



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Q.2.

(a) Evaluate the limit $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 4} - 2}{x}$. (07)

(b) Evaluate the limit $\lim_{x \rightarrow +\infty} (\sqrt{x^2 - 3x} - x)$. (07)

(c) Find the limit $\lim_{h \rightarrow 0} \frac{\sin h}{1 - \cos h}$. (06)

Q.3.

(a) Let $f(x) = \cos^3\left(\frac{x}{x+1}\right)$. Find $f'(x)$. (06)

(b) Given $x \cos y = y$. Find $\frac{d^2y}{dx^2}$ by implicit differentiation. (07)

(c) Let $y = \sqrt{\frac{x-1}{x+1}}$. Find $\frac{dy}{dx}$ using logarithmic differentiation. (07)

Q.4.

(a) Let $y = \cot^{-1}(\sqrt{x})$. Find $\frac{dy}{dx}$. (06)

(b) Use an appropriate local linear approximation to estimate the value of $\ln(1.01)$. (07)

(c) Use L'Hôpital's Rule to find the limit $\lim_{x \rightarrow +\infty} [\cos(2/x)]^{x^2}$. (07)

Q.5.

(a) Find: (i) the intervals on which $f(x) = \frac{x-2}{(x^2-x+1)^2}$ is increasing, (ii) the intervals on which f is decreasing, (iii) the open intervals on which f is concave up, (iv) the open intervals on which f is concave down, and (v) the x -coordinates of all inflection points. (12)

(b) Use any method to find the relative extrema of the function $f(x) = \frac{x^2}{x^4+16}$. (08)

Q.6.

(a) Evaluate the integral $\int_1^3 \sqrt{x} \tan^{-1} \sqrt{x} dx$. (07)

(b) Evaluate the integral $\int \tan^4 \theta \sec^4 \theta d\theta$. (06)

(c) Evaluate the integral $\int_1^3 \frac{dx}{x^4 \sqrt{x^2+3}}$. (07)

Q.7.

(a) Solve the initial-value problem $y'' - 6y' + 13y = 0$; $y(0) = -1$, $y'(0) = 1$. (07)

(b) Express the equation $x^2 + y^2 + 6y = 0$ in polar coordinates. (06)

(c) Find an equation for the ellipse that has foci $(\pm 1, 0)$ and $b = \sqrt{2}$. (07)



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Subject: Calculus I

Paper: 1

Time: 30 Min. Marks: 20

Roll No. in Fig.

Roll No. in Words.

This Paper will be collected back after expiry of time limit mentioned above, then Subjective paper shall be attempted.

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Signature of Supdt.

Q.1. Encircle the correct answer; cutting and overwriting is not allowed. (10x2=20)

(i) If $e^x = \frac{1}{2}$, then $x =$

(a) 2

(c) $-\ln 2$

(b) $\ln 2$

(d) 0.5

(ii) The values of x at which $f(x) = \frac{x^2-16}{x^2-5x+4}$ is discontinuous

(a) $x = 1, 4$

(c) $x = -1, -4$

(b) $x = 1$

(d) $x = -1$

(iii) The slope of the tangent line to the curve $y = x^2 + 4x + 7$ at $x = 1$ is

(a) 2

(c) 5

(b) 4

(d) 6

(iv) Let $f(x) = \ln(\sin x)$. $f'(x) =$

(a) $\tan x$

(c) $\csc x$

(b) $\cot x$

(d) $\sec x$

(v) If $y = \cos^{-1} x$, then $\frac{dy}{dx} =$

(a) $\frac{1}{\sqrt{1-x^2}}$

(c) $\frac{-1}{\sqrt{x^2-1}}$

(b) $\frac{-1}{\sqrt{1-x^2}}$

(d) $\frac{1}{\sqrt{x^2-1}}$

(vi) The critical points of $f(x) = x^3 - 3x^2 - 9x$ are

(a) $x = 1, 3$

(c) $x = -1, 3$

(b) $x = 1, -3$

(d) $x = -1, -3$

(vii) Consider $f(x) = \sin x$. $f(x)$ is concave up on

(a) $(0, 2\pi)$

(c) $(0, \pi)$

(b) $(-\pi, \pi)$

(d) $(\pi, 2\pi)$

(viii) $\int \frac{x}{x^2-2} dx =$

(a) $\ln(x^2-2)$

(c) $\sin^{-1} x$

(b) $\frac{1}{2} \ln(x^2-2)$

(d) $\sec^{-1} x$

(ix) An integrating factor for $\frac{dy}{dx} + \frac{y}{x} = q(x)$ is

(a) x

(c) e^x

(b) $\ln x$

(d) x^2

(x) The directrix of the parabola $y^2 = 16x$ has equation

(a) $y = 4$

(c) $x = 4$

(b) $y = -4$

(d) $x = -4$



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Subject: Calculus II

Paper: 2

Time: 30 Min. Marks: 20

Roll No. in Fig.

