

# PURBANCHAL UNIVERSITY

2021

B.E. (Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**BEG276CO: Database Management System (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

**Answer EIGHT questions.**

1. Define DBMS. Briefly explain the DBMS languages used for various operations. 8×10=80

(b) What are the different types of database users? Discuss the main responsibilities of DBA. 1+4

2(a) Differentiate between Network Data Model and Hierarchical Data Models. 2+3

(b) Construct ER diagram for the following database schema. 5  
EMPLOYEES(E-ID, E\_Name, E\_Address, E\_Contact, E\_Age, Salary)

DEPARTMENT(D\_ID, D\_Name, D\_Location)

PROJECT(P\_ID, P\_Name, P\_Manager, P\_Duration)

WORK(E\_ID, P\_ID, D\_ID, WorkingHour)

3(a) Define relational algebra. Also list out the fundamental operators of relational algebra. 1+3

(b) Consider the following relational schema

SUPPLIER(S\_ID, S\_Name, Address)

PARTS(P\_ID, P\_Name, Color, Quantity)

CATALOG(S\_ID, P\_ID, Cost)

Write a relational algebraic query for followings:

- Find the names of suppliers who supply some red part.
- Find the name of all parts that are supplied in quantity greater than 300.
- Find the name of all parts supplied by "ABC Company".

Consider the following relational schema.

10

**Contd. ...**

(2)

SAILOR(S\_ID, S\_Name, Rating, Age)  
RESERVES(S\_ID, B\_Id, Day)  
BOAT(B\_ID, B\_Name, Color)

Write a SQL query to:

- (i) Create above mentioned tables.
- (ii) Insert one record in each of the relations.
- (iii) Display the name of sailors who have reserved red boat.
- (iv) Display the record of sailor reservation who have reserved green boat for 10 days.
- (v) Delete the sailor's records who had reserved the boar for one month

5(a) What is the need of Normalization? Differentiate between 3NF and BCNF with suitable example. 2+3

(b) Compute the closure set of attributes for (A) and (BC) for the following relation: 5

$$R = \{A, B, C, D\}$$

$$FD's = \{A \rightarrow B, C \rightarrow D, C \rightarrow E\}$$

Also compute minimal super key for this relation.

6(a) What do you mean by database security? What is the importance of security in database system? 1+4

(b) Explain the principles of database security. 5

(b) What is a query tree? Explain the concept of query optimization and query decomposition. 1+3

7(a) Explain the Query processing technique with a neat diagram. 5

(b) Differentiate between Sequential and hashed file organization. 5

8(a) What is a database transaction? Explain the concept of serializability of schedules with example. 1+4

(b) Discuss the deferred update and immediate update techniques of database recovery. 5

9. Write short note on any TWO: 5+5

- (a) Distributed Database System
- (b) Shadow Paging Recovery
- (c) Triggers and views



**PURBANCHAL UNIVERSITY**  
**2019**

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Full Marks: 80 / Pass Marks: 32

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**Answer EIGHT questions.**

**8x10=80**

1. Construct an ER diagram for the Gorkhali Automobile Corporation which operates number of vehicles. The relevant information is given below. 10

Every vehicle has a registration number and each vehicle is of specific model. The company accommodates a number of vehicle models and each model is identified by a model number and has a capacity and weight. In addition, the model also has a range associated with it. A number of technicians work for the company. They have unique name, SIN, address, phone number and salary. The company has controllers who control the incoming and outgoing vehicle traffic in the vehicle areas. As they are exposed to a lot of smoke emissions and also because their job is important they need to have an annual medical examination. The date of most recent exam must be stored for each controller. All company employees including technicians belong to union. Each employee has a union membership number which must be stored. The company performs a number of checks periodically to ensure that the vehicles are in good condition. These tests are standardized by the Beaureau of Motor Vehicles and are identified by BMV test number. Test has a name and maximum possible score. The BMV requires the company to keep track of each time a given vehicle is tested by a given technician using a given test. The information for each testing event is the date the number of hours spent in testing and score received on the test.

- 2(a) What do you mean by data independence? Explain how three-schema architecture ensures data independence? 2+5
- (b) Differentiate between DDL and DML language. 3

Contd. ...

3. Consider given schema and write SQL statements for following queries.

Student (Stud#, Sname, Saddr, Sphone)

2x5=10

Assignment (Ass#, Aname, Adesc Amgr#)

Department (Dept#, Dname, Daddr, Dmgr#)

Works\_assign (Stud#, Ass#, totalhrs)

Works\_dept (Stud#. Dcpt#. totalhrs)

(a) Write DDL statements for creating relation student, assignment & works\_assign.

(b) Count the number of students who work in assignment with ASS# A18 & whose total hours worked in department with Dept D10 is more than 40.

(c) Retrieve those departments with at least five students who work more than 20 hours on assignment with Ass# A 18.

(d) Change manager # of department 5 with manager no # 6.

(e) Add a field DOB in Student relation.

4(a) What are different types of integrity constraints? Explain with Example.

(b) Compute closure set of attributes for {A} & { BC} for following relation. Also compute minimal superkey for this relation. 3+2

R(A,B,C,D,E), FDs: {A→B, C→D, C→E}

5. What is hashing? Explain how collision occurs in hashing. Explain collision prevention techniques. 2+3+3

6(a) Explain the process involved in query processing in brief.

(b) What is a query-tree? Explain the concept of query optimization and query decomposition. 1+3

7(a) Explain the methods of executing transaction? Explain with example the concept of conflict serializability of schedules. 3+2

(b) Explain how two phase locking protocol ensures serializability but not deadlock cases. 5

8(a) What are the types of failures? Differentiate deferred update and immediate update based recovery techniques. 2+4

(b) What is write-ahead logging protocol? What are the advantages of shadow paging? 2+2

9. Write short note on any TWO:

(a) Mandatory security mechanism.

(b) Relational algebra Vs Relational calculus

(c) Distributed database system.

# PURBANCHAL UNIVERSITY

2018

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**Answer EIGHT questions.**

**$8 \times 10 = 80$**

1. Explain E-R model, design E-R schema for bus ticket reservation system and also convert it into relational model [note: mention the assumption made for this design]. 4+4+2
2. What is Database Management System? Explain the system architecture of Database management system with appropriate block diagram. 2+8
- 3(a) Explain briefly about Physical and Logical Data Independence: 4  
(b) Discuss advantages of DBMS over conventional Data processing file system. 6
4. Consider the schema given below and write the relational algebra for the given scenarios.  $2 \times 5 = 10$ 
  - (i) Employee(employee\_id,first\_name,last\_name,email,phone\_number, job\_id,salary,department\_id)
  - (ii) Departments(department\_id,department\_name,,location\_id)
  - (iii) Locations(location\_id,street\_address,postal\_code, city, state, country\_id)

*Write Relational algebra to:*

- (i) Display name, address and their department\_id whose salary is greater than 6000.
- (ii) Find location id which has all the department name.
- (iii) Increase the salary of 'Ram' by 15 percent.
- (iv) List employees email, phone number whose department's postal\_code is 'KTM44604'.
- (v) Find the largest salary without using aggregation function.

## (2)

- 5(a) With relevant example explain 1NF, 2NF, 3NF and BCNF. 6
- (b) What is functional dependency? What are the two set of functional dependencies? How can we determine their equivalence? 4
6. Discuss about query processing and query optimization with suitable diagram and examples. 5+5
7. Why concurrency control is needed in Transaction Management? Describe Two Phase Locking Protocol (2PL) over single phase locking mechanism with necessary example explaining its advantages and disadvantages 3+7
- 8(a) Discuss about different types of failures. 2
- (b) Define schedule, serializability and also check whether the schedules s1 and s2 are conflict serializable or not: 8  
S1: R2(A); R3(C); W3(A); W2(A); W2(B); W3(C); R1(A); R1(B); W1(A); W1(B)  
S2: R1(A); R2(A); R3(A); W(A); R2(C); R2(B); W2(B); W1(C)
- 9(a) Explain about collision resolution technique used in hashing. 6
- (b) Explain memory hierarchy with diagram 4
- 10(a) What is distributed model? Explain lag based recovery with example. 1+4
- (b) What is ORDBMS? Explain different levels of security in database. 1+4

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**Answer EIGHT questions.**

**8×10=80**

1(a) Define data, database, database system and DBMS. Explain how 3 schema architecture ensures data independence and data abstraction. 2+5

(b) Differentiate between procedural and non-procedural database language. 3

2. Draw an ER diagram for keeping track of information for an art museum, the requirements of which are as follows (Make reasonable assumptions if required). 10

- The museum has a collection of art objects. Each art object has a unique Id, an Artist, a Year when it was created, a Title, and a Description.
- Art objects are categorized based on their type as painting, sculpture, and statue, plus another type called other to accommodate objects that do not fall into one of the three main types.
- A painting has a paint type, material on which it was drawn on, and style.
- A sculpture or statue has a material from which it was created, height, weight, and style.
- An art object in the other category has a type and style.
- Art objects are also categorized as permanent collection, which are owned by the museum (these have information on the date acquired, whether it is on display or stored, and cost) and borrowed, which has information on the collection (from which it was borrowed), date borrowed, and date returned.

**Contd. ...**

(2)

- The museum keeps track of artist's information like name, date of birth, death date, country of origin, epoch, main style and description. The name is assumed to be unique.
- Different exhibitions occur, each having a name, start date and end date. Exhibitions are related to all the art objects that were on display during the exhibition.
- Information is kept on other collections with which the museum interacts, including name, which is considered to be unique, type, description, address, phone and contact person.

3(a) Write SQL for following queries on schemas as: 1+1+1+1+1

**Employee**( ssn, name, address, salary, age, mgrssn, dno)

**Department**( dno, dname, location)

**Project**(pno, pname, plocation, manager\_name)

**Works**( ssn, pno, work hours)

- Write DDL statements to create Employee and Works relation
- List all the employees who live in Bhaktapur and work in Construction department.
- Count the number of employees working in 'Ring road project';
- Insert new employee in Civil department.
- Increase 20% salary for all employees who work for 1-IRM department

(b) Explain the importance of DBA. 5

4(a) Discuss inference rules for functional dependency. 5

(b) Compute closure set of attributes for {A} & {BC} for following relation. Also compute minimal superkey for this relation. 3+2

R(A,B,C,D,E)

FDs: {A→B, C→D, C→E}

5(a) What are the purposes of normalization? Describe join dependency. 2+3

(b) Normalize following schema of course registration by student into 3NF. 5

(3)

Student(sno, sname, saddress, pno, pname, pduration, (cno, cname, credit))

FDs: { sno→sname, saddress, pno  
pno→pname, pduration  
cno→cname, credit }

6(a) Describe the need of query optimization. 4

(b) What is buffer replacement strategy? How to detect and resolve hash collision in file organization. 2+4

7(a) What are the properties of Transaction? Why do we need concurrency control techniques? 2+3

(b) Explain how Two phase locking protocols ensures serializability but not deadlock cases. 5

8. Test serializability for given schedule. Also write equivalent serial schedule. 10

T1	T2	T3
		Read (Y) Read (Z)
Read (X) Write (X)		Write (Y) Write (Z)
	Read (Z)	
Read (Y) Write (Y)	Read (Y) Write (Y) Read (X) Write (X)	

9(a) What are the types of failures? Differentiate deferred update and immediate update based recovery techniques. 2+4

(b) What is write-ahead logging protocol? What are the advantages shadow paging? 2+2

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1. Explain the importance and needs of DBMS. Describe few characteristics of modern database approach that differentiate it from traditional database systems.
2. Write down the importance of CREATE, ALTER and DROP statements in SQL. Explain using examples the following operators.
  - (i) IN-NOT IN
  - (ii) BETWEEN – NOT BETWEEN
  - (iii) LIKE – NOT LIKE
3. What is the significance of ER diagram during conceptual database design? Construct an ER diagram for a car insurance company with a set of customers each of which owns a number of cars. Each car has a number of recorded accidents associated with it. Make any additional assumptions if required. .
4. Why normalizing a relation is necessary? Explain with example the process of normalizing a table to second and third normal forms. How does 3Nf differ from BCNF?
5. What do you mean by concurrent execution of transactions? How does two phase locking protocol handles concurrent execution? Explain conflict serializability of schedules.
6. Explain how integrity constraints help in securing a database. Discuss referential integrity constraints. Differentiate between mandatory and discretionary database access control mechanisms.

**Contd. ...**

(2)

7. Consider the following EMPLOYEE table given below.

ENO	ENAME	DESIGNATION	SALARY	COMMISSION	DEPTNO
A1	Prakash	Manager	10000	1000	101
A2	Gopal	Clerk	4500		110
A3	Hari	Salesman	8000	800	102
A4	Ram	Peon	4000		101
A5	Prasanna	Clerk	4500		110
A6	Dipak	Salesman	8000	800	101

Now answer the following questions:

- Write SQL syntax to create the given table and insert few records in it.
- Write SQL syntax to update the salary of all the employees by 10% who works in department number 101.
- Write SQL query to retrieve all information of all Employees who does not have any commission.
- Write SQL query to find the deptno and employee name of all Employees who work in the same department in which employee 'A2' works.(Assume that you do not know the department number of 'A2')
- Write SQL query to count the distinct number of departments in the table

8. Why relational algebra is known as Procedural Query Language? Explain with example SELECT, PROJECT, JOIN and CARTESIAN PRODUCT operators used in relational algebra.

