Please note that it is just a sample, things will be modified significantly, but a learned students can solve any relevant paper. Its knowledge and skill that matters.

Its not about Matric, FSc style RATTA GUESS PAPERS.

# MIDTERM EXAMINATION

## Paper: MATH 106 – Computer Programming with Python
**Programme:** BS (Mathematics)

Maximum Marks: 30 Time Allowed: 90 Minutes

Note: Write, before solving the paper, your roll number with signature here: _____

Note: Write neatly and cleanly. Each mark and symbol is meaning full in a source code. So use them carefully. Use indentations while writing computer programs. NO EXTRA TIME --- NO EXTRA SHEET

| | | |
|---|---|---|
| **Q. 1** | What is output of following snippet (tell line-by-line that which output is the result of which statement):<br>`x = "3"`<br>`y = """5"""`<br>`z = x+y`<br>`print(type(z))`<br>`x1 = x*7`<br>`print(type(x1))`<br>`print(x1)`<br>`y += x`<br>`print( "First value=" , x , "Second value=" , y , \`<br>`"Third value=" , x1*2 )`<br>`y1 = int(y)+9.0`<br>`print(type(y1))`<br>`print(y1)`<br>`y2 = y+9`<br>`print(type(y2))`<br>`print(y2)` | 0.5 + 0.5 + 0.5 + 1.5 + 0.5 + 0.5 + 0.5 + 0.5 |
| **Q. 2** | Write a program to find the distance of the point $(8, -2, 4)$ from the plane $8x + 2y + 3z - 9 = 0$.<br>The distance $d$ between a point $(x^*, y^*, z^*)$ and a plane $Ax + By + Cz + D = 0$ is given by,<br>$$d = \frac{\lvert Ax^* + By^* + Cz^* + D \rvert}{\sqrt{A^2 + B^2 + C^2}}$$ | 6 |
| **Q. 3** | A palindrome is a number or a text phrase that reads the same backward as forward. For example, each of the following five-digit integers is a palindrome: 12321, 55555, 45554 and 11611. Write a program that reads in a five-digit integer and determines whether it is a palindrome.<br>Hint: Find the reverse of the given number, then compare the original number with its reverse. If both are same then the number is palindrome. | 5+2 |
| **Q. 4** | An electric power supply company charges 7.74 Rupees per unit (KW/Hour) for the first 100 units of electricity consumed and 10.06 Rupees per unit for the rest of the units (i.e., units after 100) from the consumers. Write a program that asks the user to enter the number of units consumed and finds the electricity charges for the consumed units. | 6 |
| **Q. 5** | Write a program that inputs a year and find whether it is leap year or not.<br>A leap year is the one which is evenly(exactly) divisible by 4. For example, 2016 is a leap year, whereas 2013, 2014, 2015, 2017, 2018, and 2019 are not leap years. | 6 |

# FINAL EXAMINATION

## Paper: MATH 106 – Computer Programming with Python
**Programme:** BS (Mathematics)

Maximum Marks: 50 Time Allowed: 120 Minutes

Note: Write, before solving the paper, your roll number with signature here: _____

Note:

- Write nothing except the roll number and signature on the question paper.
- Submit question paper with your answer sheet.
- Write neatly and cleanly.
- Each mark and symbol is meaning full in a source code. So use them carefully.
- Use indentations while writing computer programs.
- NO EXTRA TIME will be allowed.
- NO EXTRA SHEET will be provided.

<table>
<tr><td><u>Q. 1</u></td><td>Write a program to assign two variables by an assignment statement. Interchange the values and print the result on the screen (without using a third variable).</td><td>2</td></tr>
<tr><td><u>Q. 2</u></td><td>Write a program that asks the annual income of a business from the user and calculate the income tax according to the following formula/rate issued by FBR for the year 2020-21.
<table>
<tr><th>Slab Number</th><th>Slab Range of Taxable Income (in PKR)</th><th>Tax Chargeable (in PKR)</th></tr>
<tr><td>1</td><td>Up to 400,000</td><td>0% of the Income</td></tr>
<tr><td>2</td><td>400,001 to 600,000</td><td>5% of the amount exceeding 400,000</td></tr>
<tr><td>3</td><td>600,001 to 1,200,000</td><td>10,000 + 10% of the amount exceeding 600,000</td></tr>
<tr><td>4</td><td>1,200,001 to 2,400,000</td><td>70,000 + 15% of the amount exceeding 1,200,000</td></tr>
<tr><td>5</td><td>2,400,001 to 3,000,000</td><td>250,000 + 20% of the amount exceeding 2,400,000</td></tr>
<tr><td>6</td><td>3,000,001 to 4,000,000</td><td>370,000 + 25% of the amount exceeding 3,000,000</td></tr>
<tr><td>7</td><td>4,000,001 to 6,000,000</td><td>620,000 + 30% of the amount exceeding 4,000,000</td></tr>
<tr><td>8</td><td>More than 6,000,000</td><td>1,220,000 + 35% of the amount exceeding 6,000,000</td></tr>
</table></td><td>9</td></tr>
<tr><td><u>Q. 3</u></td><td>Write down four ways of creating a count-controlled for loop in Python. Give example of each style.</td><td>8</td></tr>
<tr><td><u>Q. 4</u></td><td>A palindrome is a number or a text phrase that reads the same backward as forward. For example, each of the following integers is a palindrome: 88, 898, 8998, and 57275. Write a program that reads in any integer and determines whether it is a palindrome.</td><td>7</td></tr>
<tr><td><u>Q. 5</u></td><td>A company pays its employees weekly according to their hourly wage up to 40 hours, and 50% more for the additional hours (overtime). Write a program that uses a while statement to receive values of “hourly_rate” and “hours_worked” for an arbitrary number of employees and finds and prints the gross pay for each employee.</td><td>7</td></tr>
<tr><td><u>Q. 6</u></td><td>Explain the difference between break and continue statements.</td><td>2</td></tr>
<tr><td><u>Q. 7</u></td><td>What is the output of the following snippet (assume any 14-digit integer to express a value of id):
<pre>
def cub(q):
    print("The id of the parameter before modification:" , id(q))
    q = q**3
</pre></td><td>3</td></tr>
</table>