Roll No. in Words.

This Paper will be collected back after expiry of time limit mentioned above, then Subjective paper shall be attempted.

Signature of Supdt.

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Q.1. Encircle the correct answer; cutting and overwriting is not allowed. (10x2=20)

- (i) The center of the sphere $x^2 + y^2 + z^2 + 4x - 2y + 8z = 1$ is
 (a) $(-2, 1, -4)$ (b) $(2, -1, 4)$
 (c) $(2, 1, 4)$ (d) $(2, -1, -4)$
- (ii) If $\vec{v} = \langle 3, -1, 7 \rangle$ and $\vec{w} = \langle -2, 1, -3 \rangle$ then $\|\vec{v} + \vec{w}\|$
 (a) 3 (b) 4
 (c) $\sqrt{17}$ (d) $\sqrt{20}$
- (iii) $\hat{k} \times (\hat{i} + \hat{j} + \hat{k}) =$
 (a) $-\hat{i} - \hat{j}$ (b) $\hat{i} + \hat{j}$
 (c) $\hat{i} - \hat{j}$ (d) $-\hat{i} + \hat{j}$
- (iv) The line $L : x = -2 + t, y = 3 + 2t, z = 4 - t$ intersects the xy -plane at
 (a) $(1, 2, 0)$ (b) $(2, 11, 0)$
 (c) $(2, 8, 0)$ (d) $(5, 2, 0)$
- (v) The acute angle of intersection of the planes $x + y - 2z = 5$ and $3y - 4z = 6$ is
 (a) 20° (b) 26°
 (c) 29° (d) 33°
- (vi) The surface $x^2 - y^2 - z^2 = 6$ is identified as
 (a) Elliptic Cone (b) Hyperboloid of One Sheet
 (c) Hyperboloid of Two Sheet (d) Elliptical Paraboloid
- (vii) The rectangular coordinates of the point whose spherical coordinates are $(2, \frac{3\pi}{2}, \frac{\pi}{2})$ are
 (a) $(0, 2, 0)$ (b) $(0, 0, 2)$
 (c) $(-2, 0, 0)$ (d) $(0, -2, 0)$
- (viii) Let $f(x, y) = xy + 3$. $f(x + y, x - y) =$
 (a) $x^2 - y^2 + 3$ (b) $2x + 3$
 (c) $x^2 - y^2$ (d) $2x - 2y + 3$
- (ix) Let $f(x, y) = \frac{x+y}{x-y}$
 (a) $\frac{-2y}{(x-y)^2}$ (b) $\frac{-2x}{(x-y)^2}$
 (c) $\frac{2x}{(x-y)^2}$ (d) $\frac{2y}{(x-y)^2}$
- (x) $\int_{\frac{1}{2}}^1 \int_{x^2}^x \sqrt{\frac{x}{y}} dy dx =$
 (a) $\frac{2\sqrt{2}-1}{10}$ (b) $\frac{\sqrt{2}-1}{20}$
 (c) $\frac{2\sqrt{2}-1}{20}$ (d) $\frac{1-2\sqrt{2}}{20}$



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Roll No.

Time: 2 Hrs. 30 Min. Marks: 80

Subject: Calculus II

Paper: 2

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: Attempt any **FOUR** questions. All questions carry equal marks.