9. What do you mean by Database Recovery? What information is stored in log for recovery? Explain deferred update and immediate update recovery techniques.

10. Write short notes on any TWO:

- Three schema Architecture
- Functional dependency Vs Multivalued dependency
- Query optimization

5+5



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**Answer EIGHT questions.**

1. What is the difference between a database and database management system? For what reasons do organizations choose to invest in database management system?  $8 \times 10 = 80$

2. Explain the concept of data model. What data models are used in DBMS? Discuss the distinguished features of each. 5+5

3. Construct an ER diagram for a car insurance company with a set of customers each of which owns a number of cars. Each car has a number of recorded accidents associated with it. Also convert the ER diagram into relations showing primary key and foreign key. 10

4(a) What are the benefits of normalization in relational database design? Why functional dependency is important during normalization? 2+3

(b) Consider the following relational schema:

Explain how fd2 and fd3 violates the definition of second normal form. Convert the given schema into 2NF. 5

<u>RollNo</u>	<u>BookNo</u>	<u>IssuedDate</u>	<u>StdName</u>	<u>StdFee</u>	<u>BookName</u>
fd1					
fd2					
fd3					

**Contd. ...**

(2)

5. Consider the following two tables:  
EMPLOYEE.

empno	ename	commission	salary	deptno
101	Smith	400	20000	10
102	King	200	10000	10
103	Martin	0	5000	20
104	Kayes	-1	3000	20
105	Staten	0	5000	20

DEPARTMENT

Deptno	Deptname	DeptLocation
10	Human Resource	Kathmandu
20	Quality Control	Biratnagar
30	Production	Janakpur

Now answer the following questions:

4+2+2+2

- Write SQL syntax to create the above two tables with primary key and foreign key specified.
- Write SQL query to find empno, employee name and department name for all employees who work in department 20.
- Write SQL query to display information of all employees, whose name starts with letter 'S' or who have no any commission.
- Write SQL query to display the department wise total salary of department 10 and 20 in descending order of department number.

6. Define database security. Why security of database is more important in multiuser DBMS? Explain the actions that we perform in discretionary access control to protect database. 2+3+5

- 7(a) Explain query processing in brief. 3

- (b) Explain the process of buffer management. Explain the significance of 'PIN COUNT' and 'DIRTY BIT' during buffer management. 3+4

- 8(a) What is two-phase locking protocol? Explain how it ensures serializability during concurrent execution of transactions. 1+5

(3)

- (b) What is deadlock? Differentiate between wait-die and ~~wait-wait~~ schemes.
9. Write short notes on any TWO:  
 (a) Shadow paging  
 (b) Join operation  
 (c) ORDBMS

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class

**PURBANCHAL UNIVERSITY**

**2018**

**B.E. (Computer)/Fourth Semester/Final**

**Time: 03:00 hrs.**

**Full Marks: 80 /Pass Marks: 32**

**BEG275CO: Free Open Source Programming (New Course)**

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**Answer EIGHT questions.**

**$8 \times 10 = 80$**

1. Explain the philosophy of FOSS. Explain emerging applications of FOSS philosophy in various sectors. **4+6**
2. Differentiate between free software, open source software and proprietary software. What are the strengths and weakness of FOSS? Explain. **5+5**
3. What is OSS licensing? Explain its types. What are the strategies of OSS licensing? **1+4+5**
- 4(a) What is web server? How does a client browser communicate with the web server? Explain with neat diagram. **5**
- (b) What are the tags used for designing an effective web page? Explain any 4 tags with suitable example in web page design. **1+4**
- 5(a) Explain the different ways of linking the document in the web page. **5**
- (b) Create a specimen of your college web page. Divide the browser into two frames. The frame on the left will be a menu consisting of hyperlinks. Clicking on any one of these links will lead to a new page, which must open in the target frame, which is on the right hand side. **5**
6. Create an html form that has the textboxes First Name, Last Name, Address, Email ID, Pin code. When a form runs, browser fills the textboxes with data. Write JavaScript code that verifies that all textboxes have been filled. If a textbox is left empty, popup an alert indicating which textbox has been left empty. When the alert's ok button is clicked on, set focus to that specific textbox. If all the textboxes are filled, display a THANK YOU alert. **10**

**Contd. ...**

**(2)**

- 7(a) What is CSS? How external style sheet can be used to create dynamic web page? 5
- (b) What are the types of dialog boxes used in JavaScript? Explain. 5
- 8(a) Why php is called server side scripting language? Write the pros and cons of using php. 2+3
- (b) Explain the language constructs and functions used in php with suitable example. 5
- 9(a) What is file handling? Explain the reading and writing operation in files using php. 1+4
- (b) What is cookies and session? Write a program to create and destroy a session using php. 1+4
10. Write short notes on any TWO: 5+5
- (a) CURD
  - (b) FTP
  - (c) Database Connectivity



**PURBANCHAL UNIVERSITY**

**2017**

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**BEG275CO: Free Open Source Programming (New Course)**

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**Answer EIGHT questions.**

**$8 \times 10 = 80$**

- 1(a) Write a brief history of free and open source software. 5
- ✓ (b) Differentiate between proprietary software and open source software. 5
- ✓ 2(a) What are web browsers web servers? Explain how does a requested page gets displayed on user's browser. 7
- ✓ (b) Write about FTP, HTTP and HTTPS. 3
- ✓ 3(a) What is propose of using CSS file? How can you embed a CSC file into an HTML file? Give examples. 6
- (b) Write HTML codes for frames, forms and table. 4
- ✓ 4(a) Why is JavaScript considered a very powerful language? Explain. 4
- ✓ (b) Write a program to enter a member in a textbox and display its factorial on another textbox when clicked on a button. Write necessary JavaScript code to perform necessary data validation on user input. 6
5. Define PHP and explain its features. Write a PHP program to input n numbers in an array and determine the largest number in the array in descending order. 4+6
- 6(a) How are functions created in PHP programming? Give examples. 5
- ✓ (b) Write a PHP program to input a line of text and copy the contents in a data file in upper case. 5
7. Define SQL. Write the syntax of basic SQL commands with examples. 2+8

**Contd. ...**

(2)

- |  |     |
|--|-----|
| 8(a) What is session and cookies? How do you create and destroy a session?   | 6   |
| (b) Write different types of array with an example in PHP.   | 4   |
| 9. Write short notes on any TWO:<br>(a) Linking documents<br>(b) Strengths and weaknesses of FOSS<br>(c) Commercial licence verses open source licence | 5+5 |

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**PURBANCHAL UNIVERSITY**

**2016**

**E. (Computer) / Fourth Semester / Final**

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**EG275CO: Free Open Source Programming (New Course)**

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**Answer EIGHT questions.**

**8×10=80**

What is open source software? Explain it with advantages and disadvantages. 3+7

Define "free software". Is it same as "open source"? Can open source software be used for commercial purpose? Explain. 5+5

What are the major types of open source software licence? Explain current status of FOSS adoption in Nepal. 6+4

Is HTML a necessary for web page development? Justify. Write HTML code, developing for your college/university web site using following features: 3+7

- |               |           |           |
|---------------|-----------|-----------|
| (a) Scrolling | (b) List  | (c) Image |
| (d) Linking   | (e) Table | (f) Frame |

What are the techniques which make HTML page a dynamic? Explain CSS with class and DIV tag. 2+8

How is JavaScript used in web page development? Explain advantages of JavaScript. 4+6

Explain DOM with its significance. Write a program in JavaScript using form, event and DOM properties. *Don't write 4+6* 7

- (a) Explain PHP, APACHE and MySQL with its current version. 7

- (b) Differentiate between session and cookies. 3

**Contd. ...**

**(2)**

- 9(a) Explain different arrays used in PHP with an example. 5
- (b) Write a program in PHP to display factorial of a given number. 5
10. Write short notes on any TWO: 5+5
- (a) Database connectivity
  - (b) GET and Post method
  - (c) Error Handling.

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Accumulated  
Material

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- 1(a) ✓ What is Web Technology? Briefly explain the Communication Architecture in an Internet. 5
- ✓ (b) Explain commercial License versus Open source License. 5
- 2(a) ✓ What is Free Open Source Programming? Compare Free open source Software with Proprietary software. 6
- (b) What are Domain Registration and Web Hosting? How bandwidth is managed to run a website smoothly? 4
- ✓ 3. What is a HTML FORM in a Web Page? List out the elements used in FORMS with Syntax. Design a REGISTRATION FORM for a Student. The form should contain First Name, Middle Name, Last Name, Gender, Country, Phone Number, Mobile Number, Email Address, Remark and Submit Button. 10
- ✓ 4(a) What is Dynamic HTML? Explain various way of including CSS in HTML with an example. 7
- ✓ (b) Explain the LIST Tags in HTML. 3
- ✓ 5. What is Java-script? Explain different dialog boxes used in JavaScript with Syntax. Write a program to validate an email address using JavaScript. 10
6. Define PHP Programming. Explain Cookies in PHP with syntax; Write a PHP program using Cookies for user login system. 10

Contd. ...

(2)

7(a)

Write the different file opening modes in PHP. Write a program to open an existing file, append a string into a file and display the content in a Web Page.

2+3

(b) Write a program to store 10 numbers in an array. Sort the number in ascending order and display the numbers in a Web Page.

5

8(a)

Explain MYSQL database. Write a PHP function to connecting database with necessary parameter.

4

8(b)

Write an SQL-query for selecting student name that lives in Kathmandu.

3

8(c)

Write an SQL-query for selecting all female students whose name start with 'S'.

3

Roll No.	Name	Gender	Address
1	Shiva	Male	Biratnagar
2	Sarita	Female	Kathmandu
3	Sangita	Female	Bhaktapur
4	Sanjay	Male	Kathmandu

9.

Write short notes on any TWO:

5+5

(a) Error handling in JavaScipt

(b) Session Variable in PHP

(c) History of FOSS



**PURBANCHAL UNIVERSITY**

**2015**

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All questions carry equal marks.

**Answer EIGHT questions.**

$$8 \times 10 = 80$$

- 1(a) What is FOSP? Explain the advantages and disadvantages of FOSP. 5
- (b) Explain commercial License versus Open source license. 5
- 2(a) What is PROTOCOL? Explain about FTP, TCP and IP with necessary diagrams? 5
- (b) What do you mean by 404 errors in web server? How bandwidth is managed to run a website smoothly? 5
- 3(a) Explain various List Tags used in HTML and Write an example of each list tag. 5
- (b) How document is linked in HTML? Explain the types of linking documents with their example in HTML. 5
- 4(a) What is the role of CSS for making a beautiful and eye-catching Web Pages. 5
- (b) Explain various way of including CSS in HTML with an example. 5
- 5(a) Differentiate between Java and JavaScript. List out the advantages of JavaScript. 5
- (b) Write a program to display digital clock in a web-page using JavaScript and HTML. 5
6. Define PHP Programming. Explain Session in PHP with syntax. Write a PHP program using Session for user login system. 2+2+6
7. Write the different file opening modes in PHP. Write a program to READ the content of a file "source.txt" and copy its content and paste it into another file "destination.txt". 3+7
- 8(a) Explain MYSQL database. Write a PHP function for connecting database with necessary parameter. 5

Contd. ...

**(2)**

(b) Write an SQL query for selecting student name whose name starts with 'S' and having five characters. 2.5

(c) Write an SQL query for selecting all female students whose name end with 'a'. 2.5

Roll No	Name	Gender
1	Shiva	Male
2	Sarita	Female
3	Sangita	Female
4	Sanjay	Male

9(a) Write a necessary code for content management System (CMS) of a student. An Authorized person can insert student's information, can view, can edit and can delete the student record. CREATE a table 'tbl\_student' in database 'db\_college'. 10  
 $2 \times 5 = 10$

10. Write short notes on any TWO:

(a) Domain Registration

(b) Error handling in JavaScript

(c) Array in PHP

23

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E. (Computer)/Fourth Semester/Final  
Time: 3:00 hrs. Full Marks: 80 /Pass Marks: 32  
**REG275CO: Free Open Source Programming**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**Answer TEN questions.**

1. What is FOSS? Free software and open source are two parties of the same community. Explain. 2+6
2. What is open standard and open content? Differentiate between open source software and proprietary software. 3+5
3. List the benefits and shortcomings of FOSS. What is open source software licensing. Explain the OSS licensing strategies. 3+5
- 4(a) Compare web browser and web server. Explain HTTP transaction with the suitable figure. 2+3
- (b) What is HTML? Write HTML code to generate output as shown below. 1+2

**MARKSHEET**

SUBJECT	MARKS			
	INTERNAL		EXTERNAL	
	THEORY	PRACTICAL	THEORY	PRACTICAL
FOSP	20	50	80	-

5(a) Write HTML code to create the form as shown below 4

First Name	<input type="text"/>		
Last Name	<input type="text"/>		
Address	<input type="text"/>		
Date	01 <input type="button" value="▼"/>	Day	01 <input type="button" value="▼"/>
Month	01 <input type="button" value="▼"/>	Year	<input type="text"/>
Gender	<input type="radio"/> Male	<input type="radio"/> Female	
<input type="button" value="Submit"/>	<input type="button" value="Clear"/>		

Contd. ....

