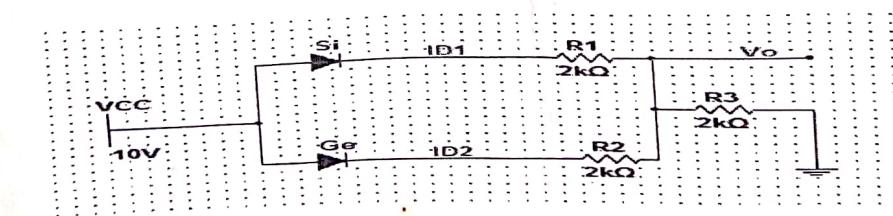
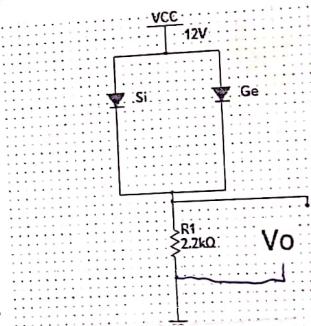
4. a) Derive the *root mean square voltage* for the output of a full-wave *bridge type rectifier* considering *Silicon diodes* and input *ac* signal being $v_i(t) = V_m \sin(\omega_0 t)$. [2.5]

b) Explain the required steps with suitable diagrams to convert an analog signal into a digital signal. [2.5]

5. a) What is *dynamic ac resistance* of a diode? Show that the dynamic *ac* resistance of a diode is given

$$\text{by : } r_d = \frac{26mV}{I_D}, \text{ where } I_D \text{ is the diode quiescent current (current at operating point).} \quad [2.5]$$

b) Determine V_o , I_{D1} and I_{D2} for the given network: [2.5]



6. Short notes: (any two)

[2.5×2]

- Load line
- PIV of centre-tapped full wave rectifier
- Base or radix of a number system
- Depletion region

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

1st Year B.Tech. (All Branches), Mid Semester Examination, 2017

Sub: Math-II (2nd Sem.) Full Marks: 20 Time: 02.00 Hours

Answer any Four questions including question no. 1.

The figures in the right-hand side indicate marks.

1. Answer all the questions. [1 × 5]

(i) Classify (ode/pde/homogeneous/nonhomogeneous/linear/nonlinear) the following differential equation $(1-x)^2y'' - 2xy' + 6y = 0$.

(ii) Give an example of an ordinary differential equation which has at least one singular solution.

(iii) Find an integrating factor of $-2xy \sin(x^2)dx + \cos(x^2)dy = 0$.

(iv) Find a basis of the solution space of $y'' + y = 0$.

(v) Solve the differential equation $2yy' + y^2 \sin x = \cos x$.

2. (a) Discuss the existence and uniqueness of a solution of the TVP

$$y' = e^{-\frac{x^2}{2}} + y^2, y(0) = 0, 0 \leq x \leq 2.$$

(b) Solve the differential equation $(D^2 + 6D + 13)y = 0$.

[2.5]

3. (a) Find the general solution of $x^2y'' - xy' + y = \tan x$ by method of variation of parameter.

(b) Solve the IVP $y' + (x+1)y = e^{x^2}y^3, y(0) = 0.5$.

[2.5]

C. F & P. [2.5]

4. Find the general solution of $y''' + 2y'' - y' - 2y = 0$ by converting it to a system. [5]

5. (a) Solve the IVP $y''' + 3y'' + 3y' + y = 30e^{-x}, y(0) = 3, y'(0) = -3, y''(0) = -47$ by using the method of undetermined coefficients.

(b) Find a basis of solutions of $x^2y'' - xy' + y = 0$, if one of the solution is $y = x, x > 0$.

[2.5]

6. (a) Check the exactness of $(2x + e^x \sin y)dx + e^x \cos y dy = 0$ and solve.

(b) Find the particular solution of $y''' + 2y'' - 3y' - 10y = 8xe^{-2x}$.

[2.5]

[2.5]

***** END *****

(Set-V₁)

B.Tech-2nd(All Br.)
Computer Programming

Full Marks : 70

Time : 3 hours

Answer six questions including

Q.No.1 which is compulsory

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer all questions :

2 × 10

**(a) With justification, find the outputs/errors if
any ;**

main () {

```
    int i = five ;
    switch (i) {
        case 1: printf ("one");
        break;
        case 2: printf ("two");
        case 3: printf ("five");
        continue
    }
}
```

(Turn Over)

(2)

X(b) Write only the C syntax how to define open a file.