- Q.2.**
- (a) Find an equation of the sphere that is inscribed in the cube that is centered at the point $(-2, 1, 3)$ and has sides of length 1 that are parallel to the coordinate planes. (06)
- (b) Show that the lines $L_1 : x + 1 = 4t, y - 3 = t, z - 1 = 0$ and $L_2 : x + 13 = 12t, y - 1 = 6t, z - 2 = 3t$ intersect, and find their point of intersection. (07)
- (c) Find an equation of the plane through the points $P_1(-2, 1, 4)$ and $P_2(1, 0, 3)$ that is perpendicular to the plane $4x - y + 3z = 2$. (07)
- Q.3.**
- (a) Find parametric equations of the line that contains the point $P(0, 2, 1)$ and intersects the line $L : x = 2t, y = 1 - t, z = 2 + t$ at a right angle. (08)
- (b) Find parametric equations of the line tangent to the graph of $\vec{r}(t) = t^2\hat{i} + (2 - \ln t)\hat{j}$ at the point where $t = 1$. (06)
- (c) $\vec{r}(t) = (t^2 - 1)\hat{i} + t\hat{j}$. Find $\vec{T}(t)$ and $\vec{N}(t)$ at the point $t = 1$. (06)
- Q.4.**
- (a) $x^2 + z \sin(xyz) = 0$. Calculate $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ using implicit differentiation. Leave your answer in terms of $x, y,$ and z . (06)
- (b) Find the local linear approximation L to the function $f(x, y) = x \sin y$ at the point $P(0, 0)$. Compare the error in approximating f by L at the point $Q(0.003, 0.004)$ with the distance between P and Q . (07)
- (c) Let $u = rs^2 \ln t, r = x^2, s = 4y + 1, t = xy^3$. Use appropriate forms of the chain rule to find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$. (07)
- Q.5.**
- (a) Find a unit vector in the direction in which $f(x, y) = \sqrt{x^2 + y^2}$ increases most rapidly at $P(4, -3)$, and find the rate of change of f at P in that direction. (06)
- (b) Find an equation for the tangent plane and parametric equations for the normal line to the surface $x^2y - 4z^2 = -7$ at the point $P(-3, 1, -2)$. (06)
- (c) Find the absolute extrema of the function $f(x, y) = xy - x - 3y$ on the closed and bounded set R that is the triangular region with vertices $(0, 0)$ and $(0, 4)$, and $(5, 0)$. (08)
- Q.6.**
- (a) Use double integration to find the volume of the solid bounded by the cylinder $x^2 + y^2 = 9$ and the planes $z = 0$ and $z = 3 - x$. (07)
- (b) Evaluate the iterated integral by converting to polar coordinates $\int_0^1 \int_0^{\sqrt{1-x^2}} (x^2 + y^2) dy dx$. (06)
- (c) Express the area of surface that is portion of the paraboloid $z = 1 - x^2 - y^2$ that is above the xy -plane as an iterated double integral in polar coordinates, and then find the surface area. (07)
- Q.7.**
- (a) Evaluate the line integral $\int_C (x + 2y) dx + (x - y) dy$ along the curve $C : x = 2 \cos t, y = 4 \sin t$ ($0 \leq t \leq \pi/4$). (07)
- (b) Let $f(x, y, z) = (x^2 + y^2)z$; σ is the portion of the sphere $x^2 + y^2 + z^2 = 4$ above the plane $z = 1$. Evaluate the surface integral $\iint_{\sigma} f(x, y, z) dS$. (07)
- (c) Use the Divergence Theorem to find the flux of $\vec{F}(x, y, z) = x^3\hat{i} - x^3\hat{j} + y^3\hat{k}$ across the surface σ which is the sphere $x^2 + y^2 + z^2 = a^2$ with outward orientation. (06)


```

        k = ++C[i++];
        cout << k << endl;
    }
    cout << endl;
    return 0;
}

```

- A) 1 times C) 5 times
 B) 3 times D) 2 times

4. How many times for loop in the following program will execute?

```

#include<iostream>
using namespace std;
int main()
{
    int i = 4;
    for (; i >= 1 ; )
        cout<<"SE-F19";
    return 0;
}

```

- A) 2 C) 0
 B) 4 D) Infinite number of times

5. Suppose you have an array: `int arr2D[4][2] = { 22,3,11,2 }`; What will be the output of `cout << arr2D[1][0];`

- A) 2 C) 22
 B) 0 D) 11

6. What will be the output of the following program?

```

#include <iostream>
using namespace std;
int main()
{
    int arrA[2][4] = {1,2,3,4,1,2,3,4};
    int i = 0;
    cout << arrA[i++][i];
}

```

- A) 2 C) 3
 B) 1 D) 4

7. What will be the output of the following program?

```

#include <iostream>
using namespace std;
int main()
{
    int arrA[2][2] = {1,2,3,4};
    int i = 0;
}