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E. (Computer)/Fourth Semester/Chance  
Time: 03:00 hrs. Full Marks. 80 /Pass Marks. 32  
**BEG275CO: Free Open Source Programming**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**Answer TEN questions.**

1. Define FOSP. Write down the importance and application of FOSP. 2+3
2. Explain commercial License versus Open source license. List out the Types of licensing. 2+3
3. Briefly explain about the communication between Web Server and Web Browser. What are the differences between HTTP and HTTPS? 6-2
4. Explain cell padding and cell spacing attribute in a table. Write a HTML code to generate the following Output. 2+6

S. No	Subject	Internal Marks System		Final Exam
		Theory	Practical	
1	FOSP	20	50	80

5. Define DHTML. What is the role Cascaded style sheet for making a beautiful and Eye-catching Web Pages with a program (write CSS code for HTML tags)? 2-6

6. Differentiate between java and JavaScript. List out the advantages of JavaScript. Explain the different dialog boxes used in JavaScript with their syntax? 2+2+4
7. Write a program to validate the email address using JavaScript also write a function to validate the form elements like name, address, email, gender etc. 4-4
8. Define PHP. Write a Program in PHP for finding out the greatest and smallest no among the three numbers contained in three php variables. 3+5

Contd. ....

(2)

Write the different file opening modes in PHP. Write a program to CREATE a file "student.docx", insert the text and display contents of a file in a web page.

2+4+2

Create MySQL database. Write a PHP function for connecting database with necessary parameter. Write a program and necessary query for displaying the content of a database table into a web browser.

2+2+4

2×4=8

Write short notes on any TWO:

(a) SQL Query

(b) Session in PHP

(c) Listing tags in HTML

≡

(2)

(b) Write HTML tag to insert image in web page. How javascript is implemented in HTML.

2+2

6(a) What are the different dialog boxes used in javascript? Explain.

4

(b) Write javascript code for the validation of name and address and phone number.

✓4

(7(a)) Write the program in javascript to display the factorial of any number.

3

(b) What is php? Write php code to create, open, delete and update the file.

1+4

8(a) Why php is called server side scripting language? Write the pros and cons of using php.

2+2

(b) Explain different array used in php with examples.

4

(9(a)) Write the program in php to list the multiple of 2.

4

(b) What is language construct and functions? Write the syntax to implement php in web page.

3+1

(10(a)) Write the syntax to connect database with mysql using php.

1

(b) What is cookies and session? Write the program to create and delete cookies using php.

2+2

(c) Write the mysql queries for: ✓  
creating a mysql table named COLLEGE

3

- Consisting of field college-id, name, address, phone number

2+4

- Insert data into table

- Select all from the table

11.

Write short notes on (any TWO)

2+4

(a) Image map

(b) CSS (Cascading Style Sheets)

(c) FOSS philosophy

(d) proprietary software

**PURBANCHAL UNIVERSITY**

**2018**

B.E. (Computer)/Fourth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG232EC: Communication Systems (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**8×10=80**

**Answer EIGHT questions.**

1. What is power signal? Prove the Parseval's Theorem for power signal. 2+8
- 2(a) Draw block diagram of analog communication system. Explain each block briefly. 4+4
- (b) Define modulation. 2
3. A carrier signal  $c(t)=20\cos 2\pi \times 10^2 t$  V is amplitude modulated by a modulating signal  $m(t)=6\cos 2\pi \times 10^8 t$  V. Find modulation index, percent of modulation, required bandwidth and transmission power of the resultant AM wave. 2.5+2.5+2.5+2.5
4. Explain about methods of generation of FM signal with block diagram. 10
5. An FM signal is represented by the following: 2+2+2+2+2  
 $S(t)=10\cos(2\pi \times 10^6 t + 5 \sin 2\pi \times 10^3 t)$ . Calculate:
  - (i) Carrier frequency
  - (ii) Message frequency
  - (iii) Modulation index
  - (iv) Frequency deviation
  - (v) Power dissipated in  $100\Omega$  resistor
6. Explain about PCM system with block diagram. 10
7. Represent the following data in unipolar, polar, bipolar & Manchester format: 2.5+2.5+2.5+2.5  
10010011

**Contd. ...**

**(2)**

- 8(a) What do you mean by multiplexing? Explain about FDM with  
diagram. 2+6
- (b) State Carlson's rule for FM wave. 2
9. Write short notes on any TWO:  $2 \times 5 = 10$
- (a) Need of modulation
  - (b) DBS-SC modulation
  - (c) Optical fiber communication



**PURBANCHAL UNIVERSITY**

**2017**

B.E. (Computer)/Fourth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**BEG232EC: Communication Systems (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**Answer EIGHT questions.**

**$8 \times 10 = 80$**

1. What is energy signal and power signal? State and prove the energy Parseval's theorem. 10

2(a) A carrier signal  $c(t) = 10\cos 2\pi \times 10^3 t$  V is amplitude modulated by a modulating signal  $m(t) = 6\cos 2\pi \times 10^7 t$  v. Find modulation index, percent of modulation, required bandwidth and transmission power of the resultant AM wave. 6

(b) What are need for modulation? Explain briefly. 4

3(a) Derive the expression for time domain representation of single tone modulated FM. 4

(b) A signal tone FM is represented by the voltage equation.  $2+2+2$   
 $v(t) = 12 \cos (6 \times 10^8 t + 5 \sin 1250t)$ .

Determine the following:

- (i) carrier frequency    (ii) modulating frequency
- (iii) modulation index

4(a) Define ASK, PSK, FSK. Explain each briefly. 8

(b) State Carlson's rule for FM wave. 2

5. Draw the general block diagram of a digital communication system and explain each block in detail. 10

6(a) Explain pulse code modulation. 6

(b) State and prove Nyquist sampling theorem. 4

7(a) Explain about Shannon's channel capacity theorem. 5

(b) What do you mean by multiplexing? Explain about TDM and FDM. 5

(2)

- 8(a) Explain single side band modulation with necessary diagram. 6
- (b) What do you mean by ISI? 4
9. Write short notes on any TWO:  $2 \times 5 = 10$
- (a) PAM
- (b) Optical fiber communication
- (c) Vestigeal side band modulation



**PURBANCHAL UNIVERSITY**  
**2016**

3.E. (Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**3EG232EC: Communication Systems (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**Answer EIGHT questions.**

$$5 \times 16 = 80$$

- 1(a) Describe the general communication system with the help of block diagram. 6
- (b) Derive the Parseval's theorem for energy signal. 4
- 2(a) Explain the various types of noise that occur in communication system. 5
- (b) Why modulation is required for signal transmission? 5
- 3(a) Explain the detection procedure for DSB-SC. 5
- (b) Describe how FM wave can be generated from PM wave and vice versa. 5
- 4(a) Define the Carson's rule for FM bandwidth. An FM wave modulated to a depth of 8, generates a BW of 180KHz. Find the frequency deviation. 5
- (b) How does PPL work? Explain with necessary figures. 5
- 5(a) A carrier signal  $c(t) = 10 \cos 2\pi \times 10^6 t$  is amplitude modulation by modulating signal  $m(t) = 5 \cos 2\pi \times 10^2 t$ . Find modulation index, percentage modulation, required bandwidth and transmission power of resultant AM wave. 5
- (b) Discuss the advantages and disadvantages of digital communication system over analog communication system. 5
- 6(a) State and explain the sampling theorem. Describe aliasing effect. 5
- (b) Explain T1 hierarchy in digital telephony in detail. 5

**Contd. ...**

**(2)**

- |      |   |                   |
|------|---|-------------------|
| 7(a) | Explain about GSM architecture with necessary diagram                         | 7                 |
| (b)  | What are the advantages of optical fiber communication?                       | 3                 |
| 8(a) | Explain the detail about PCM.   | 5                 |
| (b)  | Define information theory and explain different types of line coding schemes. | 5                 |
| 9.   | Write short notes on any FOUR:  | $2 \times 5 = 10$ |
|      | (a) Threshold effect in AM  |                   |
|      | (b) FDM   |                   |

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ZI --- 04/14/00  
(contd) - mB

**PURBANCHAL UNIVERSITY**

**2016**

B.E. (Computer) / Fourth Semester / Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG232EC: Communication Systems (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

**Answer FIVE questions.**

**5×16=80**

- 1(a) Draw the basic block diagram of an analog communication system and explain the function of each block. 8
- (b) Define electrical noise. What are its types? Explain. 8
- 2(a) With a neat diagram, explain the generation method for DSB-SC signals using Balance Modulator. 8
- (b) An amplitude modulated signal is represented as:  
 $V(t) = 10(1+0.4 \cos 2\pi \times 10^3 t) \cos 2\pi \times 10^6 t$   
Identify what type of amplitude modulation it is, and find: (i) modulating and carrier frequencies, (ii) modulation index, (iii) required bandwidth, (iv) total power to transmit. 8
- 3(a) Show that PLL can be used as FM demodulator with neat block diagram. Also point out its important merits. 8
- (b) A single tone FM is represented by the voltage equation as:  
 $V(t) = 12 \cos (6 \times 10^8 t + 5 \sin 1250 t)$ . Determine: (i) carrier and modulating frequencies, (ii) modulation index, (iii) maximum deviation and carrier swing, (iv) power dissipation by FM in  $15\Omega$  resistor. 8
- 4(a) What is modulation? Why is it needed? Describe any one method of demodulation of AM signals. 8
- (b) State and explain Shannon's channel capacity theorem. 3
- (c) Explain about PSK transmitter and receiver with necessary diagram. 5

**Contd. ...**

**(2)**

- 5(a) What is multiplexing? Explain the basic principle of frequency division multiplexing. 8
- (b) Draw the neat block diagram of optical fiber communication system and explain each block in brief. 8
- 6(a) Write short notes on any FOUR: 4x4=16
- (a) Multiple Access Techniques
  - (b) PCM
  - (c) FM vs AM
  - (d) Parseval's theorem
  - (e) Communication system in Nepal: Present Scenario



**PURBANCHAL UNIVERSITY**  
**2015**

B.E. (Computer)/Fourth Semester/Final  
Time: 3.00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG22EC: Communication Systems (New Course)

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer FIVE questions.

$$5 \times 16 = 80$$

- (a) Draw the general block diagram for digital communication system and explain each block in brief. *Chapter - 4* ✓ 7
- (b) State and explain Parserval's Theorem for power signals. 1 5
- (c) Explain the need for modulation. 2 4
- 2(a) Explain square law detection method for DSB-AM signals. 3 6
- (b) The total power content of an AM signal is 1000W. Determine the power being transmitted at the carrier frequency and at each sidebands when the percent modulation is 100%. 6
- (c) Compare NBFM and WBFM. 4
- 3(a) Explain with necessary diagram about Armstrong method for the generation of FM signal. 3 7
- (b) The maximum deviation allowed in an FM broadcast system is 7.5 KHZ. If the modulating signal is a single-tone sinusoid of 8 KHZ, determine the bandwidth of FM signal. What will be the bandwidth when modulating signal amplitude is doubled? 6
- c) State Nyquist sampling Theorem. 3
- a) Explain the basic principle of Analog-to-Digital conversion. 7
- b) How quantization error is introduced in PCM system? Explain. 5
- c) Define information and entropy. (coherent binary ASK) 4
- 1) Compare ASK, FSK and PSK. 6
- What is multiplexing? Explain FDM in Telephony hierarchy. 7
- Point out some special features of TDMA. 3

Contd. ...

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E. (Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG232EC: Communication Systems

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer EIGHT questions.

- 1(a) Discuss the general block diagram of communication system in detail. 1 7
- (b) Explain the need of modulation. 1 ✓ 3
- 2(a) How can we produce DSB-AM signal? Explain any one method. 6
- (b) How does PLL works? Explain with necessary figures. 4
- 3(a) An AM broadcast radio transfer radiates 10kW of power if the modulation percentage is 60. Calculate how much of this is the carrier power. X 4
- (b) Explain limiter-discriminator method for demodulation of FM Signal. 6
- 4(a) What is Carlson's rule? Derive the bandwidth for FM wave.  
Differentiate NBFM and WBFM. 5
- (b) A signal tone FM is represented as:  
 $V(t)=12\cos(6 \times 10^8 t + 5\sin 1250t) v$   
Determine:  
(i) Carrier frequency (f<sub>c</sub>) (ii) Modulating frequency (f<sub>m</sub>)  
(iii) The modulating index (m<sub>f</sub>) (iv) Maximum deviation ( $\Delta f_{\text{max}}$ )  
(v) Power dissipation by FM in 10Ω resistor (P) = ? 5
- 5(a) With the concept of companding, explain the basic principles of PCM system with necessary block diagram. 5
- (b) What are line coding schemes for Baseband communication system? Explain with necessary figures and examples. 5

Contd. ...