| | | |
|---|---|---|
| | print("The id of the parameter after modification:" , id(q))<br>return q<br><br>p = 4<br>print("The value of the argument:" , p)<br>print("The id of the argument:" , id(p))<br>newp = cub(p)<br>print("The received result: " , newp)<br>print("The id of the received result:" , id(newp))<br>print("The id of the argument:" , id(p)) | |
| **Q. 8** | Explain the difference between a ***void function*** and a ***value-returning function***. Also tell how the code structures of these two types of functions differs from each other. | 2 |
| **Q. 9** | What is the output of the following snippet:<br>a=[1,2,3,4,5]<br>print(a[3:0:-1]) | 2 |
| **Q. 10** | What is the output of the following snippet:<br>List = [['a', 'b', 'c'], ['d', 'e' , 'f' ], ['g', 'h', 'i' ]]<br>List.insert(1, [ m , n , o ])<br>for i in List:<br>for j in i:<br>print( j, end=" " )<br>print() | 4 |
| **Q. 11** | What is the output of the following snippet:<br>ML = [ 5, 8, -7.1, 0, 12, 2.5, 3 ]<br>mt = ("bag", 23, -6, 2.4)<br>del mt[1]<br>del mt<br>print(mt)<br>del ML[5]<br>print(ML)<br>del ML[1:4]<br>print(ML)<br>del ML<br>print(ML) | 2 |
| **Q. 12** | Write a simple snippet that creates a one-dimensional **numpy** array of 6 elements and then add a scalar value to each element of the array using broadcasting. | 2 |

# PRACTICAL EXAMINATION

## Paper: MATH 106 – Computer Programming with Python
## Programme: BS (Mathematics)

Maximum Marks: 100 Time Allowed: 120 Minutes

**Q1 (for all students):** Write a Python script to compute the tax chargeable on the ***capital gain*** on selling an immovable property. The tax rate on capital gains on sale of an immovable property is given below:

| S. No. | Amount of gain | Rate |
|---|---|---|
| 1 | Where the gain does not exceed Rs. 5 million | 3.5% |
| 2 | Where the gain exceeds Rs. 5 million but does not exceed Rs. 10 million | 7.5% |
| 3 | Where the gain exceeds Rs. 10 million but does not exceed Rs. 15 million | 10% |
| 4 | Where the gain exceeds Rs. 15 million | 15% |

Moreover, the amount of any gain arising on disposal of an immovable property is computed, for tax purposes, according to the following formula:

| S. No. | Holding Period of Property | Taxable Gain |
|---|---|---|
| 1 | Where the holding period of an immoveable property does not exceed one year | 100% |
| 2 | Where the holding period of an immoveable property exceeds one year but does not exceed two years | 75% |
| 3 | Where the holding period of an immoveable property exceeds two years but does not exceed three years | 50% |
| 4 | Where the holding period of an immoveable property exceeds three years but does not exceed four years | 25% |
| 5 | Where the holding period of an immoveable property exceeds four years | 0% |

To start, the program needs as input from the user: (1) holding period of the immovable property to be sold, (2) Original purchase price, and (3) final selling price. Definitely then gain equals selling price minus purchase price. Find and print the gain and the tax. Make a function to compute the gain tax.
Practically,

| Purchase Price | Selling Price | Gain | Holding years | Gain Tax |
|---|---|---|---|---|
| 2000000 | 3200000 | 1200000 | 3.5 | 21000 |
| 2000000 | 3200000 | 1200000 | 1.2 | 31500 |
| 2000000 | 3200000 | 1200000 | 0.5 | 42000 |
| 2000000 | 3200000 | 1200000 | 4.1 | 0 |

**Q2 (for even roll numbers):** Write a program to approximate the value of cosine of an angle by using the formula:

$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \cdots + (-1)^n \frac{x^{2n}}{2n!} = 1 + \sum_{k=1}^{n} (-1)^k \frac{x^{2k}}{(2n)!}$$

Here $x$ in radians. The program should ask an integer angle in degrees from 0 to 90.
The program should ask and find cosine values for an arbitrary number of degree values. (Not just one value of degree).

Note: Practically,
For number of terms: 7, Angle= 30 degrees. cos( 30 ) = 0.866026
For number of terms: 7, Angle= 45 degrees. cos( 45 ) = 0.707107
For number of terms: 7, Angle= 60 degrees. cos( 60 ) = 0. 500001

**Q3 (for odd roll numbers):** Write a program to approximate the value of $e^x$ by using the formula:

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots + \frac{x^n}{n!} = 1 + \sum_{i=1}^{n} \frac{x^n}{n!}$$

The program should ask and find cosine values for an arbitrary number of degree values. (Not just one value of degree).
Note: Practically,
For number of terms: 8, x= 6. E power x = 341.8
For number of terms: 6, x= 4. E power x = 48.5556