```



```

arrA[i++][++i]++;
cout << arrA[1][1];
cout << " ";
cout << arrA[0][1];
}

```

A) 4 2

C) 5 2

B) 4 3

D) 5 3

8. What will be the output of the following program?

```

#include <iostream>
using namespace std;
int main()
{
    int a[2] = { 2 , 3}, * p, * q;
    p = a;
    q = ++p;
    *p++;
    (*q)++;
    cout << a[0]<<" , "<<a[1];
    return 0;
}

```

A) 3,4

C) 3,3

B) 2,4

D) 2,3

9. What will be the value of *p1 at the end of the following program ?

```

#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main()
{
    int* p1; int x = 3;
    int y = ++x;
    p1 = &x;
    return 0;
}

```

A) 3

C) 2

B) 4

D) 4

10. What will be the value of l in the last iteration of for loop in the following code?

```

#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main()
{
    int arr[15] = { 2,1,11,2,3,5,6,2,11,0 }; int l = 0;
    for (int j = 0; j < 6; j++)
    {
        l = arr[j]++;
        cout << l<<" " <<j;
    }
    return 0;
}

```

A) 5

B) 11

C) 12

D) 1



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Roll No.

Subject: Programming Fundamentals

Paper: 3-N

Time: 2 Hrs. 30 Min. Marks: 55

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Specify output of the following:

(5x3=15)

[Part A]

```
#include <iostream>
using namespace std;
int arr1[] = {45, 0, 1, 22, 13};
int arr2[] = {12, 0, 1, 1, 20};
int i, res = 0;
int main()
{
    for (i = 0; i < 5; i++) {
        res += arr1[i];
    }
    for (i = 0; i < 4; i++) {
        res += arr2[i];
    }
    cout << res;
    return 0;
}
```

[Part B]

```
#include <iostream>
using namespace std;
void showVal(int, int);
int main()
{
    int a=0,b=0;
    showVal(a,b);
    return 1;
}
void showVal(int a, int b)
{
    a=( b=75 ) + 9;
    cout << a << " " << b;
}
```

[Part C]

```
#include <iostream>
using namespace std;
int main ()
{
    //Assume any value for the addresses involved in this code and specify your assumption
    //clearly as a comment or side note

    int x; int y;
    int *p = &x; int *q = &y;
    *p=5; *q=10;
    cout << x << " " << y << endl;
    cout << p << " " << q << endl;
    cout << *p << " " << *q << endl;
    cout << &x << " " << &y << endl;
    return 1;
}
```

[Part D]

```
#include <iostream>
using namespace std;
void main ()
{
    print (1000);
}
void print (int n)
{
    if (n > 4000)
        return;
    cout << n;
    print (2*n);
}
```

[Part E]

```
#include <iostream>
using namespace std;
int main()
{
    int arr[5], sum = 0;
    cout << "Please enter 5 numbers: ";
    for (int j = 0; j < 5; ++j)
    {
        cin >> arr[j];
        sum += arr[j];
    }
    cout << "Sum of array = " << sum << endl;
    return 0;
}
```


[5 marks] Question 3:

Write a prototype of a function named *takeInput* that takes a one-dimensional integer array as a parameter and does not return anything.

[5 marks] Question 4:

Point out the errors in the following:

```
#include <iostream>
using namespace std;
void change_val();
int modify_val();
int y;
int main()
{
    int y=0, z;
    y=10;
    y++;
    change_val (y);
    y++
    modify_val();
    cout << y ;
    return 1;
}
void change_val ()
{
    return 22;
}
int modify_val ()
{
    return 1;
}
```

[10 marks] Question 5:

You are required to design a Calculator. Take two numbers a and b as an input from the user. You need to implement the following functions:

1. double Add(double a, double b); $a+b$ (1)
2. double Subtract(double a, double b); $a-b$ (1)
3. double Divide(double a, double b); a/b (1)
4. double Multiply(double a, double b); $a*b$ (1)
5. double takeSin(double a); $\sin(a)$ (2)
6. double takecos(double a); $\cos(a)$ (2)
7. double taketan(double a); $\tan(a)$ (2)

Take input of two numbers in main() and then ask the user which function he wants to call. Then call the respective functions E.g. if the user enters 3 then divide function will be called. Keep running the logic till the user enters a character other than 'y'. You can take input from the user in character for this purpose. You might need to include relevant c++ libraries to deal with mathematical functions.