1 (c) Consider a computer that has 4 byte memory addresses. What will be the output of the following statement? Justify your answer.

printf("%d%d\n", size of(char *), size of(int, float));

(d) What do you mean by Coercion in C? Give the general form of casting.

2 (e) State two important differences between while and do while statement?

2 (f) Write the output of the following C program:

```
#include <stdio.h>
main() {
    int num[10] = {1,0,0,0,0,0,0,0,0,0}, i, j;
    for (j = 0; j < 10; ++j)
        for (i = 0; i < j; ++i)
            num[j] += num[i];
    for (j = 0; j < 10; ++j)
        printf("%d\t", num[j]);
}
```

B.Tech- 2nd(All Br.)Computer Programming (Set-V.)

(Continued)

(3)

State the functions of storage classes (i.e., auto, static, extern, and register).

What will be the output of the following programs? If you feel that there can be any compile time or run time error, point out the same, Justify your answer.

```
#include < stdio.h >
```

```
main () {
```

```
    int i, a[10]; int *j;
```

```
    for (i = 0; i < 10; i++)
        a[i] = i * 2;
```

```
j = a;
```

```
for (i = 0; i < 10; i++)
    printf("%d\n", (*j)++);
```

```
}
```

(g) State any two important differences between Structure and Union.

(h) Consider the following code. Write the missing parts of the code as indicated by the comment statements.

2-10

5-7

4-7

(4)

int i = 10, *j, **k;
j = & i;

...../* Write a statement to
the value of i using
k = & j;

...../* Write a statement to print
the value of i using k,

2. (a) Define identifiers and Symbolic constants,
State the rules for constructing
identifiers.

5 (b) What do you mean by dynamic memory
allocation? Differentiate between malloc
and calloc.

X 3. Write a C program which will read a file and
count all occurrences of "VSSUT" in that file.
Then declare, define and call a function which will
combine all occurrences of "VSSUT" in that
file with "(UCE)", i.e., VSSUT(UCE). 10

B.Tech-2nd(All Br.)Computer Programming (Set-V)

(Continued)

(5)

Write a C program to accept two 2-dimensional
 $M \times N$ matrices (say A and B). Find out their
transpose matrices (say A' and B'). Display the
resultant matrix (say C) which is the product of
A' and B' with mentioning the message "Whether
Multiplication is POSSIBLE or NOT". 10

5 (a) State and explain string handling functions
with proper example. 5

5 (b) Explain "typedef" and "enumerated data
types" with example and proper syntax. 5

6. (a) Write a C program using structure to read
and display the following information of
50 players :

(i) player's name,

(ii) player's batting average, and

(iii) player's address (Parent name, City,
State, Country with PIN code).

B.Tech- 2nd(All Br.)Computer Programming (Set-V)

(Turn Over)

(6)

B. Tech - 2
Environmental

Pages - 5

- Q) Use recursive calls in C to evaluate
 $f(x) = x - (x^3/3) + (x^5/5) - (x^7/7) + \dots n \text{ times}$
where n is a given number.

7. Write a C program for swapping of contents of two variables of character types by : 6 + 4

- (a) call by reference, and
(b) call by value.

8. Write short notes on any two : 5 x 2

- (i) argc and argv in C
(ii) Recursion vs. Iteration
(iii) Bit fields
(iv) Preprocessor Directives.

(Set-V₁)

B. Tech - 2nd(All Br.)
Basic Electronics

Full Marks : 70

Time : 3 hours

**Answer six questions including Q. No. 1
which is compulsory**

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer all questions : 2 × 10

(a) Realize an EX-OR gate with four NAND gates.

(b) Perform $(17)_{10} - (11)_{10}$ in binary and also $(11)_{10} - (17)_{10}$ in binary.

(c) What is PIV of a diode ?

(d) What is bandwidth of an amplifier ?

(e) Mention the relationship between α and β of a transistor ?

