Course No.: __**CS-682**__ Course Title: _____**System Programming**_____ .

Total Marks: __**120**__ Date of Exam:_____**5ᵗʰ July 2021**_____ .

Degree: __**BSCS**__ Semester: ____**7ᵗʰ**____ Section: __**A,B**__ .

Q.No.	1	2	3	4	5	6	7	8	9	10	Marks Obtained / Total Marks	Converted Marks Obtained / Total Marks
Marks Obtained											**/120**	**/ 20**
Total Converted Marks in Words:												
Name of the teacher: Mr Shahid Jamil												
Who taught the course:										**Signature of teacher / Examiner:**		

To be filled by Student

Reg No.:   Name: Semester: Section:

Notes:

1. **By filling out your name and registration number above, you Pledge that: "I affirm that I have not given or received any unauthorized help on this exam/assignment, and that this work is my own."**
2. **Any student found breaching the "Regulations Relating to the Examinations of PMAS-Arid Agriculture University, Rawalpindi", will face severe penalties.**
3. **Any form of Cheating, Unauthorized Help, and/or Plagiarism found in the Answers given below will have severe penalty for the student, ranging from cancellation of paper to suspension from the University rolls for up to 2 years.**

Answer the following questions.

Q.No.1.   **[12 marks]**

Covid-19 created a great panic in whole world. In order to keep track of number of cases in a country make a non-primitive type Country having properties for continent name and total number of active cases. Create dictionary or hash table using C# for storing data of Country where country name is considered as key value. Write down functions for following.

- Add Country (Add country name as key and Country variable as value)
- Add Cases (input country name and number of cases to be added if country exists update number of cases)
- COVID free Countries. Write a function that will return name of those countries whose active cases are 0.

Answer:

Q.No.2   **[12 marks]**

ArrayList is non generic C# collection class. Inherit your own class, named *MyArrayList* from *ArrayList* with following additional functionalities.

- Override Remove method of ArrayList in such a way that last occurrence of value should be removed.
- ArrayList stores object type values you have to write a function that will return list of integer values.
- Write a function that will receive value as argument and return its count (suppose values can be duplicated).

Answer:

Q.No.3   **[12 marks]**

Write a C# code for given scenario.

- *ExaminationData* class that contains three data members *student_id, subjectname and marks.*
- *StudentsData* class contains List of students *(id, name and email).* A Function as follow *void Informfailure   )*.
- *Exam* class contains main function for communication between *ExaminationData* and *StudentsData*

While entering marks in *ExaminationData* if marks are below 40, then call *Informfailure* function inside *StudentdData* class. You are not allowed to declare object of *StudentdsData* in *ExaminationData.*

Hint: You can use delegates

Answer:

Q.No.4   **[12 marks]**

Consider the model below.

1) Student class having properties id and name
2) Course class having properties id and title
3) Registration class having properties sid and cid (sid and cid are id's from Student and Course respectively)

Suppose List of above classes is already populated, now perform following LINQ base queries.

- Display name of all students
- Display name of all courses
- Display id and name of students along with their registered course id and title using Join
- Display id and name of students along with their un-registered course id and title using Join

- Display course name in order by descending

Q.No.5   **[12 marks]**

A bank account is accessed from various users it may be accessed using ATM, Mobile app other banks with in country and outside country. Assume that bank account is accessed by unlimited users. When any user wants access to bank account, its request for lock is send if resource (bank account) is free lock is guaranteed, otherwise user is set to waiting mode.

Suppose that a person A went to Bank A for transferring amount from account1 to accoutn2 and at the same time person B went to Bank B for transferring amount from account 2 to account 1.Transaction at Bank A requested for to lock on account1, resource (account 1) was free and lock was acquired by Transaction at Bank A. At the same time Transaction at Bank B requested for lock on account 2. Account 2 was free and was locked by Transaction at Bank B.

Transaction at Bank A requests to lock account 2 that was already locked by Transaction at Bank B. Transaction at Bank A goes into waiting state similarly Transaction at Bank B request to lock account 1 that was already locked by Transaction at Bank A so Transaction at Bank B goes into waiting state. Both the Transactions are in circular wait. You are supposed to write a C# application to handle above situation so that deadlock does not occur.