[10 marks] Question 6:

Write a program that implements a function `swapR(int&,int&)`. This function should take input parameters by reference (i.e. swapped values should be reflected in original variables declared in `main()` before function call. Don't create local variables in `swapR`. The function should not print anything. Value of two variables before and after calling `swapR` should be displayed in `main()`. Moreover, your logic should not make use of any extra variable while swapping values. Your whole program should have only two variables declared (that will be swapped). Use of any extra variable will result in ZERO marks.

[10 marks] Question 7:

Write a function that prints the following pattern on the screen. Use nested loops to design the pattern.

```
    1
   A B
  2 3 4
 C D E F
5 6 7 8 9
```

Hint: To print alphabets, you can use ASCII values of upper case alphabets to start with the loop.



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Subject: Digital Logic Design

Paper: 4-N

Time: 30 Min. Marks: 15

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

This Paper will be collected back after expiry of time limit mentioned above, then Subjective paper shall be attempted.

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Q.1. Encircle the right answer cutting and overwriting is not allowed. (15x1=15)

- The code where all successive numbers differ from their preceding number by single bit is
A) Binary code B) Gray C) Excess - 3 D) BCD
- The binary code for 59 using 84-2-1 code is:
A) 010100011 B) 01101111 C) 10111111 D) 10110011
- Which of the following is a universal logic gate?
A) OR B) AND C) XOR D) NAND
- The smallest 4-bit number written in signed 1's complement notation is:
A) -15 B) -16 C) -7 D) -8
- Which of the following codes is not a self-complementing code?
A) Excess-3 Code B) 84-2-1 C) 2421 D) BCD
- The Boolean expression $A'B + AB' + AB$ is equivalent to
A) $A'+B$ B) $A+B'$ C) $A+B$ D) $A'+B'$
- The Boolean expression $XY + X'Y + Y'Z$ is independent of the variable:
A) X B) Y C) Z D. None of the given
- The consensus term for an expression $X'Y + XZ'$ is:
A) $X'Y$ B) XZ' C) YZ' D) $X'YZ'$
- Sum of all minterms for a function $F(A,B,C)$ evaluates to _____.
A) 0 B) 1 C) $A+B+C$ D) ABC
- NAND gate output will be 0, if two inputs are
A) 00 B) 01 C) 10 D) 11
- A 32x1 multiplexer has _____ selection lines.
A) 3 B) 5 C) 8 D) 32
- A Boolean function $F(A,B) = A'B + AB'$ can be written as:
A) $\sum(1,2)$ B) $A \oplus B$ C) $\prod(0,2)$ D) All of the given
- Demultiplexer is also called
A) Data selector B) Data shuffler C) Data distributor D) Data encoder
- A full adder logic circuit has:
A) Two inputs and one output C) Three inputs and three outputs
B) Two inputs and two outputs D) Three inputs and two outputs
- The inputs $J = 1, K = 0$ for JK-flip flop will result in the following output after a clock pulse:
A) 0 B) 1 C) No change D) Unpredictable



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: Attempt any FOUR questions. All questions carry equal marks.

Question # 2

(3 each)

- a) If (135)x / (17)8 = (101)2, then find x.
b) Let A = 110101 and B = 111010, perform A-B using 2's complement.
c) Simplify the expression A'B'C + (AB)' + BC' using identities and theorems of Boolean algebra.
d) Write the equation for A<B to compare two 3-bit numbers A2A1A0 and B2B1B0
e) Draw the logic circuit diagram of half adder.

Question # 3

- a) Show the construction of a combinational circuit that increments a 4-bit number using four half adders. (5)
b) Design a digital circuit that accepts 3-bit number (A, B, C) at its input and produces the output M, such that M=1, iff majority of the inputs are 1. (10)

Question # 4

- a) Obtain the simplified expression in SOP form for the following function using K-Map (7)
F(A,B,C,D) = (A + B + D).(A' + C + D).(A' + B + C).(C' + D')
d(A,B,C,D) = Π(2, 5, 14)
b) Specify the truth table, output functions (in simplified form) and draw the logic circuit diagram of a 3 x 2 priority encoder. The inputs of the encoder are D2D1D0 and the input with the lowest subscript is given the highest priority. The output will be 11 if all the inputs are 0. (8)