**(2)**

- 1(a) Explain the basic principle of FDM System. 3
- 1(b) What are the advantages of optical fiber communication? 7  
Explain in detail.
- 1(c) What is Shift Keying? Explain about QPSK transmitter along with the necessary diagram. 5
- 2(b) Explain the basic structure of mobile communication system. 5
- 3(a) Give your view on Information Theory. Also explain about source entropy and information rate. 5
- 3(b) What are the various forms of noise encountered in communication system? Explain. 5
- 3(c) Write short notes on any TWO: 5+5
- (a) Threshold effect in AM
  - (b) ISI
  - (c) Parseval's Theorem for energy signal

**(2)**

- 6(a) Write short notes on any FOUR: (2)
- (i) Optical fiber communication system
  - (ii) PAM
  - (iii) Electrical noise and its types.
  - (iv) Types and properties of system
  - (v) Communication system in Nepal

15

**PURBANCHAL UNIVERSITY**

**2018**

B.E. (Computer)/Fourth Semester/Final  
Time: 01:30 hrs.

Full Marks: 40/Pass Marks: 16

**BEG207SH: Applied Sociology (New Course)**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Group A**

**Answer TWO questions.**

$2 \times 10 = 20$

1. Define sociology and highlight the relationship of sociology with engineering with appropriate example.
2. Define change. Discuss the factors of social and cultural change.
3. Define conflict and state that how does the conflict help to bring change in socio-cultural and political system.

**Group B**

**Answer FOUR questions.**

$4 \times 5 = 20$

4. What sorts of changes have been seen in Nepalese society with the advancement of new technology?
5. What is development? Mention that how is the developing countries different than developed countries?
6. What is modernization? And discuss about the characteristics of modernization in context of our society.
7. Define labor and discuss about the present condition of labor in context of developing countries.
8. What is gender? Discuss about the gender issues in Nepal.



# PURBANCHAL UNIVERSITY

2017

B.E. (Computer)/Fourth Semester/Final  
Time: 01:30 hrs.

Full Marks: 40/Pass Marks: 16

**BEG207SH: Applied Sociology (New Course)**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

## Group A

**Answer TWO questions.**

$2 \times 10 = 20$

1. Define applied sociology. Why sociological knowledge is beneficial for the students of computer engineering?
2. Define development planning. How can development planning be useful in Nepalese context?
3. What is e-governance? Discuss about the objectives and role of e-governance in the process of transformation.

## Group B

$4 \times 5 = 20$

**Answer FOUR questions.**

4. Explain the process of social and cultural change in brief.
5. Why national integration is required for national development?
6. What is political power? Discuss the role of political power in politico-economic system.
7. Explain the process of Transformation in brief.
8. What are the major ethnic issues in Nepal? What solution would you offer to solve them?



# PURBANCHAL UNIVERSITY

**2016**

B.E. (Computer)/Fourth Semester/*Final*

Time: 01:30 hrs.

Full Marks: 40/Pass Marks: 16

**BEG207SH: Applied Sociology (New Course)**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

## Group A

**Answer TWO questions.**

**$2 \times 10 = 20$**

1. What is meant by social and cultural change? Discuss technological change and its consequences in Nepal.
2. Define nation building process. How far power is important in nation building process? Discuss.
3. Discuss the role of applied sociology in the development of Nepal.

## Group B

**Answer FOUR questions.**

**$4 \times 5 = 20$**

4. Show the relationship of sociology with engineering.
5. Define development and briefly discuss the indicators of development.
6. "Migration is a process of transformation" Justify.
7. "Society cannot change without conflict? Justify it.
8. Discuss the gender issues in the context of Nepal.
9. Define flow of capital. Write about the importance of flow of capital in the politico-economic system.



**PURBANCHAL UNIVERSITY**  
**2015**

B.E. (Computer)/Fourth Semester/Final  
Time: 01:30 hrs Full Marks: 40/Pass Marks: 16  
**BEG207 SH: Applied Sociology (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Group A**

**Answer TWO questions.**

$2 \times 10 = 20$

1. Define sociology and show its relationship with engineering.
2. What is development? Discuss the role of indigenous and appropriate technology in development.
3. What is political system? Discuss about national building process in Nepal.

**Group B**

**Answer FOUR questions.**

$4 \times 5 = 20$

4. Discuss the gender issues in the context of Nepal.
5. Globalization is an important process of social transformation. Justify the statement.
6. What are the consequences of technological changes in current Nepalese society?
7. What do you mean by conflict? Discuss the impact of conflict in socio-cultural sectors.
8. Explain the application of sociological knowledge in implementation of social and technical issues.

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E. (Computer)/Fourth Semester/Final  
Time: 01:30 hrs Full Marks: 40/Pass Marks: 16  
**BEG207SH: Applied Sociology**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Group A**

**Answer TWO questions.**

$2 \times 10 = 20$

1. Explain the application of sociological knowledge in identification of social and technological issues.
2. Define development. Describe the features of Developing Countries.
3. Explain the historical development of Nepalese society and culture.

**Group B**

$4 \times 5 = 20$

**Answer FOUR questions.**

4. Discuss the role of electronic media in modernization.
5. Define division of labour. Write about the importance of division of labour in the production and productivity.
6. Describe the features of indigenous and appropriate technology.
7. Is national integration essential for development of Nepal? Discuss.
8. Explain the concept of state.

**PURBANCHAL UNIVERSITY**

**2013**

B.E. (Computer) Fourth Semester / Final

Time: 01:30 hrs.

Full Marks: 40 / Pass Marks: 16

**BEG207SH: Applied Sociology**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Group A**

Answer TWO questions.

$$2 \times 10 = 20$$

1. Define social and cultural change. Discuss the role of technology to bring socio-cultural change in Nepal.
2. What do you mean by economy? Discuss its shifting process.
3. What is globalization? Discuss its impact upon Nepalese society.

**Group B**

Answer FOUR questions.

$$4 \times 5 = 20$$

1. Discuss the role of applied sociology in solving of social and technical issues.
2. Describe the main features of developing countries.
3. "e-governance is a process of transformation." Justify.
4. Discuss the role of capital and labour to bring change in the socio-economic system.
5. What is meant by national integration? Discuss its main bases.
6. Describe briefly the various issues of gender and ethnic group of Nepal.

**PURBANCHAL UNIVERSITY**

**2013**

B.E. (Computer) / Fourth Semester / Final

Time: 01:30 hrs.

Full Marks: 40 / Pass Marks: 16

**BEG207SH: Applied Sociology (New Course)**

Candidates are required to give their answers in their own words as practicable.

The figures in the margin indicate full marks.

**Group A**

Answer TWO questions.

1. Explain the factors of social and cultural change in brief.
2. What do you mean by development and development planning? Explain the features of developing country.
3. What is national integration? What are the main factors influencing national integration? Explain.

**Group B**

Answer FOUR questions.

4. Discuss the role of sociological to identify social and technical issues.
5. What do you mean by the resistance of socio-cultural changes?
6. Differentiate between e-commerce and e-governance.
7. Discuss the ethnic issues in the context of Nepal.
8. What is economy? Discuss its shifting process.



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*[Signature]*

# PURBANCHAL UNIVERSITY

2018

B.E. (Computer/Elect. & Comm.)/Fourth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG231EC: Microprocessor (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Answer FIVE questions.**

$5 \times 16 = 80$

- 1(a) What is microprocessor? Write its applications. 4
- ✓ (b) Draw a block diagram of 8085 microprocessor and each block briefly. 6+6
- 2(a) Draw a timing diagram of instruction MOV B, C. Assume the instruction is in the location BFFFH. 5
- (b) What is addressing modes? Explain addressing modes of 8086 microprocessor in brief. 6
- (c) Explain about flag register of 8086 microprocessor. 5
- ③ (a) What is interrupt? Explain interrupt process in brief. 8
- (b) Interface ROM memory chip with 8085 microprocessor. Also illustrate the address range of the chip. 8
- 4(a) Write a program to generate 10ms of delay. 5
- ✓ (b) Write a program to find largest number in a block of data. The length of block is 0Ah and series starts itself from C000H onwards. Store the maximum number in the location C050H. 5
- (c) Explain about one pass & two pass assembler. 6
- 5(a) Draw the block diagram of 8255 PPI. Explain each block briefly. 6+6
- ✓ (b) Explain about comparative study of higher series of Intel microprocessor. 4

6. Write a short notes on any FOUR: 4×4=16

- (a) Macro  
(b) Null modem connection  
(c) 8085 registers  
(d) String instruction  
(e) Simplex & duplex transmission



**PURBANCHAL UNIVERSITY**

**2017**

B.E. (Computer/Elect. & Comm.)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**BEG231EC: Microprocessor (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Answer FIVE questions.**

$$5 \times 16 = 80$$

1(a) Draw the block diagram of micro computer system. Explain each block briefly. 8

✓ (b) Explain about evolution of microprocessor. 8

2(a) Draw a timing diagram of instruction MOV A, M. Assume the instruction is in the location 1FFFH. 5

✓ (b) What is addressing modes? Explain addressing modes of 8085 microprocessor in brief. 1+4

(c) Explain about flag register of 8086 microprocessor. 6

3(a) Find out the delay occurred in the following program [Assume the crystal frequency as 4 MHz. 8

LXI B, 2000H 10T

LOOP: MOV A,B 4T

ORA C 4T

DCX B 6T

JNZ LOOP 10/7T

(b) Write a program in 8085 to count number of 0's and 1's in a given number stored at 2050H. 8

4(a) Draw block diagram of 8255 PPI and explain each block briefly. 5+5

✓ (b) What is interrupt? Classify the interrupt on the basis of priority. Also write the interrupts of 8085 microprocessor on priority basis. 6

**Contd. ...**

**(2)**

5(a) Draw the block diagram of 8085 microprocessor and explain each block briefly. 6+6

✓ (b) What is parallel communication? Explain the method of parallel communication. 4

6. Write a short notes on any FOUR:  $4 \times 4 = 16$

✓ (a) Address decoding

✓ (b) Simplex and duplex communication

✓ (c) Macro assemblers

✓ (d) Higher series of microprocessor

✓ (e) Null modem connection



**PURBANCHAL UNIVERSITY**  
**2016**

(Computer/Elect. & Comm.)/Fourth Semester/Final  
Date: 03.00 hrs.  
Subject: Microprocessor (New Course)

Full Marks: 80 /Pass Marks: 32

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.  
Answer FIVE questions.

$$5 \times 16 = 80$$

(a) Explain the evolution of microprocessor. 8

(b) What is flag? Specify the contents of registers and the flag status as the following instructions are executed in 8085: 8

A	B	C	D	S	Z	CY
---	---	---	---	---	---	----

MVI A, 02H

MVI B, F9H

ADD B

MOV C, A

MOV D, B

H LT

2(a) Draw the internal architecture of 8085 microprocessor clearly mentioning all the blocks. 6

(b) Why do we require addressing modes? Explain the types of addressing modes of 8086 microprocessor. 5

(c) Categorize the types of instruction used in 8085 microprocessor with example. 5

3(a) What do you mean by a counter and delay? Write a program which generates a delay of 10ms in 8085 microprocessor. 7

(b) Draw the timing diagram of LDA 2050H instruction. 5

(c) Discuss about one pass and two pass assembler. 4

Contd. ...

**(2)**

- 4(a) Write a assembly language program in 8085 to count number of '0' in the string "10010011". 5
- (b) Explain the role of RIM and SIM instruction with their proper format. 6
- (c) What is RS 232C? Explain its working procedure. 5
- 5(a) Explain the operating modes of 8086 microprocessor. 4
- (b) Discuss the different methods of parallel data transfer. 6
- (c) Write an assembly language programming in 8086 to find the largest number stored in data array. 6
6. Write a short notes on: 4×4=16
- (a) Connection to printer and null modem
  - (b) Address decoding
  - (c) Higher series of Intel microprocessor
  - (d) Basic Interrupt processing



**PURBANCHAL UNIVERSITY**

**2016**

**B.E. (Computer/Elect. & Comm.)/Fourth Semester/Final**

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**BEG231EC: Microprocessor (New Course)**

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Answer FIVE questions.**

**5×16=80**

- 1(a) Explain the applications of microprocessor. 5
- 1(b) Draw the timing diagram of the instruction MOV A, M. 5
- 1(c) What will be the content of accumulator and status of S, Z, AC, CY and P flag when 8085 subtract 92H from 47H? 6
- 2(a) Explain the function of instruction RAL & RAR with example. 5
- 2(b) Draw the internal architecture of 8086 microprocessor. Explain each block briefly. 4+4
- 2(c) Write about macro assemblers with example. 3
- 3(a) What are the addressing modes of 8086 microprocessor? Explain. 5
- 3(b) Write a program to control a railway crossing signal that has two alternately flashing red light, with 2 second delay on time for each light. 6
- 3(c) Write a program in 8086 to generate Fibonacci series. 5
- 4(a) A set of eight readings is stored in memory starting at location xx50H. Write a 8085 program to check whether a byte 40H exists in the set. If it does, stop checking and display its memory location, otherwise output FFH. . 4
- 4(b) Write a program in 8086 to find the smallest number in a given series of data. 5
- 4(c) Explain the types of 8085 interrupts. 7

**Contd. ...**

**(2)**

- 5(a) Draw the block diagram of 8255 Programmable Peripheral Interface and explain each block briefly. 5+5
- (b) Explain about asynchronous and synchronous serial data transfer with necessary diagram. 3+3
- 6(a) Explain 8086 memory interface with necessary diagram. 8
- (b) Explain the comparative study of higher series of Intel microprocessor. 4
- (c) What is assembler directives? Explain with example. 4

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**PURBANCHAL UNIVERSITY  
2015**

B.E. (Computer/Elect. & Commn.)/Fourth Semester/Final  
Time: 03:00 hrs.  
Full Marks: 80 /Pass Marks: 32  
BEG231EC: Microprocessor (New Course)

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions.

- (a) What is a microprocessor? Explain the internal architecture of 8085 microprocessor.  $8 \times 10 = 80$
- (b) Explain about JUMP and CALL operation in 8085 microprocessor. 3
- (c) What is an instruction cycle? Draw the timing diagram of instruction LDA. 8
- (d) What is an interrupt? How interrupt is handled by the microprocessor? 2
- (e) Design an interfacing circuit for a 2 Kilo Byte EPROM with an 8085 microprocessor using NAND gate and calculate the possible address range as per your design. 6
- (f) Explain the concept of Address Decoding. 4
- (g) What is a flag? Explain about the flag registers of 8086 microprocessor. 5
- (h) Differentiate between vectored and polled interrupt. 5
- (i) What is an assembler directive? Explain about any four assembler directive. 6
- (j) Differentiate between synchronous and asynchronous data transmission. 4
- (k) Write an assembly language program to swap data stored at the location 4020H and 4040H. And also write the comment for the above. 6
- (l) Write a program to compliment the status of flag register. 4
- (m) Explain the internal architecture of 8255A PPI. 5
- (n) Explain in brief about the addressing modes of 8085 microprocessor. 5

*Contd. ...*

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E. (Computer/Elect. & Commn.)/Fourth Semester/Final  
Time: 03:00 hrs.  
Full Marks: 80 /Pass Marks: 32  
BEG231EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer FIVE questions.

- (a) Compare Harvard architecture with Von Neumann architecture. Discuss about the application of microprocessors in this modern world. 6
- (b) What will be the contents of PC & SP during the execution of following instructions in each step and explain it. 5

2000 MVI A, 47H  
2002 MVI B, 38H  
2004 CALL, 2010H  
2007 OUT FCH  
2009 HLT  
200A NOP

200F NOP  
2010 ADD B  
2011 RET

- (c) Explain about the flag registers of 8085 with an example by which they are set & reset. 5

- (a) What do you mean by a counter and delay? Write a program which generates a delay of 5ms in 8085 microprocessor. 2+4

- (b) What do you mean by assembling, linking and executing of an assembly language program? Also discuss about one pass and two pass assembler. 3+2

**Contd. ...**

**(2)**

- 1(a) Explain about the concept of macro and subroutine in 8086 with the help of suitable example. 5
- ✓ 1(b) Explain about the internal architecture of 8255A and mention its application. 6
- 1(c) What is the need for serial communication? Explain about synchronous and asynchronous serial communication. 5
- 1(d) Explain about the different types of memory used in microprocessor based system. 5
- 1(e) Explain how interrupt vector table is used for interrupts. List the different software and hardware interrupts of 8086 microprocessor. 6
- 1(f) Write a program in 8086 to read string and convert it into reverse order. Display the input string and reverse string in separate lines. 5
- 1(g) Design an address decoding circuit to interface two  $(256 \times 8)$  bit RAM blocks with starting address 5000H. 5
- 5(a) Draw the timing diagram for memory write operation. 6
- 5(b) Write a program in 8085 to swap nibbles (upper four bits and lower four bits) of 50 eight bit numbers stored at 8000H and transfer to new location 9000H. 5
- 5(c) Write a program in 8086 to find the sum of the following series.  
 $X + 2X + 3X + 4X + \dots \text{ to ten terms.}$  5
- 6(a) Explain the functional block diagram of 8086 micro processor. 6
- ✓ 6(b) Explain DMA. 5
- 6(c) Describe in brief about higher series microprocessors. 5

**(2)**

- 8(a) Write an assembly language program to multiply two 16-bit numbers and store the result at 2020H location. 5
- ✓ 8(b) What is null modem? Discuss 8251 PCI. 5
9. Write Short notes on any FOUR.
- (a) Macro assembler  
(b) RS-232 interface  
(c) Address decoding  
(d) Segment register  
(e) Input/ Output Interface

4x2

PURBANCHAL UNIVERSITY  
2008

Computer/Electronics & Comm.)/Fourth Semester/Final  
Time: 03:00 hrs.  
Full Marks: 80 / Pass Marks: 32  
BEG233EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.

Answer EIGHT questions from GROUP A, and FOUR from GROUP B.

Group A

(46)

1. What is stored program concept? Explain about Von Neumann architecture with block diagram.

2. Draw the timing diagram of MVI A, 08H instruction.

3. Differentiate between sequential execution and pipelined execution with example.

4. Write the function of following instructions:

- |                  |                |         |
|------------------|----------------|---------|
| (a) LXI H, 8000H | (b) ANI OFH    | (c) NOP |
| (d) XCHG         | (e) JPE        | (f) DAA |
| (g) EI           | (h) CALL addr. |         |

5. What are assembler directives? Explain any four assembler directives.

6. Write an assembly language programming in 8085 to generate Fibonacci sequence.

7. Explain about the concept of ROM cell with diode matrix.

8. Why line driver and line receiver are required in RS232C to connect DTE with DCE? Explain about null modem configuration with figure.

9. Explain about polled and chained interrupt with block diagram.

10. Write an assembly language programming in 8086 to transmit 10 bytes of data from first list to second list.

Contd...

PURBANCHAL UNIVERSITY

2014 (New)

B.E. (Computer/Elect. & Comm.)/Fourth Semester/Chance  
Time: 03:00 hrs.  
Full Marks: 80 / Pass Marks: 32  
BEG231EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.

Answer FIVE questions.

- 1(a) Draw the timing diagram for memory write operation and explain it.
- 1(b) If a microprocessor is of 8 bit, what does it specify? Write application of microprocessor.
- 1(c) Write an assembly language program in 8085 that will count the odd numbers stored in the location COOOH to COO9H. Also store the count at EOOOH location.
- 2(a) What is interrupt? Classify it on the basis of priority. Also mention its importance's.
- 2(b) Explain about RS - 232 physical layer standards along with its application.
- 2(c) Write about the output of the following program.
 

LXI	SP	4400H
LXI	B	1234H
LXI	D	5678H
PUSH	B	
PUSH	D	
POP	B	
POP	D	
HLT		

- 3(a) Draw the block diagram of 8086 microprocessor. Explain about each block.

(b) What are the addressing modes of 8085 microprocessor? Explain in brief.

(c) Write an assembly language program in which there are sixteen bit data and are stored in two tables starting at D000H and E000H, 10 data in each table. Add corresponding data and store it in third table starting from F000H in 8085.

4(a) Draw the block diagram of 8255 PPI and explain about its different modes of operation.

(b) Interface 1KB EPROM with the microprocessor using 3x8 decoder. Find the address range.

Differentiate between the 8085 and 8086 microprocessors.

5(a) Write an assembly language program in 8085 that will arrange the 10 bits data stored from the location D000H in descending order.

(b) Write an assembly language program that will complement the content of Program Status Word (PSW).

(c) What do you mean by I/O interface? Explain about its types

6(a) What do you mean by assembler directive? Explain about its types. (Pg - 6-3, DV Hall) (11-61 B Ram) 8

(b) Explain about the importance of virtual memory.

(c) Write about the flag registers of 8086 microprocessor.

2

Group B  
11. Draw the internal architecture of 8086 microprocessor. Explain it briefly.

12. Draw the block of 8255 A programmable Peripheral Interface. Explain each block briefly.

13(a) Calculate the time delay of following program:

MVI B, 60H  
MVI C, FFH  
DCR C  
JNZ 41H  
DCR B  
JNZ 40H

HLT (Assume clock frequency of 2MHz)

(b) Specify the contents of memory locations XX70H to XX74H after execution of the following instruction.

EXT H XX70H  
MVI B, 05H  
MVI A, 01H  
STORE MOV M, A  
INR A  
DCR B  
JNZ STORE

HLT  
(a) Write an assembly language program in 8085 to check whether a byte 55H exists in the set or not. If it does, show FF at 8050H, otherwise 00H at 8050H. Data bytes are stored from memory location 8040H.

b) Write an assembly language program in 8085 to convert binary to ASCII value.

Write short notes on (any TWO):

(a) Macro and subroutine (b) MPU and CPU  
(c) Flag register of 8085 microprocessor

2

2x5=10

PURBANCHAL UNIVERSITY  
2012

Computer/Electronics & Communication)/Fourth Semester/Final  
Time: 03:00 hrs.  
Full Marks: 80 /Pass Marks: 32  
EG233EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions from Group A and FOUR questions from Group B.

Group A

What are the applications of microprocessor? Explain it. 5

Explain about semaphore. 5

If 8085 adds two numbers 23H and 4AH, what will be the content of accumulator and status of S,Z,AC,P and CY flags? 5

Explain what operation will take place when the following instructions are executed. 5

RAR, CMPP, XRA A, NOP, JC label

Draw the timing diagram of fetch operation. 5

Write a program in 8085 to clear memory location from 2050H to 2070H. 5

Explain each steps of 8085 interrupt process. 5

Differentiate between synchronous and asynchronous bus. 5

Write a program in 8085 to divide the number 2645H by 2011. 5

Explain about memory management. 5

Group B

Draw the block diagram of 8279 keyboard/display controller. 5

Explain each block briefly. 5

PURBANCHAL UNIVERSITY  
2013

B.E. (Computer/Electronics & Communication)/Fourth Semester/Final  
Time: 03:00 hrs.  
Full Marks: 80 /Pass Marks: 32  
BEG231EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer FIVE questions.

(a) Explain the internal architecture of 8085 microprocessor. 8

(b) Write a program to swap the contents of memory location 2033H and 2044H. 8

(c) What is flag? Explain different types of flags of 8085. 8

(d) Explain different addressing modes of 8 bit microprocessor. 8

(e) Design a microprocessor based system that compares the data from the input port F0H with the one stored in the memory at 8000H; Design should meet following criteria.

Condition	Green LED	Red LED
-----------	-----------	---------

Data are equal	ON	OFF
----------------	----	-----

Data are not equal	OFF	ON
--------------------	-----	----

The green LED is connected to bit D0 of output port. Red LED is connected to the bit D1 of same output port.

(f) Explain the internal architecture of 8255A PPI. 8

(g) Explain the control word format of 8255A PPI. 8

(h) Define the following:

(i) Stack

(ii) Program counter

(iii) Address register

(iv) Instruction register

(v) Address decoder

(vi) Control unit

(vii) Memory

(viii) Register

(ix) ALU

(x) Decoder

(xi) Multiplexer

(xii) Demultiplexer

(xiii) ROM

(xiv) RAM

(xv) Cache

(xvi) CPU

(xvii) Bus

(xviii) Memory controller

(xix) Cache controller

(xx) Cache memory

(xxi) Cache controller

(xxii) Cache memory

(xxiii) Cache controller

(xxiv) Cache memory

(xxv) Cache controller

(xxvi) Cache memory

(xxvii) Cache controller

(xxviii) Cache memory

(xxix) Cache controller

(xxx) Cache memory

(xxxi) Cache controller

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(xxxvii) Cache controller

(xxxviii) Cache memory

(xxxix) Cache controller

(xxx) Cache memory

(xxxi) Cache controller

(xxxii) Cache memory

(xxxiii) Cache controller

(xxxiv) Cache memory

(xxxv) Cache controller

(xxxvi) Cache memory

(xxxvii)

(2)

8(a) Draw a neat timing diagram of instruction STA.

8

(b) What do you mean by assembler directive? Explain ASSUME and SEGMENT directive. 2+6

8(c) What is segment register? Explain. 8

8(d) Write a program to complement the contents of flag register in 8055. 8

8(e) Interface a 1 kilobyte R/W memory with a microprocessor using a decoder and NAND gate. Find the possible address range. 6

8(f) Differentiate between software and hardware interrupt. 2

8(g) Write a program to count the number of '1' in the byte stored in register 'D' and store the value of count in register 'E'. 8

≡

(2)

12(a) Calculate the COUNT to obtain 100 $\mu$ s 100P delay,  
MVI B, COUNT

Loop NOP

NOP

DCR D

JNZ loop

Use the clock frequency of your system:

(b) Show the register contents as each of the following instructions is being executed:

A B C D E H L

MVI C FFH

LXI H XX70H

LXI D XX70H

MOV M C

LDAX D

HLT

13. Draw the pin details of 8085 microprocessor. Explain each pin briefly.

14(a) Write addressing modes of 8086 microprocessor.