(Turn Over)

(2)

- Q) What is ripple factor? Mention its Full-Wave rectifier.
- (g) Define the concept of slew rate and of an idea OPAMP.
- (h) What is load line? Explain its significance.
- (i) Write two advantages of a push-pull amplifier.
- (j) What are the minimum values of gain inverting and non-inverting amplifiers?
2. (a) Explain about diode clipper and clamp circuits.
- (b) Describe diode half-wave and full-wave rectifier circuits.
3. * (a) Construct a JK Flip-Flop using AND and NOR gates.
- (b) Describe various logic gates with their truth table.
- 2nd(All Br.)/Basic Electronics(Set-V.)

(3)

- (a) Compare and contrast between AM and FM in a communication system. 5
- (b) Explain how can you use to measure voltage, current, frequency, time period and phase difference of a sinusoidal wave in a CRO. 5
5. (a) Explain the various parameters of an OP-AMP. How these can be measured in laboratory. 5
- (b) Discuss the importance of Intrinsic and Extrinsic semiconductor. 5
6. (a) Mention various properties of negative feedback. Draw the block diagrams of different feedback topologies. 5
- (b) Explain the operation of crystal oscillator with the help of neat sketch. 5
7. (a) Establish the application of a BJT as an Amplifier and as a Switch. 5

(Continued)

2017 May 1

(Set-V₁)

B.Tech-2nd
Mathematics-II

Full Marks : 70

Time : 3 hours

Answer six questions including Q. No. 1
which is compulsory

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

2 × 10

1. Answer all questions :

- (a) Find an integrating factor of $xdy - ydx = x^2$.
- (b) Find the differential equation whose linearly independent solutions are $\cos 2x$, $\sin 2x$ and e^{-x} .
- (c) Show that e^x and xe^x are linearly independent.
- (d) Write the differential equation whose auxiliary equation has roots 1 and -1.

- Took 5105*
(2)
- X 8
 (a) State the conditions for which L
 transform of a given function exists.
 (b) Give an examples of a continuous fun
 which does not satisfy Lipschitz cond
 on a rectangle.
 (c) Find the radius of convergence and int
 of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{(-1)^{(n+1)}}{n} (x-1)^n.$$
 (d) Discuss about the ordinary and regula
 singular points of $(x^2-1)y'' + xy' - y = 0$ at
 $x = 0, 1.$
 (e) Classify the partial differential equation
 $f_{xx} + 2f_{xy} + 4f_{yy} = 0.$
 (f) Prove or disprove that $u = x^2 - y^2$ is a solution
 of $u_{xx} + u_{yy} = 0.$
2. (a) Solve the initial value problem
 $y'' - 5y' + 6y = 2e^x, y(0) = 1, y'(0) = 1.$
 Mathematics-II (Set-V₁)
- 5
(Continued)
- (3)*
- (a) Solve
 $(1+x)^2 y'' + (1+x) y' + y = \sin 2 [\log(1+x)].$
 Find the power series solution of the
 differential equation :
 $(x^2 + 1) y'' + xy' + xy = 0.$
- (b) Solve
 $y''' + 2y'' + y' = 0.$
4. (a) Find the power series solution of the
 differential equation :
 $x^2 y'' + xy' + \left(x^2 - \frac{1}{4}\right)y = 0.$
- (b) Using Laplace transform, solve
 $ty'' + 2y' + ty = \cos t, y(0) = 1.$
5. (a) Find the general solution of the system
 $\frac{dx}{dt} = 4x - y, \frac{dy}{dt} = 2x + y.$

X 8

(b) Using convolution theorem, find
 $L^{-1} \left\{ \frac{s}{(s^2 + 16)^2} \right\}$

(4)

6. (a) Find the nontrivial solutions of the
 -Liouville problem
 $\frac{d^2y}{dx^2} + \lambda y = 0, \lambda > 0, y(0) = 0, y''(\pi)$
 (b) The equation of heat conduction in a rod
 length l is

$$L^{-1} \left\{ \frac{s}{(s^2 + 16)^2} \right\}$$

$$\frac{\partial^2 V}{\partial x^2} = \frac{1}{k} \frac{\partial V}{\partial t},$$

If $V = V_0 t$ when $t = 0$, and

$$\frac{\partial V}{\partial x} = 0$$

when $x = 0$ and $x = l$ for all values of t (> 0),
 show that

$$V = \frac{1}{2} V_0 t - \frac{4V_0 l^2}{\pi^2} \sum_{n=1}^{\infty} \exp\{-k(2n-1)^2 \pi^2 t / l^2\} \frac{\cos((2n-1)\pi x)}{l}$$