Question # 5

- a) An 8 x 1 MUX has inputs A, B, C connected to selection inputs S2, S1, S0 respectively. The data input I0 through I7 are: I0 = I4 = 0. I5 = I6 = I7 = 1. I1 = I2 = D. I3 = D'. Determine which Boolean function the given MUX implements. (7)
b) Draw the logic circuit diagram of JK flip flop. Also draw characteristic table, excitation table and derive characteristic equation for JK flip flop. (8)

Question # 6

(15)

Design a 3-bit synchronous counter using T flip flops, whose counting sequence is controlled by a control input x, such that:

- if x = 0: 0 -> 1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 7 -> Repeat (Up Counter)
if x = 1: 0 -> 3 -> 5 -> 2 -> 7 -> 1 -> Repeat



UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Roll No.

Subject: Electricity and Magnetism & Basic Electronics

Paper: 5-N

Time: 2 Hrs. 30 Min. Marks:80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: Attempt TWO questions from each Section. All questions carry equal marks.

Section – I ELECTRICITY AND MAGNETISM

Question No. 2:

(10+5+5=20)

- (a) What is electric field? Find the electric field due to a hollow charged spherical shell having charge q and radius R at both inside and outside points.
- (b) Briefly explain scalar product and vector product.
- (c) Calculate the total electric potential V at the center of a square having four charges fixed at its four corners. The length of each side is 2.3m and the charges are
 $q_1 = -12nC$, $q_3 = +31nC$,
 $q_2 = -24nC$, $q_4 = +17nC$.

Question No. 3:

(10+5+5=20)

- (a) Explain the heat engine. What is an ideal engine, state the mechanism of Carnot Engine in details?
- (b) How can we relate the entropy and second law of thermodynamics.
- (c) A uniform magnetic field B of magnitude 1.2nT is directed vertically upward throughout the volume of a laboratory chamber. A proton with K.E 5.3MeV enters the chamber moving horizontally from south to north. What magnetic force acts on proton as it enters the chamber? (mass of proton $m_p = 1.67 \times 10^{-27}kg$).

Question No. 4:

(10+5+5=20)

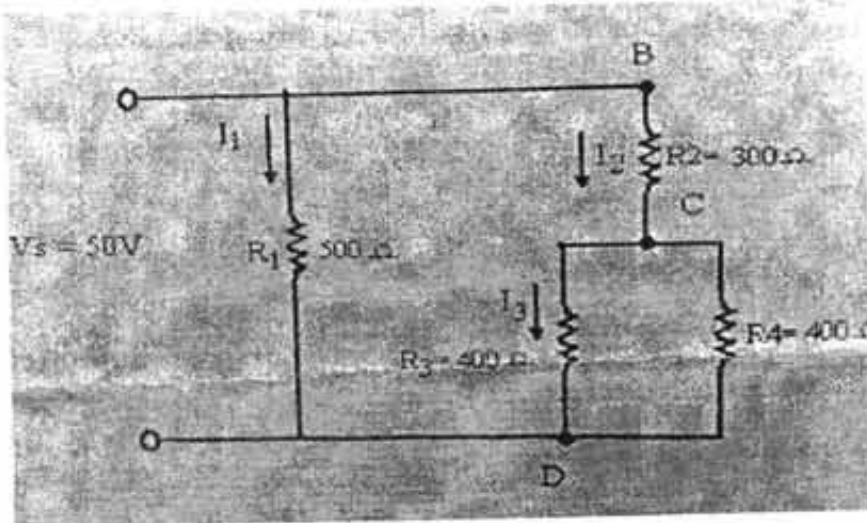
- (a) What do you know about capacitor? Define capacitance, develop an expression for capacitance of a parallel plate capacitor.
- (b) Can we derive Coulomb's Law from Gauss's law.
- (c) a storage capacitor on a random-access memory (RAM) chip has a capacitance of 55pF. If the capacitor is charged to 5.3V, what is the charge on plates how many access electrons are on negative plate?