(b) Differentiate between macro and subroutine with example.

15. Write short notes on:

(a) Register model of 8036 microprocessor

(b) Memory interfacing

**PUREANCHAL UNIVERSITY**

**2013**

B.E. (Computer/Electronics & Communication)/Fourth Semester /Final

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

**BEG231EC: Microprocessor**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Answer FIVE questions.**

(1(a)) Explain the internal architecture of 8085 microprocessor. 8

(b) Write a program to swap the contents of memory location 2033 H and 2044H. 4

(c) What is flag? Explain different types of flags of 8085 4

2(a) Explain different addressing modes of 8 bit microprocessor. 8

(b) Design a microprocessor based system that compares the data from the input port FFH with the one stored in the memory 8000H. Design should meet following criteria.

Condition	Green LED	Red LED
Data are equal	ON	OFF
Data are not equal	OFF	ON

The green LED is connected to bit D<sub>0</sub> of output port 01H and red LED is connected to the bit D<sub>6</sub> of same output port.

3(a) Explain the internal architecture of 8255A PPI. 6

(b) Explain the control word format of 8255A PPI 2

(c) Define the following 2x4

(i) Stack

(ii) Program counter

(iii) Accumulator based microprocessor

(iv) Macro assembler

Contd. ...

Contd

(2)

- 4(a) Draw a neat timing diagram of instruction STA. 8
- (b) What do you mean by assembler directive? Explain ASSUME and SEGMENT directive. 2+6
- 5(a) What is segment register? Explain its type. 8
- (b) Write a program to compliment the contents of flag register in 8085. 8
- 6(a) Interface a 1 kilobyte R/W memory with a microprocessor using a decoder and NAND gate. Find the possible address range. 6
- (b) Differentiate between software and hardware interrupt. 2
- (c) Write a program to count the number of '1' in the byte stored in register 'D' and store the value of count in register 'B' 8

**PURBANCHAL UNIVERSITY**

**2012**

B.E. (Computer/Electronics & Comm.)/Fourth Semester/*Chance*  
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32  
**BEG233EC: Microprocessor**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Group A**

Answer EIGHT questions.

1. ✓ What is microprocessor? Write any four differences between Von-Neumann and Harvard architecture. 1+4

Q. Draw the timing diagram of OUT-F8h instruction. Pg-110 5

3. ✓ Write an ALP in 8085 that count the number of odd number from 10 bytes data stored sequentially from location C000H. Also store the count at D00H. 5

4. ✓ Draw a block diagram of 8086 microprocessor and explain about two units. 3+2

5. ✓ What is addressing modes? Explain any four addressing modes of 8085A microprocessor. 1+4

6. ✓ What are assembler directives? Explain any four assembler directives. 1+4

7. ✓ Explain about virtual memory. 5

✓ Write an ALP in 8085 that converts the binary number into its equivalent ASCII code. Pg : 332, 1001car 5

✓ Write an ALP in 8086 that swaps the value of two variables. 5

10. ✓ What is interrupt? How would you clarify interrupt on the basis of priority? 5

Contd. ...

(2)

**PURBANCHAL UNIVERSITY**

**2011**

B.E. (Computer/Electronics & Communication)/Fourth Semester/*Final*  
Time: 03:00 hrs. Full Marks: 80 /Pass Marks: 32  
**BEG233EC: Microprocessor**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer EIGHT questions from GROUP A and FOUR from GROUP B.

**Group A**

1. ✓ What is stored program concept? Explain its architecture. 5

2. Draw the Timing diagram of MOV A, B instruction. 5

3. Write an ALP in 8085 to find the number of 1's present in the given data 2CH. 5

4. Explain different addressing modes of 8086. 5

5. Explain general purpose registers of 8085 processor. 5

6. With the help of circuit diagram explain how read\write operation is performed in DRAM. 5

7. Write short notes on RISC and CISC. 5

8. With connection diagram explain RS-232 bus standard. 5

9. Describe Read interrupt mask (RIM) and Set interrupt mask (SIM) with its bit pattern. 5

10. Write an ALP in 8085 to multiply two numbers. The number being stored in locations C000H and C001H. 5

**Group B**

11. Draw the internal architecture of 8086 microprocessor and explain it briefly. 10

12. Draw the block diagram of 8251 programmable communication interface showing the data bus buffer, transmitter section, receiver section R/W control logic and modem control. Explain the function of each section. 10

Contd. ...

(2)

13. Draw the block diagram of 8279 keyboard/display interface and describe the major component. 10
- 14(a) Explain Flag register of 8086 microprocessor. 5  
~~(a)~~ Write a short note on Uniprogramming and multiprogramming. 5
- 15(a) What do you mean by interrupt? Explain serial and parallel communication. 5  
~~(b)~~ What do you mean by synchronous and asynchronous bus? Explain virtual memory. 5

To differentiate an opcode from a data byte or an address, this machine cycle is identified as the opcode fetch cycle by the status signals ( $20/\bar{M}$ ;  $S_1=1, S_0=1$ ). The active low  $20/\bar{M}$  signal indicates that it is a memory operation; and  $S_1, S_0$  being high indicate that it is an opcode fetch cycle.

(2)

Group B

Answer FOUR questions.

11. ~~Draw pin diagram of 8085A microprocessor and explain the each pins.~~
- 12(a) Write an ALP in 8085 that perform two 32 bits number addition with proper comments and discussion.
- (b) Write an ALP in 8085 that find the complement of the one byte data stored at D000H without CMA instruction and store its result at reg. E.
13. ~~Draw a block diagram of 8251A programmable chip. Explain clearly the Read/Write control logic, transmitter section, receiver section, data bus buffer and modem control.~~
- 14(a) ~~What do you understand by synchronous and asynchronous serial data transfer? What is Baud rate?~~
- (b) Explain about IEEE488 standard.
15. Write short notes on any FOUR:  
(a) RTLL Register Transfer language  
(b) Semaphore  
(c) RIM and SIM  
(d) Memory mapped I/O  
~~(e) Types of memory~~

CMA: Complement content of Accumulator  
 $A = 0110$  ;  $(MA = 100)$

PURBANCHAL UNIVERSITY

2010

Computer/Electronics & Comm.)/Fourth Semester/Final

03:00 hrs.

Full Marks: 80 /Pass Marks: 32

33EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.

Figures in the margin indicate full marks.

Answer EIGHT questions from GROUP A, and all from GROUP B.

Group A

✓ Harvard architecture is better than Von-Neumann architecture.  
Justify your answer with figures. 5

What do you understand by single-chip microprocessors?  
Explain with block diagram. Where are they used? 5

Draw the timing diagram of STA 2255H instruction if it is stored in memory location. 5

C050                    32 (opcode)  
C051                    55  
C052                    22

Write an assembly language program in 8085 to find the factorial of a given number. 5

Explain about flag register of 8086 microprocessor. 5

What are assembler directives? Explain any four assembler directives. 5

Write an assembly language program in 8086 to transfer 10 bytes of data stored in an array 1 to new array array2. 5

Explain the types of ROM. Calculate the address line required to access 4K byte memory chip. 4+1

Write about 8085 interrupts & vector locations with necessary diagram. Pg- 710 '8 ROM 5

Explain about operating modes of 8086 microprocessor. 5

Contd. ...

PURBANCHAL UNIVERSITY

2011

B.E. (Computer/Electronics & Comm.)/Fourth Semester/Chanc

Time: 03:00 hrs.

Full Marks: 80 /Pass Marks: 32

BEG233EC: Microprocessor

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Group A

Answer EIGHT questions.

- (1) Harvard architecture is better than Von Neumann architecture. Justify your answer with figures. 5
- (2) Define addressing mode. Explain briefly the various types of addressing modes of 16-bit microprocessor. 4+4
3. How is the microprogramming different from uniprogramming? Explain the concept of common procedure sharing. 2+3
- 4(a) How does microprocessor differentiate between Data and Instruction code? 2

(b) What is the output at part 1 when the following instructions are executed?

MVI A, 8F H  
ADI 72 H  
JC DISPLAY  
OUT PORT1  
HLT  
Display: KRA A  
OUT PORT1  
HLT

Show necessary calculations.

- 5. You have given a 74LS138 3-to-8 decoder, a 2732 (4K\*8) EPROM and a 6116(2K\*8) CMOS R/W memory. Design an 8085 interfacing circuit satisfying the following conditions:

(i) Address range for 4K\*8 EPROM should begin at 0000H. 5

(ii) Address range for 2K\*8 R/W should begin at 2800H. 5

Contd. ...

(2)

6. Draw and briefly explain the timing diagram of MOV A, M. 5
7. Define Baud Rate. Differentiate between Synchronous and Asynchronous communication. 1+4
8. What do you understand by assembler directives? Explain, any two. 5
9. Write an 8085 program to load two numbers 9BH and A7H in register D and E respectively and add the numbers. If the sum is greater than FFH, display 01H at Output port, otherwise display the sum. 5
10. Write a program to transfer the contents of array 1 to array 2 by masking lower nibble without altering other bits for 8086 microprocessor. Assume 10 bytes of data are defined in arry1. 5

Group B

Answer FOUR questions.

- 11(a) Calculate the delay provided by the following Delay program, for a system having clock frequency 3 MHz. 5

8085-T states		TRAP (highest priority)
MVI B, 38H	7	RST 7.5
LOOP2: MVI C, FFH	7	RST 6.5
LOOP1: DCR C	4	RST 5.5
JNZ LOOP1	10/7	INTR (lowest priority)
DCR B	4	
JNZ LOOP2	10/7	

- (b) Write an 8085 program to count the number of set bits and reset bits in a number 37H stored at register C. Display the total number of set bits at 9000H and reset bits at 9001H. 5

12. Draw and explain the architecture of 8086 microprocessor. 10
13. Draw the block diagram of 8255A programmable peripheral interface. Explain each block briefly. 10

- 14(a) What are the SIM and RIM instructions? What are the Maskable, and non-Maskable interrupt? Discuss the priority of different interrupts of 8085. 2+2+1

- (b) Write a program in 8085 to convert 8-bit binary number into BCD number. 1g-328 (your answer) 5

15. Explain about interrupt along with its types & also explain the use of interrupt. 10

(2)

Group B

11. Draw the neat diagram of the internal architecture of 8086 microprocessor and explain the two different units. 5+5

12. Draw the expanded block diagram of 8251A programmable chip for Read/Write control logic and registers, Transmitter section & Receiver Section. Explain briefly about them. 5+5

- 13(a) Calculate the time delay of following program: 5

MVIA, FFH → 7  
 LOOP2: MVIC, 32H → 7  
 LOOP1: DCR C → 4  
 JNZ LOOP1 → 10/7  
 OUT 11H → 10  
 DCRA → 4  
 JNZ LOOP2 → 10/7

HLT (Assume clock frequency of 2MHz.)

- (b) Specify the register contents and the flag status as the following instructions are executed. Specify also the output at PORT0. 5

14. A system is designed to monitor the temperature of a furnace. Temperature readings are recorded in 16 bits and stored in memory locations starting at XX60H. The high-order byte is stored first and low-order byte is stored in next consecutive memory location. However the high-order byte of all the temperature readings is constant. Write a program in 8085 to transfer low-order reading to consecutive memory locations starting at XX80H & discard the high-order bytes.

Temperature reading (H): 0581, 0595, 0578, 057A, 0598

# PURBANCHAL UNIVERSITY

2018

B.E.(Computer)/Fourth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG274CO: Discrete Structure (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

**Answer EIGHT questions.**

**$8 \times 10 = 80$**

- 1(a) State pigeonhole principle. Find the minimum number of students in a class to be sure that four out of them are born in the same month. 5



(b) A collection of 10 electric bulbs contain 3 defective ones. (i) In how many ways can a sample of four bulbs be selected? (ii) In how many ways can a sample of four bulbs be selected which contain 2 good bulbs and 2 defective one? 5

- 2(a) What do you mean by valid argument? Prove the validity of the argument. "If the market is free then there is no inflation. If there is no inflation then there are price controls. Since there are price controls therefore the market is free." 1+6

- (b) Describe the law of modes ponen with example. 3

- 3(a) Consider the DFA M defined by the following next state table. 6
- (i) Find the input symbols of M. the state set of M. the initial state of M and accepting state of M.
- (ii) Draw the state diagram of M.

		$\delta$		
		a	b	c
S	$\Sigma$			
	$S_0$	$S_1$	$S_0$	$S_2$
$S_1$		$S_0$	$S_3$	$S_0$
$S_2$		$S_3$	$S_2$	$S_0$
$S_3$		$S_1$	$S_0$	$S_1$

- (b) Give a formal definition of a regular expression and grammar. 4

Contd. ...

(2)

- 4(a) Let  $A=\{1, 2, 3, 4\}$  for the relation  $R$  whose matrix is given. Find the matrix of transitive closure by using warshall's algorithm. 5

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- (b) Define partition set with an example. 2

- (c) Let  $R$  be a relation from  $A$  to  $B$  and let  $S$  and  $T$  be relations from  $B$  to  $C$ . Prove or disprove. 3

$$(SUT) \circ R = (S \circ R) \cup (T \circ R)$$

- 5(a) What do you mean by generating function? Give example. 3

- (b) Solve the recurrence relation:  $a_{r+2} - 2a_{r+1} + a_r = 2^r$  given that  $a_0 = 2$  and  $a_1 = 1$ . 7

- 6(a) Let  $R = \{(1,2), (2,3), (3,1)\}$  and  $A = \{1,2,3\}$ . Find reflexive, symmetric and transitive closure of  $R$ . using composition relation of  $R$ . 5

- (b) Prove that if  $a$  and  $b$  are two positive integers, then  $\underline{\gcd(a,b)} \times \underline{\text{lcm}(a,b)} = ab$ . 5

- 7(a) Prove by mathematical induction that  $1^2 + 2^2 + 3^2 + \dots + n^2 = (n+1)(2n+1)/6$ . 5

- (b) Define Euler circuit and path. Give an example of graph which is Euler circuit. 5

- 8(a) Define tautology, contradiction and contingency. Show that the statement  $\sim(p \leftrightarrow q) \equiv ((P \wedge \sim q) \vee (\sim P \wedge q))$  is tautology. 3+4

- (b) Define universal quantifier and existential quantifier. 3

9. Write short notes on any TWO: 5+5

(i) DNF and CNF

(ii) Hamiltonian circuit

(iii) Transport network

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# PURBANCHAL UNIVERSITY

**2017**

B.E.(Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG274CO: Discrete Structure (New Course)**

*Candidates are required to give their answers in their own words as far as practicable.*

*All questions carry equal marks. The marks allotted for each sub-question is specified along its side.*

**Answer EIGHT questions.**

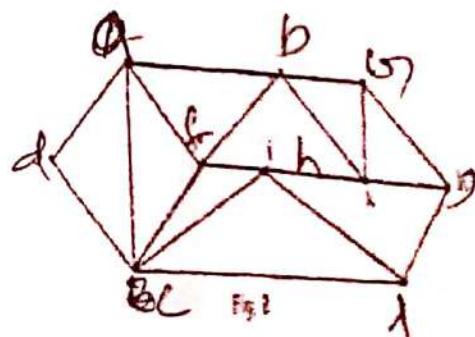
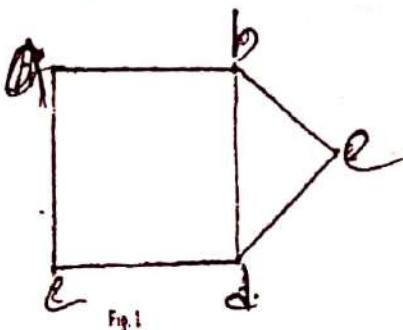
**$8 \times 10 = 80$**

1(a) Use Warshall's Algorithm to find the transitive closure of the relation  $R$  on a set  $A = \{1, 2, 3, 4\}$  where  $R = \{(1, 1), (1, 3), (2, 3), (2, 4), (3, 2), (3, 3), (4, 1)\}$ . 5

1(b) Suppose that the relation  $R$  on a set is represented by the matrix  $M_R = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ . Is  $R$  reflexive, symmetric, and/or antisymmetric? 5

2. State the contra-positive and converse statement of the following statement: "If the triangle is equilateral then it is equiangular". Show that the statement  $((p \rightarrow q) \wedge (q \leftrightarrow r)) \rightarrow (p \rightarrow r)$  is tautology and obtain the principle disjunctive normal form of  $(\neg p \rightarrow r) \wedge (q \leftrightarrow p)$ . 2+4+4

3(a) Determine whether the given graph has Hamilton circuit. If it does, find such a circuit. 2+4



(b) Define the following graph with example (any TWO): 2+2

(i) Regular graph    (ii) Complete graph    (iii) Bipartite graph

**Contd. ...**

(2)

- 4(a) Define generating functions. List out their areas of application. 2+2
- (b) Solve the recurrence relation: 6
- $F_n = 5F_{n-1} - 6F_{n-2}$  where  
 $F_0 = 1$  and  $F_1 = 4$ .
- 5(a) State multiplication principle of counting. In how many ways can 7 women be seated in a row if 2+5  
(i) any person may sit next to any other?  
(ii) men and women must occupy alternate seat?
- (b) Define composition of relation with an example. 3
- 6(a) If R be a relation on a set of integers Z defined by  $R = \{(x, y) : x, y \in Z, (x, y) \text{ is divisible by } 6\}$ . Then prove that R is an equivalence relation. 5
- (b) Let  $R = \{(1, 1), (2, 1), (3, 2), (4, 3)\}$  be a relation on a set  $A = \{1, 2, 3, 4\}$ . Find the powers  $R^n, n \geq 1$ . 5
- 7(a) Define mathematical induction. Prove that the statement given below is true using mathematical induction. 1+4
- $1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}$
- (b) Define walk, path and cycle with examples. 5
- 8(a) Give the formal definition of regular expression and grammar. 4
- (b) Describe finite state automata with an example. 6
- 9(a) Describe the Euler circuit and path with example. 5
- (b) Write short notes on: 2.5+2.5
- (i) Fibonacci member      (ii) Logical equivalent
10. Prove the validity of the following argument If I get the job and work hard, then I will get promoted. If I get promoted then I will be happy. I will not be happy. Therefore, either I will not get the job or I will not work hard'. 10



**PURBANCHAL UNIVERSITY**

**2016**

B.E.(Computer)/Fourth Semester/Final

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG274CO: Discrete Structure (New Course)**

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

$$8 \times 10 = 80$$

**Answer EIGHT questions.**

2

1(a) State pigeonhole principle.

(b) In a psychology experiment, the subjects under study were classified according to body type and gender as follows:

3

	Endomorph	Ectomorph	Mesomorph
Male	72	54	36
Female	62	64	38

(i) How many male subjects were there?

(ii) How many subjects were ectomorphs?

(iii) How many subjects were either female or endomorphs?

(c) A bookshelf is to be used to display six new books. Suppose that there are eight computer science books and five French books from which to choose. If we decide to show four computer science books and two French books and we are required to keep the books in each subject together, how many different displays are possible?

5

2(a) Define universal quantifier and existential quantifier.

3

(b) Show that the statement  $((p \rightarrow q) \wedge (q \leftrightarrow r)) \rightarrow (p \rightarrow r)$  is tautology.

3

(c) Obtain the principle conjunctive normal form of  $(\neg p \rightarrow r) \wedge (q \leftrightarrow p)$ .

4

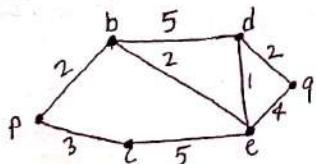
3(a) State principle of mathematical induction. Prove by mathematical induction that  $1+5+9+\dots+(4n-3)=n(2n-1)$

2+5

**Contd. ...**

(2)

- (b) State the contrapositive, converse and inverse of the following statement.  
"If the triangle is equilateral, then it is equiangular." 3
- 9(a) Discuss types of relation on a set. 3
- (b) Let  $A = \{1, 2, 3\}$  and the relation  $R$  is given as: 5  
 $R = \{(1, 1), (1, 2), (1, 3), (2, 2), (2, 3), (3, 3)\}$ . Determine whether the relation  $R$  is symmetry, Asymmetry, Anti-symmetry, Transitive or/and Reflexive. Justify your answer. 5
- (c) Define domain and range. 2
5. Let  $c_1$  and  $c_2$  be real numbers. Suppose that  $r^2 - c_1r - c_2 = 0$  has two distinct roots:  $r_1$  and  $r_2$ . Show that if  $a_n = \alpha_1 r_1^n + \alpha_2 r_2^n$  for  $n = 0, 1, 2, \dots$  where  $\alpha_1$  and  $\alpha_2$  are constants, then the sequence  $\{a_n\}$  is a solution of the recurrence relation  $a_n = c_1 a_{n-1} + c_2 a_{n-2}$ . Also find the solution of the recurrence relation  $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ . 5+5
6. Express the relation  $R = \{(1, 1), (1, 3), (2, 1), (2, 3), (2, 4), (3, 1), (3, 2), (4, 1)\}$  on the set  $A = \{1, 2, 3, 4\}$  as directed graph. Use the Warshall's algorithm to compute transitive closure of  $R$ . 3+7
- 7(a) Define Hamiltonian circuit and path. Give the example of graph which is Hamiltonian circuit. 2+3
- (b) Define sub-graph and bipartite graph with example. 5
- 8(a) Find the length of a shortest path between  $p$  and  $q$  in the weighted graph given below: 7



Contd..

(3)

- (b) Define loop, path and circuit.
- 9(a) Define parsing. Discuss context free grammar and regular grammar.
- (b) Discuss importance of Finite state machine.
- (c) Write down the regular expressions for following:  
(i) the set of strings of two 0s, followed by zero or more 1s and ending with a 0.  
(ii) the set of strings for three 0s followed by two or more 1s.  
(iii) the set of strings of any number of 0s followed by at least one number of 1.

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# PURBANCHAL UNIVERSITY

2016

B.E.(Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

**BEG274CO:** Discrete Structure (New Course)

Full Marks: 80 / Pass Marks: 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

**Answer EIGHT questions.**

$8 \times 10 = 80$

- 1(a) Prove that, if d is  $\text{GCD}(a, b)$ , then: 5  
 (i)  $d = sa + tb$  for some integers s and t.  
 (ii) If c is any other common divisor of a and b, then c divides d.
- (b) Prove that if n pigeons are assigned to m pigeonholes, then one of the pigeonholes must contain at least  $\left[ \frac{(n-1)}{m} \right] + 1$  pigeons. 5
- 2(a) Define converse, contra-positive and inverse. What are the contra-positive, the converse and the inverse of the conditional statement: "The home team wins whenever it is raining"? 5
- (b) State De Morgan's laws for logical equivalences. Determine whether the logical equivalence  $\neg(p \rightarrow q) \underset{\text{A} \rightarrow q}{\cancel{A}} \equiv p \wedge \neg q$  is a tautology, contradiction or contingency. 5
- 3(a) Define principal disjunctive and conjunctive normal forms. Find principal conjunctive normal form for  $[(p \vee q) \wedge \neg p \rightarrow \underset{\neg p}{\cancel{q}}] \underset{\neg p}{\cancel{\neg q}}$  5
- (b) State principle of mathematical induction. Show that  $1 + 2 + 3 + \dots + x = \frac{x(x+1)}{2}$  by mathematical induction. 5
- 4(a) Define symmetric and transitive properties on a set A. Show that if  $R_1$  and  $R_2$  are equivalence relations on A then  $R_1 R_2$  is an equivalence relation. 5
- (b) Let  $A = \{1, 2, 3, 4\}$  and let  $R = \{(1, 4), (3, 2), (4, 3)\}$  and  $S = \{(1, 1), (1, 2), (2, 2), (3, 3), (4, 2), (4, 4)\}$  be the relations on A. Use Warshall's algorithm to compute the transitive closure of  $R \cup S$ . 5

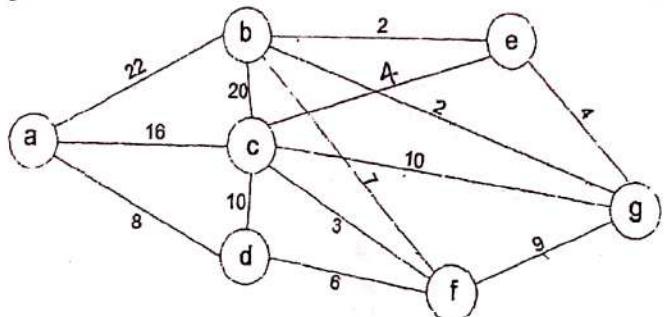
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(2)

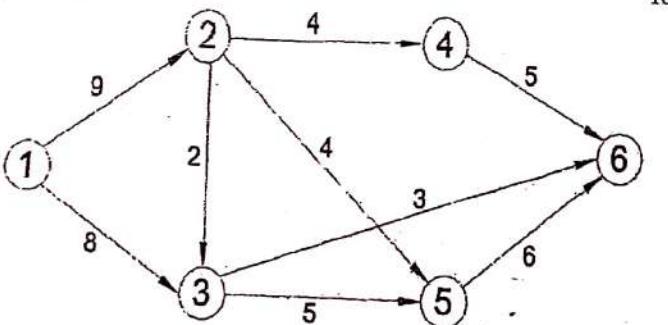
- 5(a) Solve the following recurrence relation using generating function:  
 $a_0 - 9a_{n+1} + 20a_{n+2} = 0$ ,  $a_0 = 2$ ,  $a_1 = 1$

- (b) Solve:  $a_{n+2} - 4a_{n+1} + 4a_n = 2^n$

6. Determine a shortest path between, the vertices a to g as shown below:



7. Find a maximum flow in the given network by using the labeling algorithm.



- 8(a) What are the strings in the regular sets specified by the regular expressions:  
 $10^*$ ,  $(10)^*$ ,  $0 \cup 1$ ,  $0(0 \cup 1)^*$  and  $(01)^*$ ?

(3)

- (b) Define finite Machines with output. Draw the state diagram of the finite-state machine with the state table:

State	f Input		g Input	
	0	1	0	1
s <sub>0</sub>	s <sub>1</sub>	s <sub>0</sub>	0	0
s <sub>1</sub>	s <sub>2</sub>	s <sub>0</sub>	1	1
s <sub>2</sub>	s <sub>0</sub>	s <sub>3</sub>	0	1
s <sub>3</sub>	s <sub>1</sub>	s <sub>3</sub>	1	0

9. What do you understand by permutation and combination? A bag contains 4 red, 5 black and 6 white balls. In how many ways:

- (i) 2 red and 1 black balls can be drawn?  
(ii) 2 black and 1 white balls can be drawn?  
(iii) 1 ball of each colour can be drawn?

iii

**PURBANCHAL UNIVERSITY**

**2014 (New)**

B.E.(Computer)/Fourth Semester/Final  
Time: 03:00 hrs.  
**BEG274CO: Discrete Structure**  
Full Marks: 80 /Pass Marks. 32

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Group A**

$2 \times 12 = 24$

**Answer TWO questions.**

- 1(a) Define regular graph, complete graph and connected graph.  
Explain methods to represent graph in a computer.
- (b) Explain transport network with an example.
2. What is finite state automata? Design a deterministic finite automata (DFA) that accepts strings consisting of symbols 0 and 1 and ending with a substring 01.
3. Discuss recurrence relation, homogeneous recurrence relation and Fibonacci sequence.

**Group B**

$7 \times 8 = 56$

**Answer SEVEN questions.**

4. Suppose that a box contains 15 balls, of which 8 are red and 7 are black. In how many ways can 5 balls be chosen so that:
  - (a) all five are red
  - (b) all five are black

5. Prove the following statement by mathematical induction

$$1+2+3+\dots+n = \frac{n(n+1)}{2}$$

✓

6. What do you mean by diagraph of a relation? Let  $A = \{a, b, c, d\}$  and  $R = \{(a, b), (a, c), (b, a), (b, c), (c, d), (d, a)\}$ .

Find the transitive closure of  $R$  using warshall's algorithm.

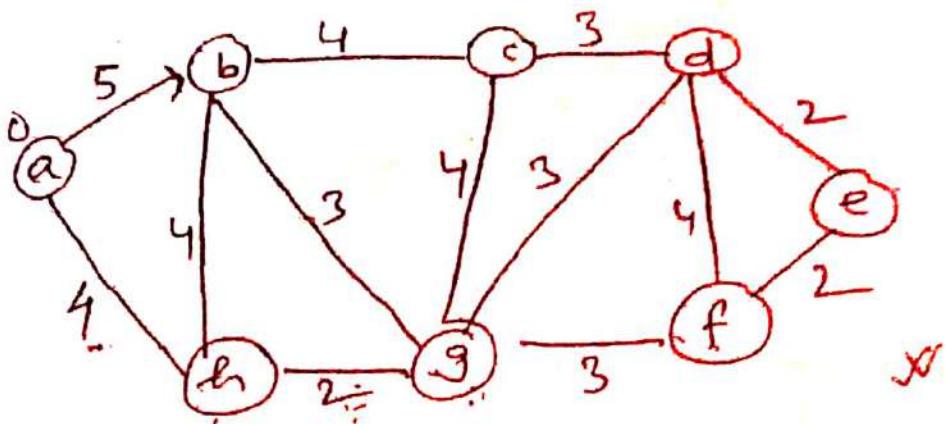
7. What do you mean by minimal spanning tree? Using prim's algorithm find the minimal spanning tree for the following graph

Shortest path

✓

Contd. ...

(2)



三

Define, union, intersection and difference of two sets with examples.

If  $A = \{x/x \text{ is a positive integer } < 8\}$

$$B = \{x/x \text{ is an integer such that } 2 \leq x \leq 4\}$$

$$C = \{x/x \text{ is an integer such that } x^2 < 16\}$$

Then verify that:

$$N(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C).$$

10.

What do you mean by Proposition and truth tables? What is tautology? Prove that  $\neg p \vee (p \vee q)$  is a tautology.

10.

What are equivalence relation. Let A | {1, 2, 3, 4, 5}

$$R = \{(1, 1), (2, 2), (1, 2), (2, 1), (3, 3), (3, 4), (4, 3), (4, 4), (5, 5), (5, 4), (4, 5)\}.$$

Determine whether  $R$  is an equivalence relation or not.

Define pigeonhole principle. What is extended pigeonhole principle? Show that if 9 colours are used to paint 100 horses, atleast 12 horses will be of same colour.

**Write short notes on any TWO:**

- (a) Generating functions
  - (b) Strings and languages
  - (c) Composite function

For equivalence.

**PURBANCHAL UNIVERSITY**  
**2014 (New)**

B.E.(Computer)/Fourth Semester/Chance

Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

**BEG274CO: Discrete Structure**

Candidates are required to give their answers in their own words as far as practicable.

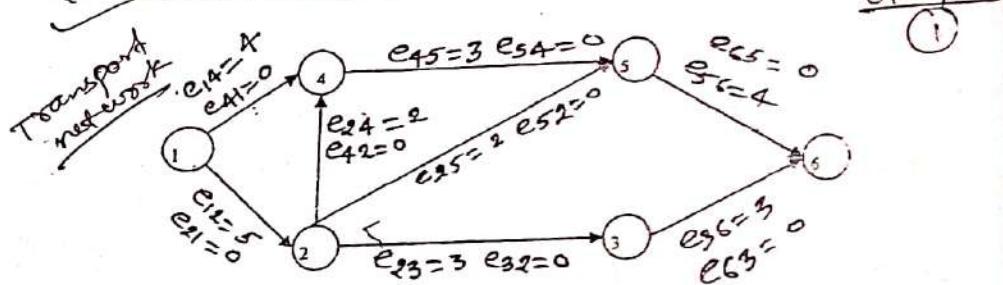
The figures in the margin indicate full marks.

**Group A:**

$2 \times 12 = 24$

**Answer TWO questions.**

1. Use the labeling algorithm to find a maximum flow for the network in the figure:



2. Let  $A = \{1, 2, 3, 4\}$ ,

$R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (3, 4), (4, 3), (4, 4), (5, 5)\}$  and  
 $S = \{(1, 1), (2, 2), (3, 3), (4, 4), (4, 5), (5, 4), (5, 5)\}$

Prove that  $R$  is an equivalence relation. Use Warshall's algorithm to compute the transitive closure containing  $R$  and  $S$ .

- 3(a) Show that the following argument is valid: If today is Tuesday, I have a test in Mathematics or Economics. If my Economics Professor is sick, I will not have a test in Economics. Today is Tuesday and my Economics Professor is sick. Therefore I have a test in Mathematics.

8

- (b) Obtain the principal disjunctive and principal conjunctive normal form of  $\neg p \vee q$ .  $(p \vee q)$   $(p \wedge q)$

Contd. ...

$$\begin{array}{l} a R b = b R a \\ a R b = b R c \\ a R b = c R a \end{array}$$

(2)  
Group B:

Answer SEVEN questions.

7x8=56

1. Prove that, if  $a$  and  $b$  be two positive integers, then  $\text{GCD}(a, b) \cdot \text{LCM}(a, b) = ab$ . 4

2. Compute  $\text{GCD}(273, 98)$  using the Euclidean algorithm. 4

✓ 3. State Pigeonhole principle. Show that if any eight positive integers are chosen, two of them will have the same remainder when divided by 7. 2+6

✓ 4. State principle of mathematical induction. Using the principle of mathematical induction prove that  $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n+1)(2n-1)}{3}$ . 2+6

Let  $X = \{1, 2, 3, 4\}$  and  $B = \{a, b, c\}$ .

Let  $R = \{(1, a), (1, b), (2, b), (2, c), (3, b), (4, a)\}$  and

$S = \{(1, a), (2, c), (3, b), (4, b)\}$

Compute: (a)  $\bar{R}$  (b)  $R \cap S$  (c)  $R \cup S$  and (d)  $R^{-1}$ . (inverse rela.)

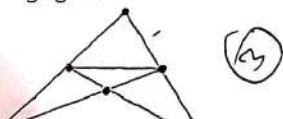
8. Let  $M$  be the finite state machine with state table appearing in the table:

S	A	f			g		
		a	b	c	a	b	c
s0	s0	s1	s2	0	1	0	
s1	s1	s1	s0	1	1	1	
s2	s2	s1	s0	1	0	0	

Find the input set  $A$ , the state set  $S$ , the output set  $O$  and initial state of  $M$ . Draw the state diagram of  $M$ .

Find the output string for the input string aabbc. 2+3+3

9. Use Fleury's algorithm to construct an Euler circuit for the graph in the following figure:



$$a_n = \alpha_1 x_1^n + \alpha_2 x_2^n + \dots$$

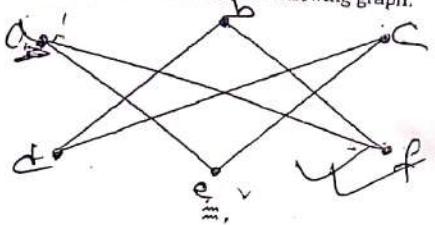
10. Solve the recurrence relation:

$$a_n - 9a_{n-1} + 20a_{n-2} = 0, a_0 = -3, a_1 = -10.$$

11. Use generating function to solve the following:  $a_n = 3a_{n-1} + a_0 = 1$ .

12(a) Compute the truth table of the statement  $(p \Rightarrow q) \Leftrightarrow (\neg q \Rightarrow \neg p)$

(b) Find a Hamiltonian circuit for the following graph:



$$a_n = \alpha_1 x_1^n + \alpha_2 x_2^n + \dots$$

$$a_n = \alpha_1 x_1^n + \alpha_2 x_2^n + \dots$$

**PURBANCHAL UNIVERSITY**  
**2013**

S.E.(Computer)/Fourth Semester/Final  
Time: 03:00 hrs.

Full Marks: 80 / Pass Marks: 32

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The figures in the margin indicate full marks.

Answer EIGHT questions.

1(a) In a certain programming language, variable should be of length three and should be made up of two letters followed by a digit or of length two made up of a letter followed by a digit. How many variables can be formed? 5

(b) State the Pigeonhole Principle. Find the minimum number of students in a class to be sure that four out of them are born in the same month. 2+3

2(a) List conditions for logical equivalence. Show that  $[P \wedge (P \vee Q)] \wedge \neg P$  is a contradiction. 2+3

(b) Define inference. List out the rules of inference for quantified statement. 1+4

3(a) Show the premises "If you send me an e-mail message, then I will finish writing the program".- "If you don't send me an email message, then I will go to sleep early" and "If I go to sleep early, then I will wake up feeling refreshed" will lead to conclusion "If I don't finish writing the program, then I will wake up feeling refreshed". 5

(b) Prove by induction method that  $2^{3^n} - 1$  is divisible by 7. 5

4(a) Define composition of a relation. Consider the following five relations on set  $A = \{1, 2, 3, 4\}$

$$R_1 = \{(1, 1), (1, 2), (2, 3), (1, 3), (4, 4)\}$$

$$R_2 = \{(1, 1), (1, 2), (2, 1), (2, 1), (2, 2), (3, 3), (4, 4)\}$$

$$R_3 = \{(1, 3), (2, 1)\}$$

$$R_4 = \emptyset, \text{ the empty relation}$$

$$R_5 = A \times A, \text{ the universal relation}$$

Determine which of the relations are reflexive. 2+3

Contd. ...

**(2)**

- (b) Define the closure of a relation. Explain symmetric and transitive closure of a relation. 1+4
- 5(a) Define recurrence relation. Find the solution of the recurrence relation  $a_n = a_{n-1} + 2a_{n-2}$  with  $a_0 = 2$  and  $a_1 = 7$ . 5
- (b) Solve  $a_n - 4a_{n-1} + 4a_{n-2} = 2^n$ . 5
- 6(a) Solve the recurrence relation  $a_n = 2a_{n-1} - a_{n-2}$ ,  $n \geq 2$  given  $a_0 = 3$ ,  $a_1 = -2$  using generating function. 5
- (b) Briefly explain the various types of graphs with suitable examples. 5
- 7(a) Differentiate between Eulerian and Hamiltonian graph with suitable examples. 5
- 8(a) Define finite state automaton. Construct deterministic finite state automata that recognize the set of bit string that begins with two D's. 2+3
- (b) Define grammar and regular expression with examples. 2.5+2.5
- 9(a) Explain tautology, converse, inverse and biconditional statement with examples. 4
- (b) Define disjunctive and conjunctive normal form. Obtain the disjunctive normal form of the form:  $\sim(a \rightarrow (b \wedge c))$ . 3+3

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