| **Semester** | **Course Code** | **Course Title** |
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| Autumn 2024-25 | IT161 | Computer Programming and Problem Solving |

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| As.No. | 1 |
| Assessment Title. | Operators and Selection Statements |
| Date of Submission | 27-Sept-2024 |

| **Format/Frame Work** | |
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| **Question** | Professor will give it. |
| **Flowchart** | Image from your notebook |
| **Program** | Should be typed content,  It may be program, syntax, or theory.  Screen Shorts are not acceptable.  **Note:** Student name should be specified in given content (i.e., Include your Roll-number and name in comment) |
| **Output:** | Probably Typed or copy-past content of your program output. If it is difficult, then put output-screen shorts.  NOTE: Include your name in the comment. |
| **Your Observation** |  |

Assignment Programs on Operators

1. Write a program of your choice that illustrates the concept of operators.
2. Program to shift input data two bits to the left.
3. Write a C program to swap two numbers using bitwise operators.
4. Write a C program to find the size of data types using miscellaneous operators.

Assignments Programs on Selection Statements

1. C program to check whether a number is positive, negative, or zero.
2. Write a program to find the roots of a quadratic equation using if and switch.
3. Write a program to find the largest of three numbers using the ternary operator.
4. C program to check whether a character is a vowel or consonant.
5. C program to check whether a character is an alphabet or not.
6. C program to enter a week number and print the corresponding day of the week.
7. C program to check whether a given number is EVEN or ODD using the ternary operator.
8. Write a program to check whether a given number is even or odd, and also determine its sign (positive or negative) using conditional statements like if and switch.
9. Write a C program to read marks for a minimum of 6 subjects, calculate the total marks and average, and assign a grade based on the average using the following criteria: 90 and above: Grade A, 75 to 89: Grade B, 60 to 74: Grade C, 45 to 59: Grade D, 35 to 44: Just pass (Grade P), below 35: Grade F. Use the switch statement to implement the grade assignment.

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| **Question 1** | Write a program of your choice that illustrates the concept of operators |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  // Name : Rajveer Chaudhari  //Roll no: 24  int main(){  int a ,b ,c;  printf("Enter Value of Two Numbers\n");  scanf("%d %d",&a,&b);  // Arithmetic operators  printf("Arithmetic Operators:\n");  printf("sum = %d\n", a + b);  printf("Subtraction = %d\n", a - b);  printf("Multiplication = %d\n", a \* b);  printf("Division = %d\n", a / b);  printf("Modulo Division = %d\n", a % b);  // Logical operators  printf("\nLogical Operators:\n");  printf("(a > b) && (a < 20) = %d\n", (a > b) && (a < 20)); // Logical AND  printf("(a > b) || (b < 2) = %d\n", (a > b) || (b < 2)); // Logical OR  printf("!(a == b) = %d\n", !(a == b)); // Logical NOT  // Relational operators  printf("\nRelational Operators:\n");  printf("a == b = %d\n", a == b);  printf("a != b = %d\n", a != b);  printf("a > b = %d\n", a > b);  printf("a < b = %d\n", a < b);  printf("a >= b = %d\n", a >= b);  printf("a <= b = %d\n", a <= b);  // Assignment operators  printf("\nAssignment Operators:\n");  c = a;  printf("c = a: c = %d\n", c);  c += b;  printf("c += b: c = %d\n", c);  c -= b;  printf("c -= b: c = %d\n", c);  c \*= b;  printf("c \*= b: c = %d\n", c);  c /= b;  printf("c /= b: c = %d\n", c);  // Bitwise operators  printf("\nBitwise Operators:\n");  printf("a & b = %d\n", a & b); // Bitwise AND  printf("a | b = %d\n", a | b); // Bitwise OR  printf("a ^ b = %d\n", a ^ b); // Bitwise XOR  printf("~a = %d\n", ~a); // Bitwise NOT  printf("a << 1 = %d\n", a << 1); // Left shift  printf("a >> 1 = %d\n", a >> 1); // Right shift    return 0;  } |
| **Output:** |  |
| **Your Observation** | printf() : Used to display text content on screen  scanf() : Used to take input for variables  ‘+’ : Operator used for addition of numbers  ‘-’ : Operator used for subtraction of numbers  ‘\*’ : Operator used for Multiplication of numbers  ‘/’ : Operator used for Division of numbers  ‘%’ : Operator used for Modulo Division of numbers  ‘&&’ : Used to do AND operation between two conditions  ‘||’ : Used to do OR operation between two conditions  ‘>’ : Greater than condition  ‘<’ : Less than condition  ‘==’ : Used to check equality of both sides  ‘!=’ : Used to check/define that both side are not equal  ‘=’ : To assign any value to a variable  ‘+=’ : Used to add right side value to left side variable  ‘-=’ : Used to subtract right side value from left side variable  ‘\*=’ : Used to Multiply right side value to left side variable  ‘/=’ : Used to divide left side variable by right side value  ‘&’ : Used to do AND operation between two bits  ‘|’ : Used to do OR operation between two bits  ‘^’: Used to do XOR operation between two bits  ‘~’: Used to do NOT operation on a bit  ‘<<’ Used to shift bits of a variable to left side by specified places  ‘>>’ Used to shift bits of a variable to right side by specified places |

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| **Question 2** | Program to shift input data two bits to the left. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){    int a;  printf("Enter Value of Number");  scanf("%d",&a);  printf("After shifting input data two bits to the left the value is now: %d\n",(a<<2));  } |
| **Output:** |  |
| **Your Observation** | ‘<<’ Used to shift bits of a variable to left side by specified places |

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| **Question 3** | Write a C program to swap two numbers using bitwise operators. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){  int a,b;  printf("Enter Two numbers");  scanf("%d %d",&a,&b);  a=a^b;  b=a^b;  a=a^b;  printf("First No = %d, Second No = %d\n",a,b);  } |
| **Output:** |  |
| **Your Observation** | ‘^’: Used to do XOR operation between two bits |

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| **Question 4** | Write a C program to find the size of data types using miscellaneous operators. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll No: 24  void main(){  int i;  float f;  char c;  double d;  long l;    printf("Size of int is %ld\n",sizeof(i));  printf("Size of float is %ld\n",sizeof(f));  printf("Size of char is %ld\n",sizeof(c));  printf("Size of double is %ld\n",sizeof(d));  printf("Size of long is %ld\n",sizeof(l));  } |
| **Output:** |  |
| **Your Observation** | sizeof() : used to get size of a variable in bytes |

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| **Question 5** | C program to check whether a number is positive, negative, or zero. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){    int a;  printf("Enter value of no: \n");  scanf("%d",&a);    if(a>0){printf("Its Positive\n");}  else if(a==0){printf("Its zero\n");}  else{printf("Its Negative\n");}  } |
| **Output:** |  |
| **Your Observation** | if else : Used to execute code based on condition  eg. certain code only runs if certain condition is met |

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| **Question 6** | Write a program to find the roots of a quadratic equation using if and switch. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  #include <math.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){  double a,b,c,D,x,y;    printf("for Format \nax^2 + bx + c = 0\nEnte values of a,b,c\n");  scanf("%lf %lf %lf",&a,&b,&c);    D = (b\*b)-(4\*a\*c);    if(D>=0){  x = (-b + sqrt(D))/(2\*a);  y = (-b - sqrt(D))/(2\*a);  printf("Roots are X=%lf,%lf\n",x,y);  }  else{printf("It don't has any roots\n");}  } |
| **Output:** |  |
| **Your Observation** | math.h : a library for mathematical functions  sqrt() : used to get square root of a number |

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| **Question 7** | Write a program to find the largest of three numbers using the ternary operator. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll No: 24  void main(){  int a,b,c,d;  printf("Enter value of of Three Numbers: \n");  scanf("%d %d %d",&a,&b,&c);    d = (a>b)?a:b;  printf("Biggest number is: %d\n",(c>d)?c:d);  } |
| **Output:** |  |
| **Your Observation** | Ternary operator can be used instead of if else but it has furthermore limitations, better if we use it for simple sorting |

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| **Question 8** | C program to check whether a character is a vowel or consonant. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name:Rajveer Chaudhari  //ROll NO: 24  void main(){  char c;  printf("Enter The alphabet\n");  scanf("%c",&c);    switch(c){  case 'a':  printf("Its a vowle\n");  break;    case 'e':  printf("Its a vowle\n");  break;    case 'i':  printf("Its a vowle\n");  break;    case 'o':  printf("Its a vowle\n");  break;    case 'u':  printf("Its a vowle\n");  break;    default :  printf("Its a Consonant\n");  }      } |
| **Output:** |  |
| **Your Observation** | Switch case function can be used to sort things, it also has a problem if first case of switch function becomes true and we don't use break function it will execute codes from next cases without checking conditions |