Section – II BASIC ELECTRONICS

Question no 5:

(10+10)

- (a) What are the voltage dividers.
- (b) Work out the values for R_T , I_T and current through the first resistor in the circuit given below, source voltage is 50V. ($R_1=500$ ohms, $R_2=300$ ohms, $R_3=R_4=400$ ohms)

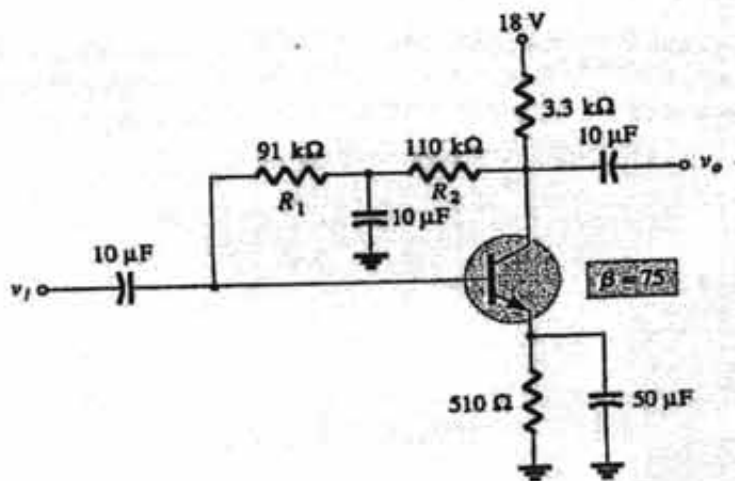


Question no 6:

(10+10)

a) What is transistor biasing? Draw the circuit diagrams for proper biasing of common base transistor.

(b) Determine the dc level of I_C for the given network.



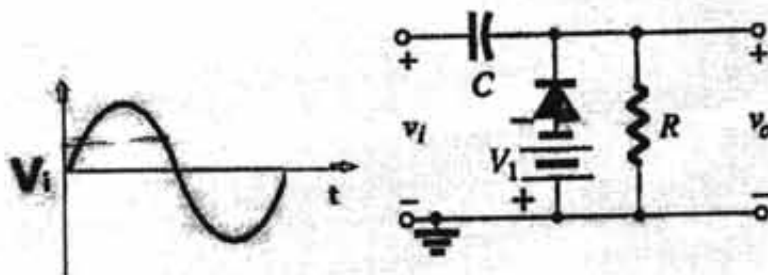
Question no 7:

(10+10)

a) What is a pn-junction diode, how it is forward and reverse biased, explain both mathematically, graphically and with circuits.

b) Calculate and sketch the output V_o for the input shown ($V_1 = 3V$, $R = 80k\Omega$, $C = 1\mu F$).

$V_{in(max)} = 10V$





UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual-2022

Subject: Electricity and Magnetism & Basic Electronics

Paper: 5-N

Time: 30 Min. Marks: 20

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

This Paper will be collected back after expiry of time limit mentioned above, then Subjective paper shall be attempted.

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x2=20)

- Which of the following is a thermodynamics law?
 - Zeroth law of thermodynamics
 - Faraday's Law of thermodynamics
 - Ideal Gas Law of thermodynamics
 - Boyle's Law of thermodynamics
- If a body X is in thermal equilibrium with body Z, and a body Y is in thermal equilibrium with body Z. Then X and Y are in ---with each other?
 - Non equilibrium.
 - Equilibrium.
 - More Information Required.
 - None of these.
- Angle between two vectors A and B can be determined by
 - their dot product
 - their cross product
 - head to tail rule
 - none
- A field in which the work done in a moving a body along closed path is non zero is called
 - Electric field
 - Non Conservative field
 - Gravitational field
 - Conservative
- If current in a conductor decreases then according to Lenz's law self-induced voltage will?
 - Aid the increasing current.
 - Tend to decrease the amount of current.
 - Produce current opposite to the increasing current.
 - Aid the applied voltage
- What is the total resistance of twelve 6.8kilo ohms resistors in parallel?
 - 5.66 ohms
 - 566 kilo ohms
 - 566.6 ohms
 - 0.566 ohms
- Which law of conservation best explains and justify the direction of induced Electromotive force (EMF) in a circuit?
 - Mass.
 - Charge.
 - Energy.
 - Momentum.
- A 6 nano -coulomb point charge (a) is located at a distance d away from a 8 micro-coulomb point charge(b). What would be the ratio of F_{ab} / F_{ba} ?
 - 1
 - $\frac{1}{2}$
 - 18
 - 2
- A cylindrical wire of length l moving in magnetic field B with velocity v, the induced emf does not depend on
 - Length.
 - Field B.
 - Velocity.
 - Diameter.
- In order to switch on a diode in series configuration, the applied voltage must be
 - Greater than 1V
 - Less than 1V
 - Greater than knee voltage
 - Less than knee voltage