(Continued)

B.Tech-2nd/Mathematics-II (Set-V₁)

(5)

(a) Using Laplace transform, solve

$$y''' + 2y'' - y' - 2y = 0, y(0) = 1, y'(0) = 2, \\ y''(0) = 2.$$

(b) A taut string of length l has its ends $x = 0$, $x = l$ fixed. The point where $x = \frac{1}{3} l$ is drawn aside a small distance h and released at time $t = 0$. At any subsequent time $t > 0$, the displacement $y(x, t)$ of the string satisfies the one dimensional wave equation

$$\frac{\partial^2 y}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 y}{\partial t^2}.$$

Determine $y(x, t)$ at any time $t > 0$.

8. Write short notes on any two :

5 × 2

(i) Integrating factor and find integrating factor of

$$(\cos^2 y - \cos^2 x) dy + \cos y \sin 2x dx = 0.$$

(ii) Indicial equation and find the zeros of the indicial equation of

$$x^2 y'' + x y' + (x^2 - 1)y = 0.$$

(Turn Over)

(6)

ages-5

- (iii) Dirac δ -function and find the Laplace transform of Dirac δ -function.
(iv) D'Alembert's solution for the one dimensional wave equation (derive this).

B.Tech/1st/All Sections
Programming and Data Structure

Full Marks : 70

Time : 3 hours

Answer any six questions including Q. No. 1 which is compulsory

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

(a) What is circular queue?

(b) Convert into postfix expression.

$A + (C * D(E/F)) - G \neq K$

(c) What is the output?

```
main()
{
    int x = 0;
    printf("%d%d%d", x, ++x,
           x++, ++x);
```

(Turn Over)

(2)

(d) Write the output

int x = 15, y = 20;

main()

{ void disp(int*, int); $x = 3, y = 20$ }

disp(&x,y); $x = 3$

printf("x = %d y = %d", x, y);

}

void disp(int *a, int b)

{ int *x = a;

*x /5; $x = 1$

b /8;

printf("x = %d b = %d", *x, b);

}

✓ (e) int a[] = { 10, 20, 30 };

int *p[] = { a, a + 1, a + 2 };

printf("%u%u%u", p, *p, *(p));

Determine the output.

(f) What is function prototype ?

(3)

What is the size of structure xy?

struct xy {

```
    int p : 15;  
    int q : 4;  
    int r : 9;
```

Determine the output

```
main()  
{  
    int disp(float, float);  
    int p;  
    float x = 2, y = 3;  
    p = disp(disp(x, y), disp(x, y));  
    printf("p = %d", p);  
  
    int disp(float p, float q)  
    {  
        return(p*q);  
    }  
}
```

px2

px9

- (i) What is enumerated data type? (dr)
(j) Define time and space complexity of an algorithm.

(4)

- 1. ~~(a)~~ Explain and differentiate between call by value and call by reference with examples. 5
- ~~(b)~~ How the functions are classified in C language. Discuss with suitable examples. 5
- 2. ~~(a)~~ Write a program in C to check whether a given number is Armstrong number. 5
- ~~(b)~~ Write a program in C to sort the elements of an array in descending order. 5
- 3. ~~(a)~~ Define dequeue. Write an algorithm for the implementation of a dequeue. 5
- ~~(b)~~ Write algorithms for push and pop operations for stack. 5
- 4. ~~(a)~~ Write a program in C to check a given number is palindrome or not. 5
- ~~(b)~~ Explain recursion. Write a program to calculate sum of digits of a number using recursion. 5

(5)

What are the modes of a file can be opened?

Write a program in C to merge two files into another file.

5

Create a structure to specify data on students given below :

5

roll number, name, department, course, year of joining.

(i) Create a function to print name of all students who joined in a particular year.

5

(ii) Create a function to print data of a student whose roll number is given.

(iii) Explain typedef vs. enumerated data type with example.

5

(iv) Write a program in C to display prime numbers between 1 to 100.

5

(v) Write a program in C to add two matrices and display the resultant matrix.

5

(vi) What is storage class? Differentiate static variable vs. automatic variable.

5