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| **Question 9** | C program to check whether a character is an alphabet or not. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){  int a;  char c;  printf("Enter the value\n");  scanf("%c",&c);  a = (int)c;  if(97<=a && a<=122){  printf("Its a alphabet\n");  }  else if(65<=a && a<=90){  printf("Its a alphabet\n");  }    else{  printf("Its not a alphabet\n");  }  } |
| **Output:** |  |
| **Your Observation** |  |

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| **Question 10** | C program to enter a week number and print the corresponding day of the week. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){  int a;  printf("Enter The number\n");  scanf("%d",&a);    switch(a){  case 1:  printf("Sunday\n");  break;    case 2:  printf("Monday\n");  break;    case 3:  printf("Tuesday\n");  break;    case 4:  printf("Wednesday\n");  break;    case 5:  printf("Thursday\n");  break;    case 6:  printf("Friday\n");  break;    case 7:  printf("Saturday\n");  break;    default:  printf("Enter Valid No of day\n");  }  } |
| **Output:** |  |
| **Your Observation** |  |

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| **Question 11** | C program to check whether a given number is EVEN or ODD using the ternary operator. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){    int a;  printf("Enter the no: \n");  scanf("%d",&a);    ((a%2)==0)?(printf("It is Even\n")) : (printf("It is Odd\n"));  } |
| **Output:** |  |
| **Your Observation** |  |

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| **Question 12** | Write a program to check whether a given number is even or odd, and also determine its sign (positive or negative) using conditional statements like if and switch. |
| **Flow chart** |  |
| **Program or Related Content** | #include <stdio.h>  //Name: Rajveer Chaudhari  //Roll NO: 24  void main(){  int a;  printf("Enter a Integer\n");  scanf("%d",&a);    if(a!=0){  if(a%2==0){  printf("It is a even no\n");  }  else{  printf("Its odd no\n");  }    if(a>0){  printf("It is a positive no\n");  }  else if(a<0){  printf("It is a Negative no\n");  }  }  else{printf("Zero is not even or odd nor positive or negative\n");}  } |
| **Output:** |  |
| **Your Observation** |  |

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| **Question 13** | Write a C program to read marks for a minimum of 6 subjects, calculate the total marks and average, and assign a grade based on the average using the following criteria: 90 and above: Grade A, 75 to 89: Grade B, 60 to 74: Grade C, 45 to 59: Grade D, 35 to 44: Just pass (Grade P), below 35: Grade F. Use the switch statement to implement the grade assignment. |
| **Flow chart** |  |
| **Program or Related Content** | #include<stdio.h>  //Name: Rajveer Chaudhari  //Roll No: 24  void main()  {  int a,b, c , d , e, f, g;  printf("Enter the marks of Subject 1:");  scanf("%d", &a);  printf("\nEnter the marks of Subject 2:");  scanf("%d", &b);  printf("\nEnter the marks of Subject 3:");  scanf("%d", &c);  printf("\nEnter the marks of Subject 4:");  scanf("%d", &d);  printf("\nEnter the marks of Subject 5:");  scanf("%d", &e);  printf("\nEnter the marks of Subject 6:");  scanf("%d", &f);  printf("\nThe Total Marks are %d", a+b+c+d+e+f);  g= (a+b+c+d+e+f)/6;  if(g>=90){  g=1;  }    else if(75<=a && a<=89){  g=2;  }    else if (60<=a && a<=74){  g=3;  }    else if (45<=a && a<=59){  g=4;  }    else if (35<=a && a<=44){  g=5;  }    else if (a<=34){  g=6;  }    switch(g){  case 1:  printf("\nThe Grade Scored is A\n");  break;  case 2:  printf("\n The Grade Scored is B\n");  break;    case 3:  printf("\n The Grade Scored is C\n");  break;    case 4:  printf("\n The Grade Scored is D\n");  break;  case 5:  printf("\n The Grade Scored is P(Just Pass)\n");  break;    case 6:  printf("\n The Grade Scored is F\n");  break;  }  } |
| **Output:** |  |
| **Your Observation** |  |