Answer:

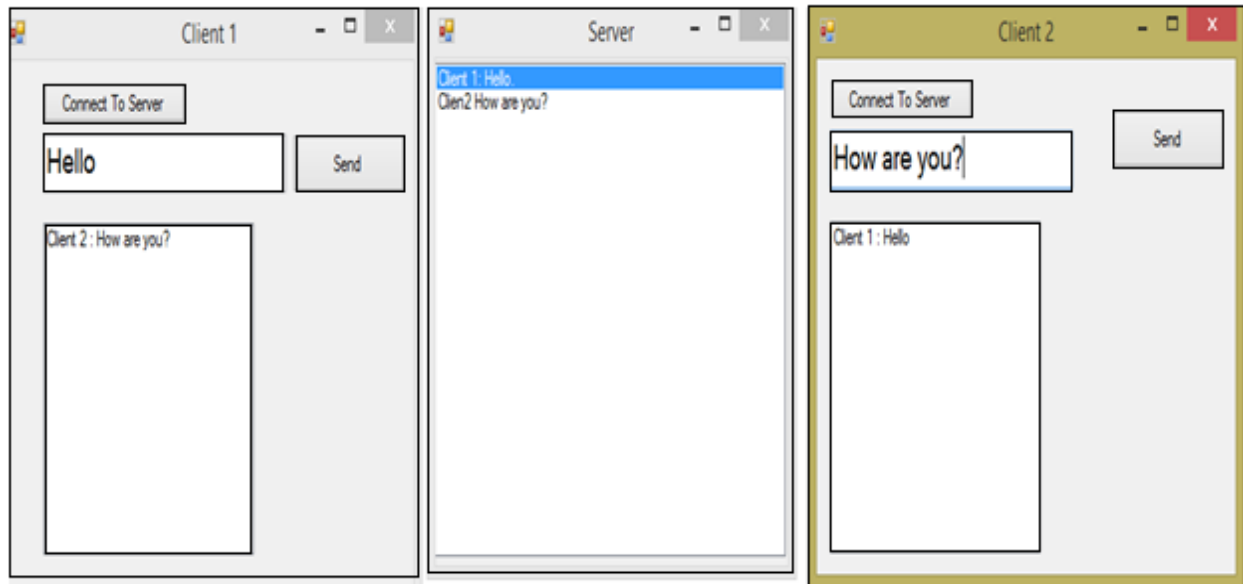Q.No.6   **[12 marks]**

You have to write a C# based application where you need to run 04 threads (say A, B, C, D) simultaneously. Now you have a single variable of type ***int*** where Thread **A** will write 1500 random values (of range 20-100) with random time interval (of 100-1000 ms). Threads B, C, and D are the readers of the value written by Thread A. Now you have to synchronize these threads in such a way that when all the three threads B, C, and D finish reading, then Thread A will attempt for next write and vice versa. You need to use Mutex/lock mechanism to make sure that only one writer and reader can enter the critical region.

Answer:

Q.No.7   **[12 marks]**

Implement given Client Server architecture using C#

- On button **Connect to server** clients are connected to server
- Text inside **Text box** will be sent to server on clicking **Send** button. Server broad cast this message to other clients connected with server.
- Clients and Server displays received messages in *list box* control.
- Server will continuously listen for clients and client will continuously listen if any message received from server or not.
- Server can handle multiple clients

Answer:

Q.No.8   **[12 marks]**

Write C# code of TCP based Client/Server application, Server can handle more than 1 clients at a time. Server has a song priority queue. When client gets connected it receives detail of song that is on top of queue. Client can increase priority of song by sending song's name. When message is received on server side, server increments priority by 1 and queue is re-adjusted accordingly. Client will automatically quit after sending 5 messages to server or by sending **exit** message for early quit.

Answer:

Q.No.9   **[12 marks]**

Suppose the xml file named 'catalog.xml' has lot of records and is placed on computer drive 'D', first read the xml file and then write LINQ based solutions for the following:

- Sort the entire CDs based on price such that cheapest CD is on top, and then print the entire node with proper format
- Find only those CDs which are not older than 5 years(w.r.t current year) and then print them
- Select only Title, Price and Year of each CD, then sort the result based on year as descending order and finally print the result
- Print only one of the oldest and latest CD detail on screen

```
▼<CATALOG>
  ▼<CD>
     <TITLE>Empire Burlesque</TITLE>
     <ARTIST>Bob Dylan</ARTIST>
     <COUNTRY>USA</COUNTRY>
     <COMPANY>Columbia</COMPANY>
     <PRICE>10.90</PRICE>
     <YEAR>1985</YEAR>
  </CD>
  ▼<CD>
     <TITLE>Greatest Hits</TITLE>
     <ARTIST>Dolly Parton</ARTIST>
     <COUNTRY>USA</COUNTRY>
     <COMPANY>RCA</COMPANY>
     <PRICE>9.90</PRICE>
     <YEAR>1982</YEAR>
  </CD>
  ....
  ....
</CATALOG>
```

Answer:

Q.No.10   **[12 marks]**

Suppose that data table is populated using student table. Data table contains registration number, name, age, session and semester. A non-primitive type Student also contains same properties. Write a LINQ based query which will convert data table to **List<Student>**.

Answer: