

**Nepal College of Information
Technology**

(Balkumari Lalitpur)

(Affiliated to Pokhara University)



OLD QUESTIONS COLLECTION (2019)

FOR 2ND SEMESTER SOFTWARE

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(NCIT College)

POKHARA UNIVERSITY

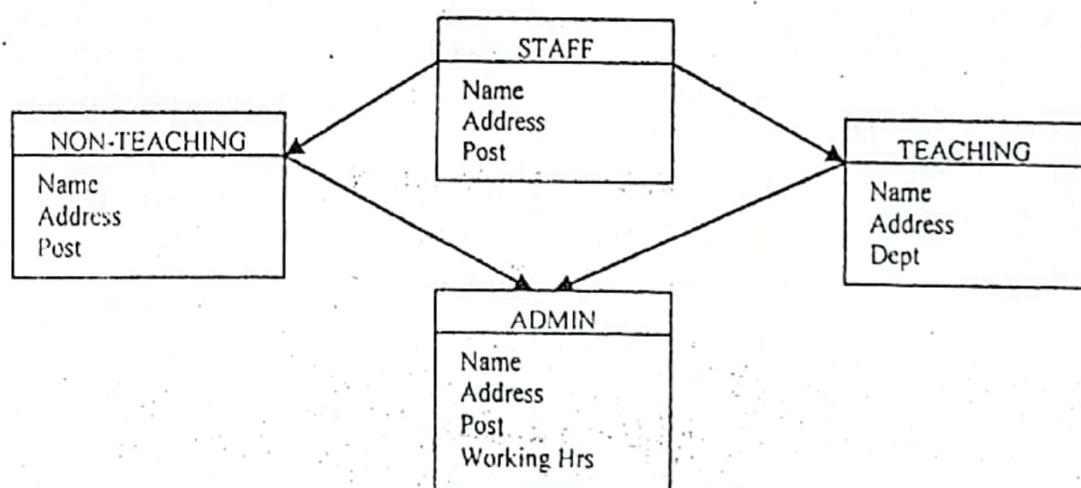
Level: Bachelor Semester: Spring Year : 2012
Programme: BE Full Marks: 100
Course: Object Oriented Programming In C++ Pass Marks: 45
Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

- | | | |
|----|--|---|
| 1. | a) What do you mean by OO programming paradigm? Explain object oriented programming features with reference to real world objects. | 8 |
| | b) What is a dynamic constructor? Explain the constructor overloading with suitable example. | 7 |
| 2. | a) What is information hiding? What are access modes available in C++ to implement different levels of visibility? Explain with an example. | 8 |
| | b) Explain advantages and disadvantages of a Friend function with a suitable example. | 7 |
| 3. | a) How concept of DMA can be use in C++? Explain with appropriate example. | 8 |
| | b) What is multiple inheritance? Does ambiguity occurs in this type of inheritance? If yes, explain with an example. | 7 |
| 4. | a) The following figure shows minimum information required for each class. Write a program with member functions to read and display information of individual object. Every class should contain at least one constructor and should be inherited to other classes as well. | 7 |



- b) Explain and contrast the following:
- i. IS-A-rule
 - ii. HAS-A-rule
5. a) Write a program to add two Times expressed in hours, minutes and seconds using operator overloading. 8
- b) What do you mean by pure polymorphism? Differentiate between function overloading and function overriding. 7
6. a) Do you find any advantages of Generic programming? Write a function template to calculate the average and multiplication of a numbers. 8
- b) Differentiate between Programming in Large and Programming in Small. 7
7. Write short notes on: (Any two) 2×5
- a) Message passing formalism.
 - b) The non-linear behavior of complexity.
 - c) Reusability implies non-interference.

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Level: Bachelor

Semester: Fall

Programme: BE

Course: Object Oriented Programming in C++

Year : 2013

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What are the main features of object oriented programming? Declare a C++ structure (Program) to contain the following piece of information about cars on a used car lot:
 - i. The manufacturer of the car.
 - ii. Model name of the car.
 - iii. The asking price for the car.
 - iv. The numbers of miles on odometer.
- b) What are the mechanism of data abstraction? Explain difference between structured and OO programming approach. 7
2. a) Create a class Person with data member *Name, age, address* and *citizenship number*. Write a constructor to initialize the value of a person. Assign citizenship number if the age of the person is greater than 16 otherwise assign value zero to citizenship number. Also create a function to display the values. 8
- b) What do you mean by static data member of a class? Explain the characteristics of a static data member. 7
3. a) Explain and contrast memory recovery, stack and heap with a suitable example. 8
- b) During the time of hybrid inheritance when there is hierarchical inheritance at the upper level and multiple inheritance at lower level, ambiguity occurs due to the duplication of data from multiple path at the grand child class. How this kind of ambiguity is resolved? Explain with suitable example. 8
4. a) Write a program to add two complex numbers using binary operator 8

overloading.

b) What is the difference between static binding and runtime binding?

7

Explain with a suitable code.

5. a) What is template? List the merit and demerit of using a template in

8

C++, Define two classes named 'polar' and 'rectangle' to represent

points in polar and rectangle systems. Use conversion routines to

convert from one system to another system using template.

b) What is containership? How does it differ from inheritance, describe

7

how an object of a class that contain objects of other classes are

created.

6. a) Explain in brief about interface and implementation. How different

8

components of designed Software can be represented and integrated?

Discuss in brief.

b) Do 'derivation' and 'friendship' mean the same? What are the

7

similarities and differences between two.

7. Write short notes on: (Any two)

2x5

a) Dynamic Constructor.

b) Virtual Destructor.

c) CRC Cards.

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

Attempt all the questions.

1. a) What is the significance of forming abstractions while designing an Object Oriented System? In case of Object Oriented Programming, explain how do we have the view that computation is simulation?

8

b) When and how do we make use of static data members of a class? Differentiate between virtual functions, friend functions and static member functions.

7

2. a) What are access specifiers? Describe different access specifiers used in C++.

8

b) Discuss the various situations when a copy constructor is automatically invoked. How a default constructor can be equivalent to a constructor having default arguments.

7

3. a) Write a class Time with three integer attributes hour, minute and second. Include following responsibilities in the class.

8

i. Default and parameterized constructor.

ii. Display method to display Time in hour: minute, second format.

iii. Appropriate operator overload to realize addition of two Time

objects with '+' operator.

7

b) Explain the principle of substitutability. How does inheritance provide the concept of reusability?

8

4. a) How does inheritance influence the working of constructors and

destructors? Class 'Y' has been derived from class 'X'. The class 'Y' does not contain any data members of its own. Does the class 'Y'

require constructors? If yes why?

b) How can Polymorphism be achieved during compile time and during

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Semester: Spring

Year : 2013

Level: Bachelor

Full Marks: 100

Programme: BE

Pass Marks: 45

Course: Object Oriented Programming in C++

Time : 3 hrs.

run time? Explain with examples in C++.

5. a) What is exception? Define the types of exceptions. Explain in brief 7

b) about the exception handling mechanism in C++.

6. a) How are Object Oriented Programs designed and developed according 8 to the concept of RDD? Describe the entire process in brief.

Create a base class student. Use the class to store the name, dob, roll no and includes member function getdata () , discount () . Derive two classes PG and UG from student. Make dispresult () as virtual function and redefine this function in the derived class to suit the requirement.

- b) Specify is a rule and has a rule with suitable example. How are agreements sent to the base constructors in multiple inheritance? 8
Whose responsibility is it?

7. Write short notes on: (Any Two) 2x

- a) Programming in small and in large
b) Generalization
c) Inline function.

8

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Level: Bachelor Semester: Fall Year : 2014
Programme: BE Full Marks: 100
Course: Object Oriented Programming in C++ Pass Marks: 45
Time : 3hrs.

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

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Attempt all the questions.

1. a) What makes the OOP better than POP. Explain with features of OOP. 8
b) What sorts of shortcomings of structure are addressed by classes? 7

Explain giving appropriate examples.

2. a) What are static data members and static member functions? Show 8
their significance giving examples.

- b) What is message passing? Describe with example. 7

3. a) Define Subtype and subclass. Explain why multiple inheritance is 8
dangerous.
b) How composition differs from inheritance? Write a program to 7
concatenate two strings (name and address of a person) using the
concept of containership.

4. a) Write a program with class Fibo to realize following code snippet. 7

```
Fibof = 1;  
For (i=1;i<=10;i++){  
    ++f;  
    f.display();
```

}

(Hint: overload ++ operator and conversion technique)

- b) Define two class named 'Polar' and 'Rectangle' to represent points in 8
polar and rectangle systems. Use conversion routine to convert from
one system to another system.

5. a) What is generic and templates. Create a template to find the sum of 8
two integers and floats.

- b) What do you mean by RDD? What is the use of CRC card? 7

6. a) Explain the terms: 8

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|--|------------------|-------------|
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| | Time : 3hrs. | |

- i. Responsibility implies non interference
 ii. Programming in Large and Programming in Small
- b) Discuss the context where it becomes important to make base class virtual. Also include an appropriate example.
7. Write short notes on: (Any two)
- Non-linear behavior of complexity
 - Deferred method
 - Exception Handling.

2×5

Candidates are required to give their answers in their own words as far as practicable.
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Attempt all the questions.

- With the help of object oriented programming, explain how can object oriented programming cope in solving the complex program. Explain computation as simulation. 7
- a) Where do you use friend function? Write a program to find largest of four integer numbers. Your program should have three classes and each classes should have one integer number. 8
- Differentiate message passing and procedure call with suitable example. What are possible memory errors in programming? Differentiate between Is-A rule and Has-A rule. 7
- a) Can you derive a Pointer from Base class? Explain with suitable example. 7
- b) What are the advantages of using runtime polymorphism over compile time polymorphism. How does overloading differ from overriding? Explain. 8
- a) What is virtual function? When do we make a function virtual? Explain with suitable example. 7
- b) What is a template? Explain different type of templates used in C++. 7
- a) What is a software component? Explain the different steps for developing and implementing software components in Object Oriented Programming. 8
- b) What is de-structor? Can you have two destructors in a class? Give example to support your reason. 7
- a) What is information hiding? What are access modes available in C++ to implement different levels of visibility? Explain with example. 7

2x5

- b) Create a class Person with data members Name, Age and Address. Create another class Teacher with data members Qualification and Department. Also create another class Student with data member Program and Semester. Both classes are inherited from the class Person. Every class has at least one constructor which uses base class constructor. Create member function Show Data () in each to display the information of the class member.

7. Write short notes on: (Any two)

- a) Programming in Small and Programming in Large.
b) Exception Handling.
c) Copy constructor.

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

Attempt all the questions.

1. a) How does making use of abstractions help in designing of an Object Oriented System? Explain with an example. 7
- b) What is the role of behaviour in OOP? Along with a figure and an example of a CRC card, explain its significance in Object Oriented Design. 8
2. a) What is an inline function? Explain its importance with the help of an example program. 7
- b) How do we make use of a Virtual Destructor when we need to make sure that the different destructors in an inheritance chain are called in order? Explain with an example in C++. 7
3. a) Create classes called class1 and class2 with each of having one private member. Add member function to set a value (say setvalue) on each class. Add one more function max () that is friendly to both classes. max () function should compare two private member of two classes and show maximum among them. Create one-one object of each class then set a value on them. Display the maximum number among them. 8
- b) Explain how Inheritance support Reusability? Describe the syntax of multiple and multilevel inheritance? 7
4. a) Compare and contrast composition and inheritance. 5
- b) Differentiate between is-a and has-a rule with suitable example. 5
- c) Write a program to enter the information of n students and then display it using the concept of multilevel inheritance. 5
5. a) What is the benefit of overloading an operator? Design a Soccer Player class that includes three integer fields: a player's jersey number, number of goals, number of assists and necessary 8

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| | | |
|--|------------------|----------------|
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7.

- constructors to initialize the data members. Overload the $>$ operator (greater than). One player is considered greater than another if the sum of goals plus assists is greater than that of the others. Create an array of 11 soccer players, then use the overloaded $>$ operator to find the player who has the greatest total of goals plus assists.
- b) How can you achieve run time polymorphism in C++? Discuss with a suitable example.

6. a) Define a class called stack and implement generic methods to push and pop the elements from the stack.

7

b) Path-follower Robot:

A Path-follower Robot senses the path it needs to follow thru its sensors. Based on the data received thru its sensors, the Robot makes use of its actuators (Robotic Wheels) to steer itself forward. For the above mentioned system, identify as many components (collaborating objects) as you can, draw CRC card for at least three of them and show the interaction between these components thru an interaction diagram.

7. Write short notes on: (Any two)

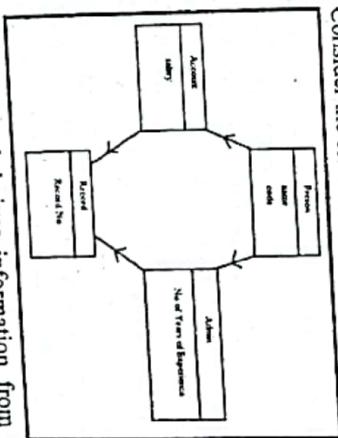
- a) Responsibility Driven Design.
b) Stack versus Heap Based Allocation.
c) Virtual functions.

2x5

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

Attempt all the questions.

1. a) Describe Object Oriented Programming as a new paradigm in computer programming field. Explain computation as simulation.
b) "Friend function breaches the encapsulation", justify. Also mention the uses of friend function.
2. a) What are the common types of functions available in C++? Define the 3 common types of functions in C++ with a program.
b) Can we have more than one destructor in a class? Write a program to add two complex numbers using the concept of constructor
3. a) Explain and contrast the following:
i. Interface and implementation
ii. Programming in small and programming in large
- b) "Ambiguity is essential evil", explain by example how it can effectively solve in complex programming.
4. a) Consider the class network of the following figure.



The class *Record* derives information from both *Account* and *Admin*

classes and in turn derive information from the class *Person*. Define all the four classes with at least one parameterized constructor and 'void display()' method in each class. In main O function, create the object of the class 'Record' and initialize all the data members and display them.

- b) Define the role of this pointer and pure abstract class in object oriented programming to create multiple object with suitable program.

5. a) How does a polymorphism play constructive role in application development? Which type of polymorphism is essential for the computation of distance among two cities from the specific location.

The unit of measurements are feet and inch. (Also use standard unit if essential).

- b) What do you mean by generic programming? Illustrate it with an example of function template.

6. a) "A constructor is a special member function that automatically initializes the objects of its class", support this statement with a program of all types of constructors. Also enlist the characters of constructors.

- b) How can you define pure virtual functions in C++? The pure virtual functions do nothing but it is defined in base class, why?

7. Write short notes on: (Any two)

- a) Non-linear behavior of complexity
b) Is-a rule and has-a rule
c) Memory recovery

2x5

POKHARA UNIVERSITY
Level: Bachelor Semester: Fall Year : 2016
Programme: BE Full Marks: 100
Course: Object Oriented Programming in C++ Pass Marks: 45
Time : 3hrs.

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

Attempt all the questions.

1. a) Why Object-oriented programming is a superior than Procedural-oriented Programming. Explain.

- b) Differentiate between structure and class. Why is class preferred over structure? Support your answer with suitable example.

2. a) What is information hiding? What are access modes available in C++ to implement different levels of visibility? Explain with example.

- b) What do you mean by dynamic constructor? Explain its application by a program to compute the complex numbers.

3. a) Create classes called class1 and class2 with each having one private member. Add member function to set a value (say setvalue) on each class. Add one more function max O that is friendly to both classes max() function should compare two private member of two classes and show maximum among them. Create one-one object of each class then set a value on them. Display the maximum number among them.

- b) Under what condition virtual base class is created? Explain it with suitable examples.

4. a) State principle of substitutability. Explain sub classing for specialization, generalization. List out the disadvantages of inheritance.

- b) Define type conversion. Explain with example conversion from one class type to another class type.

5. a) When do you use virtual function? How it provides run time polymorphism. Explain it with suitable example.

- b) What are the advantages of Generic programming ? Write a function template to calculate the average and multiplication of numbers.

6. a) What is software component? Explain about implementation and integration of component with real world example.

b) Do you find any advantages of adopting Responsibility Driven

Design? Explain with the help of suitable example.

7. Write short notes on: (Any two)

a) The is-a and has-a rule

b) Operator overloading

c) CRC card.

2x5

POKHARA UNIVERSITY

Year : 2016
Full Marks: 100
Pass Marks: 45

Time : 3hrs.

Level: Bachelor
Semester: Spring
Programme: BE
Course: Object Oriented Programming in C++

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

The figures in the margin indicate full marks.

Attempt all the questions.

प्रश्नोंका उत्तर अपने शब्दों में देना चाहिए।

1. a) What are different aspects of software components?

b) Explain Message Passing™ OOPNALISM™ with syntax in C++. What is stack versus heap memory allocation?

2. a) Is it mandatory to create constructor in derived class if base class contains constructor? "Constructor is called in derived class but it can't be inherited". Support your answer with suitable example.

b) Create a class called Mountain with data members name, height, location, a constructor that initializes the members to the values passed to it as parameters, a function called CmpHeight() to compare two objects and DisplayInfo() to display the information of Mountain. In main, create two objects of the class mountain and print the information of the mountain which is greatest height.

3. a) Differentiate between various access specifiers used in a class. Explain it with reference of an example.

b) What is inheritance? What are the different forms of inheritance?

4. a) Describe overriding. How do you differentiate function overloading from method overriding. Explain with suitable example.

b) Differentiate between

i. Subclass and Subtype
ii. The is-a rule and has-a rule.

5. a) Define operator overloading. Write a simple program to overload unary ++ operator.

b) What are advantages of dynamic memory allocation? Explain with suitable example.

6. a) What is exception? Write the syntax for exception handling in C++.

7

Write a program that catches multiple exceptions.

b) What is generic and templates? Create a template to find the sum of

two integers and floats.

7.

Write short notes on: (Any two)

a) Virtual Function Vs. Pure Virtual Function

b) STL

c) RDD

8
2x5

POKHARA UNIVERSITY

Semester: Fall

Year : 2017

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

Level: Bachelor
Programme: BE
Course: Object Oriented Programming in C++

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

Attempt all the questions.

पुस्तकालय सञ्चारण एवं प्रेसेज़री समिति
बालकूमारी नगरपालिका १८८५१९४९
NCTR College

1. a) Describe how object oriented programming models the real world problem with reference of agents, method, behavior and responsibilities? 8
- b) What do you mean by static data member of a class? Explain the characteristics of a static data member. 8
2. a) Does a friend function violate the data hiding? Explain briefly. Write a program to swap variables of two classes using friend function. 7
- b) What is constructor? Can constructor be overloaded? If yes, explain how that is possible with reference of an example. 7
3. a) Differentiate methods of arguments passing in constructor and destructor. 7
- b) Inheritance supports the reusability characteristics of OOP. Justify your answer. Explain ambiguity that occurs in multiple inheritances. 8
4. a) Write base class that ask the user to enter Time (hour minute and second) and derived class adds the Time of its own with the base. Finally make third class that is friend of derived and calculate the difference of base class time and its own time. 7
- b) When base class and derived class have same function name what happens when derived class object calls the function? Differentiate overloading with overriding. 8
5. a) What is polymorphism? How operator overloading is used to support polymorphism? Explain it by overloading '+' operator to concatenate two strings. 7
- b) What is the advantage of using template functions? Write a program to illustrate a template function with two arguments. 8

6. a) Reusability implies non-interference. Explain with example.

b) Explain in brief about interface and implementation. How different components of Software design can be represented and integrated?

Discuss in brief.

7. Write short notes on: (Any two)

a) CRC card

b) Virtual function

c) Features of object-oriented programming

8

2x5

POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2017
Full Marks: 100
Pass Marks: 45

Course: Object Oriented Programming in C++
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
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Attempt all the questions.

1. a) What are shortcomings of procedural oriented programming? Explain the notion of "everything is an object" in object oriented programming.

b) Differentiate between the concept of computation as simulation and responsibility implies non-interference.

2. a) What is responsibility driven design? Draw a CRC Card of student.

b) What is encapsulation? How can encapsulation be enforced in C++?
Explain with suitable code.

3. a) What is constructor? Write an example of copy constructor and explain each line of code.

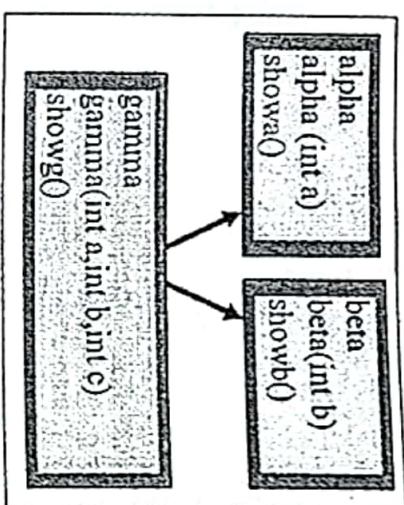
b) Create a class time a constructor having hour, minute and second as arguments is use to take two time data from user. The add function that takes two class objects as arguments adds them respectively then display aggregate result? (Apply 60 second=1 minutes and 60 minutes=1 hour).

4. a) Why is destructor function required in class? Can a destructor accept arguments?

b) What is inheritance? Explain different forms of inheritance.

5. a) How does visibility mode control the access of members in the derived class? Explain with an example.

b) Write a complete program with reference to the given figure.



4

8

alpha
alpha (int a)
showa()

beta
beta(int b)
showb()

gamma
gamma(int a,int b,int c)

showg()

Level: Bachelor Semester: Fall Year : 2018
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Attempt all the questions.

6. a) What are generic and templates? Create a template to find the sum of two integers and floats.

b) Write a complete program to convert the polar co-ordinates into rectangular coordinates.

(hint: polar co-ordinates (radius, angle) and rectangular co-ordinates (x,y) where $x=r\cos(\text{angle})$ and $y=r\sin(\text{angle})$).

2x5

7: Write short notes on: (Any two)

- Friend function
- Pure polymorphism
- Expectation mechanism

7

1. a) With the help of object oriented programming explain how can object oriented programming cope in solving the complex program. Explain computation as simulation.

b) Private data and function of a class cannot be accessed from outside function. Explain how it is possible to access them with reference of an example.

2. a) What is constructor? Can constructor be overloaded? If yes how?

b) Create a class called Employee with data member Code, Name,

Address, Salary. Create a constructor to initialize the member of the class. Also create another constructor so that we can create an object from another object. Define member function display() to display the information of the class.

3. a) Explain how does composition provide re-usability? Differentiate between Is-A rule and Has-A rule.

b) What is a hybrid inheritance? Does ambiguity occur in hybrid inheritance? If Yes? How can you remove this? Explain with example.

4. a) What are the advantages and disadvantages of using friend function? Explain with example program.

b) What is type casting? Write a program to read a height of a person in Feet and Inches and convert it into Meter using user defined to class type conversion method. 1 meter=3.28084 feet, 1 foot=12 inch.

5. a) What is function template? Create a template function to swap two values.

b) Create a class Person with data members Name, Age and Address. Create another class Teacher with data members Qualification and Department. Also create another class Student with data member Program and Semester. Both class are inherited from the class Person.

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Every class has at least one constructor which uses base class constructor. Create member function Show Data() in each to display the information of the class member.

6. a) What is compile time and run time polymorphism? How can you achieve runtime polymorphism in C++? Explain deferred method. 7
b) What are the use of new and delete operator in a program ? Explain with an suitable example. 8
7. Write short notes on: (Any two) 2x5
- Overriding
 - Exception Handling
 - Standard Template Library

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Level: Bachelor Semester: Spring Year : 2018
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Attempt all the questions.

- a) Define computation as simulation. Why the behaviour of complexity is regarded as non-linear? 7
b) What are the advantages of oriented programming over structural programming? Explain with suitable examples. 8
- a) Illustrate the role of friend function in object oriented programming with its pros and cons. Also write a suitable program. 8
b) Can a class have more than one constructor? If yes, justify your answer with help of a program that reads firstName and secondName then concatenates into Name. (use suitable type of constructor). 7
- a) Can you have more than one constructor in a program? Write a program to find area of a triangle (when its sides are given) using the concept of overloaded constructor. 8
b) Define Reusability? What are the advantages of software Reusability in OOP design? 7
- a) What are the different types of inheritance? Describe multiple inheritance with an example. 8
b) The following figure shows minimum information required for each class. Write a program by realize the necessary member functions to read and display information of individual object. Every class should contain at least one constructor and should be inherited to other classes as well. 7

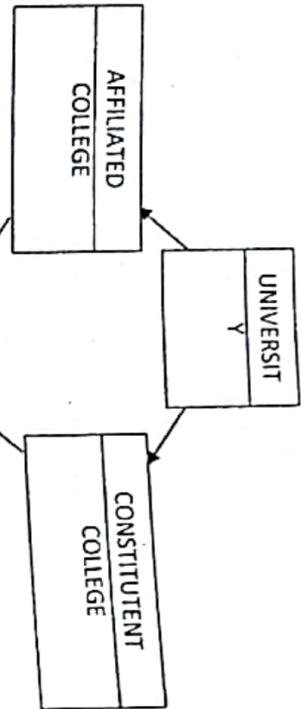
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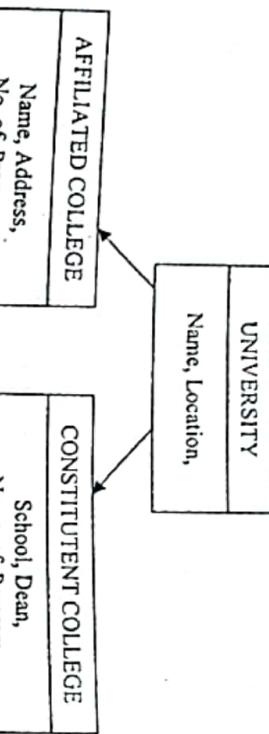
Attempt all the questions.



5. a) Why does 'this' pointer is widely used than object pointer? Write a programme to implement pure polymorphism. 7
 - b) Write a program showing '+' and '-' operator overloading. 8
 6. a) Differentiate between template function and template class. How can we compute the roots of quadratic equation by using function template? Explain by examples. 7
- OR
- What is application of exception handling? Illustrate the process of exception handling with necessary programming modules. 7
- b) Differentiate between:
 - i. Programming in Large and Programming in Small
 - ii. CRC Card and sequence diagram
7. Write short notes on (Any Two): 2×5
- a) Message passing formalism
 - b) Software Components
 - c) Abstraction mechanism

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| | | |
|---|------------------|-------------|
| Level: Bachelor | Semester: Spring | Year : 2019 |
| Programme: BE | Full Marks: 100 | |
| Course: Object Oriented Programming C++ | Pass Marks: 45 | |
| | Time : 3 hrs. | |



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

1. a) Software development process is not linear. Justify. Explain abstraction mechanism technique in C++ with examples. 7
- b) Differentiate between structure and class in C++? What are the various access specifiers used in class? 8
2. a) Illustrate the role of friend function in object oriented programming with its pros and cons. Also write a suitable program. 8
- b) What is dynamic memory allocation? How is memory allocated and deallocated in C++? Explain with examples. 7
3. a) Explain subtype, principle of substitutability, object pointer, this pointer, virtual function with examples. 7
- b) Write a program to input two vector coordinates from a base class named "Base". Class "Derived" inherits all the properties of class Base. Class "Derived" must contain a function named add_vector() that add the two vectors input from the base class and finally display the result from a function display() that is friend with the base class. 8
4. a) Create a class called Person with suitable data members to represent their name and age. Use member functions to initialize and display these information. Derive Student and Employee from the Person class with their unique features. Initialize objects of these classes using constructor and display the information. 7
5. a) Explain with examples. 8
- b) How can you achieve compile time and runtime polymorphism. 8
- c) Explain with examples. 8
6. a) What is exception? Explain in brief about the exception handling mechanism in C++. 7
- b) Explain CRC card and sequence diagram with suitable example. 7
7. Write short notes on: (Any two)
 - a) Software reusability
 - b) Template functions
 - c) Software component

b) Write a program to add two complex numbers. Your program should have three objects. Each object contains two attributes (i.e real and imaginary part). Now add each attribute and save them into third object separately. Use the concept of '+' operator overloading.

6. a) Explain the purpose of template programming with examples. Describe the technique of exception handling in C++ with examples.

b) Explain CRC cards and sequence diagram with examples.

7. Write short notes on: (Any two)

- a) Message Passing in C++
- b) Inline function
- c) Abstraction mechanism

7

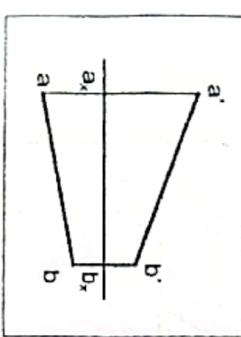
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. Draw an ellipse having major axis 90mm and minor axis 60 mm by definition method.

2. Reproduce the given views of the lines and determine the true length. (figure 1)



$$\begin{array}{ll} a'a_x = 35 & b'b_x = 15 \\ aa_x = 20 & bb_x = 20 \\ ab_x = 40 & \end{array}$$

3. Draw complete orthographic views (three views) of the given object. figure2)

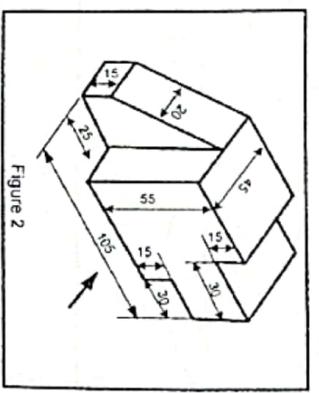


Figure 2

30

POKHARA UNIVERSITY
Level: Bachelor Semester: Spring Year : 2013
Programme: BE Full Marks : 100
Course: Engineering Drawing Pass Marks : 45
Time : 3hrs.

18

- A right circular cone is cut by a plane P as shown in figure 3. Find the true shape of the section and also construct the lateral surface development of the object.

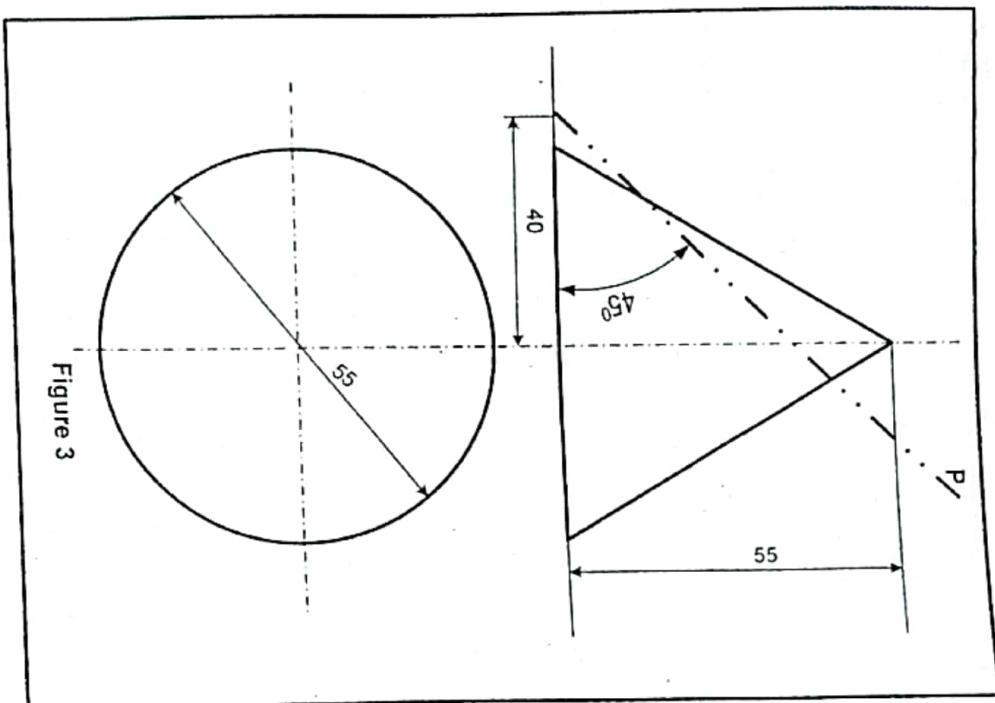


Figure 3

5. Assembled the given parts of the Screw Jack and draw its full sectional (orthographic) front view. (figure 4)

24

2

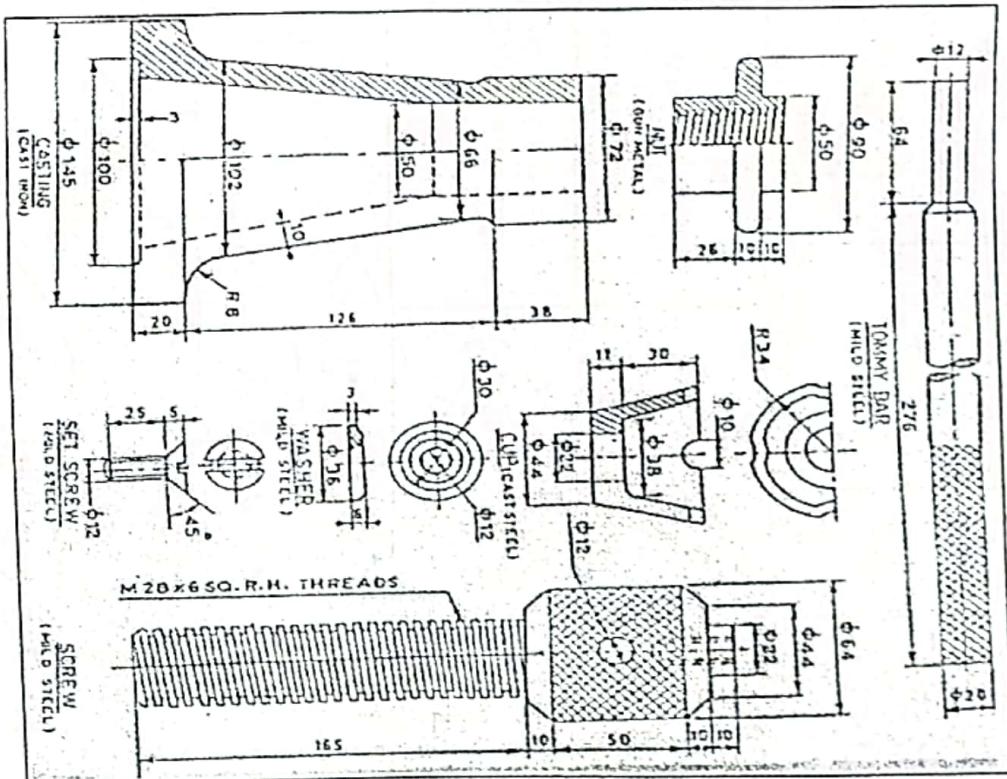


Figure 4

OR

- Assemble the given parts of the split bearing and draw its full sectional (orthographic) front view. (figure 5)

3

POKHARA UNIVERSITY

Level: Bachelor
Semester: Fall
Programme: BE
Course: Engineering Drawing

Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

Attempt all the questions.

1. Draw a conical helix of one convolution, where the base diameter of cone is 40 mm and axial height is 60 mm. Also find the top view of the helix.
2. Reproduce the given views of plane ABCD and find its true shape. (Figure-1).

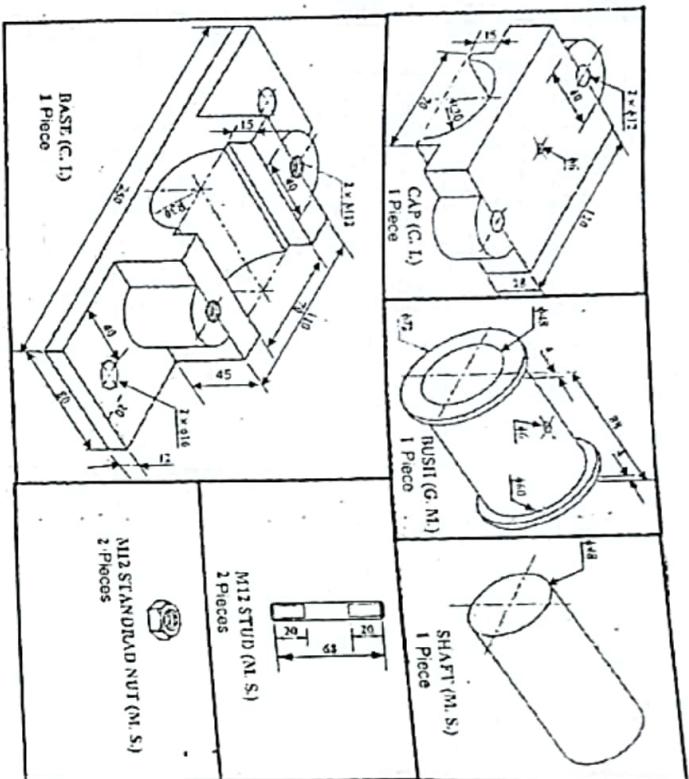
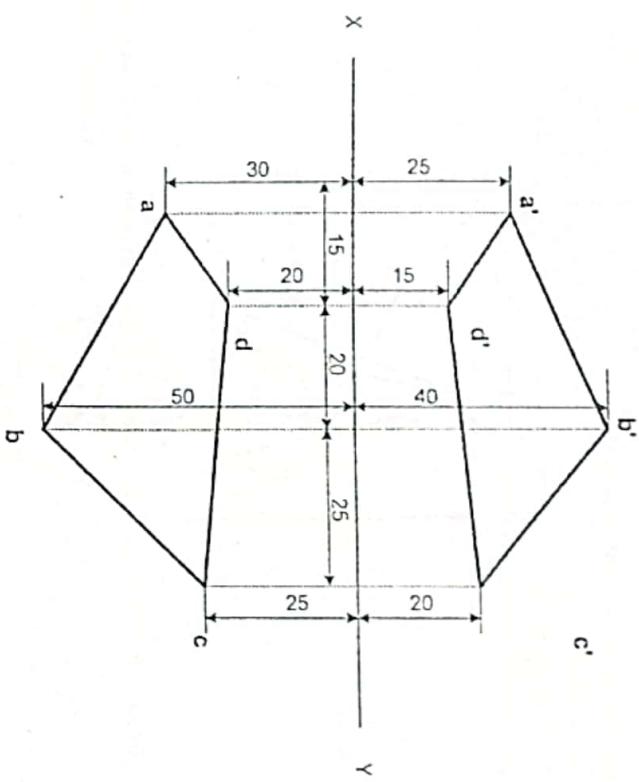


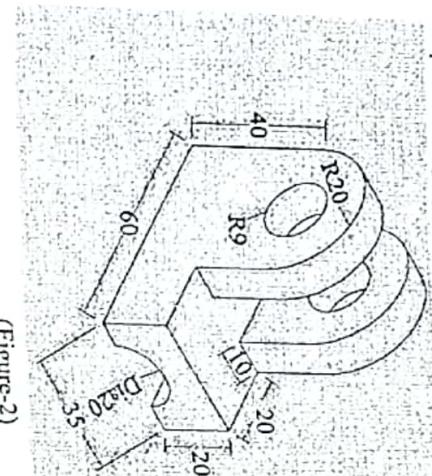
Figure 5

1
(Fig-1)



14
14

3. Draw the complete orthographic views of the given object. (Figure-2).



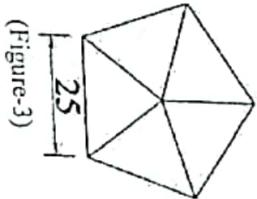
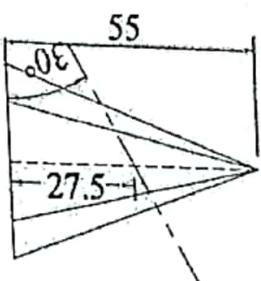
(Figure-2)

18

4. A pentagonal pyramid is cut by a cutting plane as shown in figure-3.

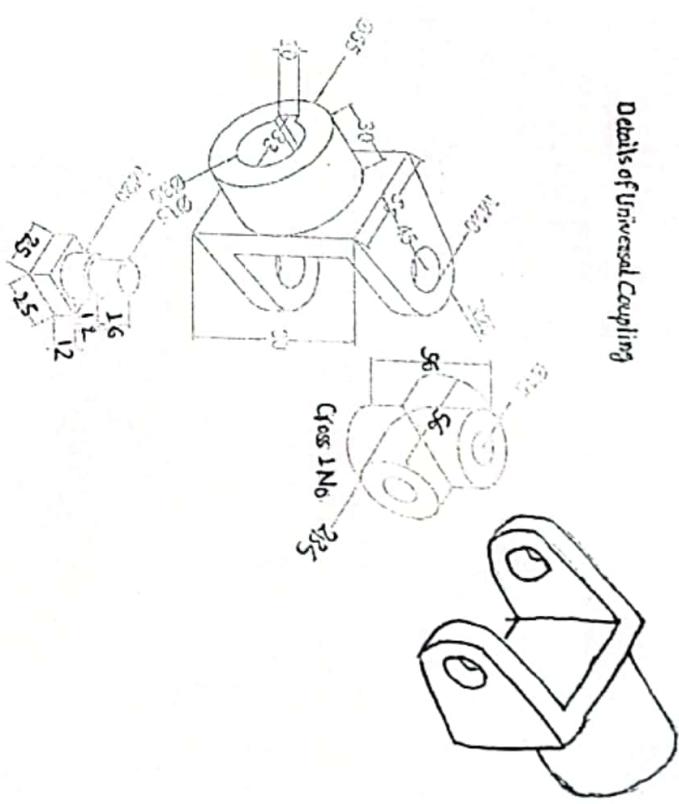
Reproduce the given figure and draw:

- Sectional top view.
- True shape of the section.
- Lateral surface development of the object.



2

5. Assemble the given parts of Universal Coupling and draw its full sectional front view (Figure-4).



(Figure-4)

Or
Assemble the given parts of Stuffing Box and draw its full sectional front view (Figure-5).

Or



POKHARA UNIVERSITY

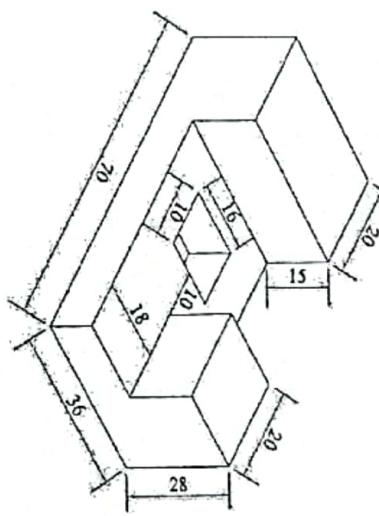
Level: Bachelor Semester: Fall Year : 2014
 Programme: BE Course: Engineering Drawing Full Marks: 100
 Time : 3 hrs. Pass Marks: 45

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

Attempt all the questions.

1. Draw an epicycloid, given the diameter of generating and directing circles are 30 mm and 90 mm respectively. 14
2. Draw the projection of a thin circular sheet of 50 mm diameter and negligible thickness, when its plane is inclined at 45° to the VP and is perpendicular to the HP. A point on its circumference nearest to the VP is 35 mm away from HP and 10 mm from VP. 14
3. Draw the complete orthographic views of the given object. (Fig.-1) 30

(Figure-5)

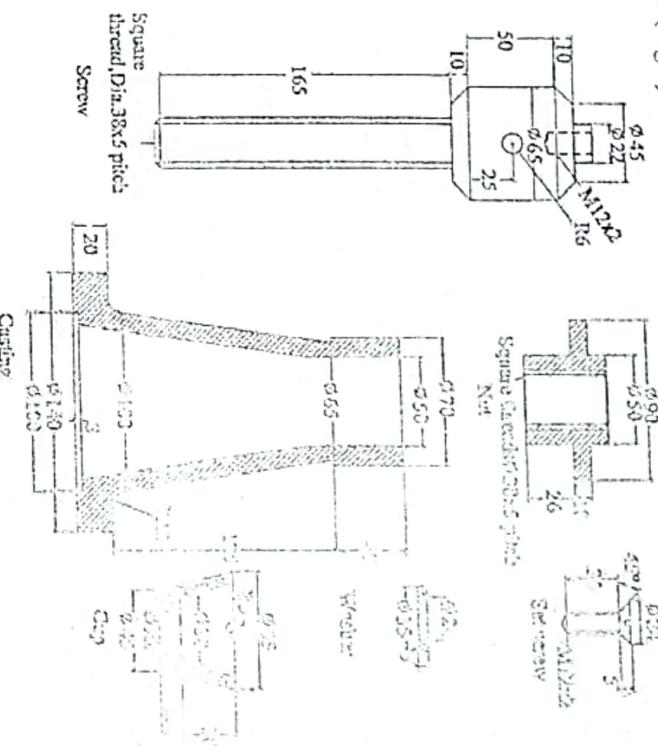


(Figure-1)

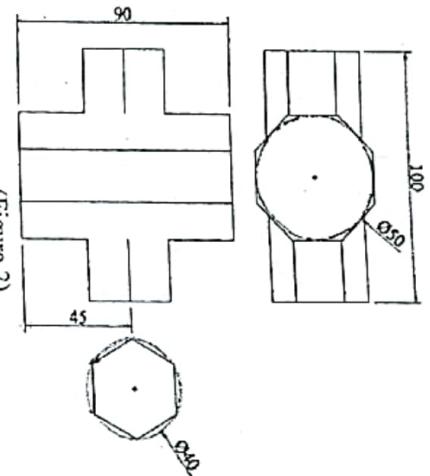
4. A vertical octagonal prism is completely penetrated by a hexagonal prism as shown in figure-2. Reproduce the given views of the object and draw line of intersection. 18

OR

Assemble the given parts of Screw Jack and draw its full sectional front view (Fig-4).

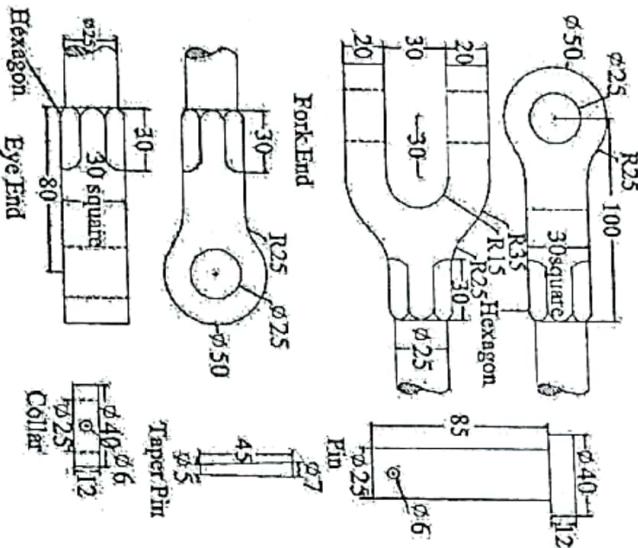


(Figure-4)



(Figure-2)

5. Assemble the given parts of Knuckle Joints and draw its full sectional front view. (Fig-3). 24



(Figure-3)

POKHARA UNIVERSITY

| | | |
|-----------------------------|------------------|-----------------|
| Level: Bachelor | Semester: Spring | Year : 2014 |
| Programme: BE | | Full Marks: 100 |
| Course: Engineering Drawing | | Pass Marks: 45 |
| | | Time : 3 hrs. |

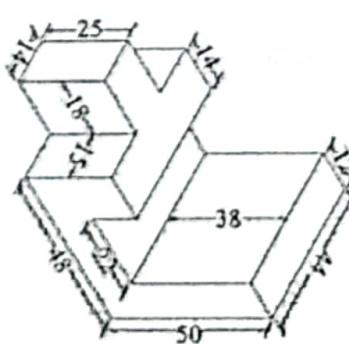
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

All provided dimensions are in mm.

Attempt all the questions.

1. Construct an ellipse where the distance of the focus from directrix is 40mm and eccentricity is $2/3$. 14
2. Draw the projection of the line MN when its end M is 10mm from the HP and 15mm from the VP and end N is 30mm from the HP and 40mm from the VP. Its end projectors are 40mm apart. Find its true length also. 14
3. Draw the complete orthographic views of the given object. (Figure-1). 30

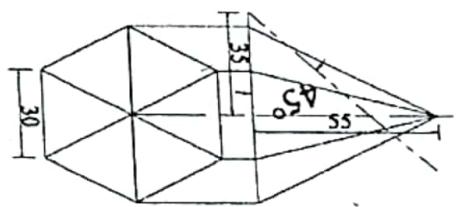


(Figure-1)

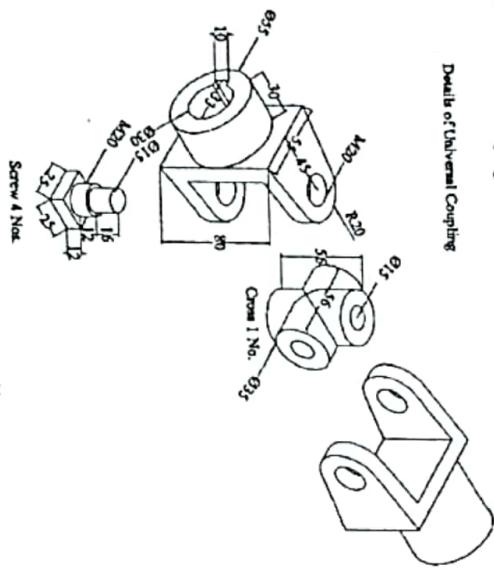
4. A hexagonal pyramid is cut by a cutting plane as shown in figure-2. Reproduce the given figure and draw:
 - Sectional top view.
 - True shape of the section.
 - Lateral surface development of the object.

18

5. Assembled the given parts of Universal Coupling and draw its full sectional front view.(Figure-3).
24



(Figure-2)

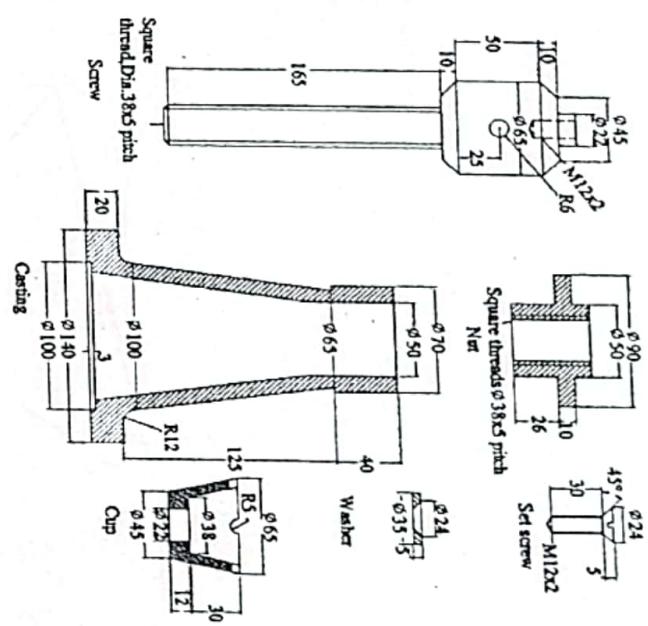


(Figure - 3)

OR

Assembled the given parts of Screw Jack and draw its full sectional front view (Figure-5).

2



(Figure-5)

3

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Engineering Drawing

Semester: Spring
Time

Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

Attempt all the questions.

1. Draw an ellipse by concentric circle method where diameter of circles are 50 mm and 30 mm. Designate the drawn figure as 'Figure-1'. 16
2. Reproduce the given views of a plane and determine the true shape. 12

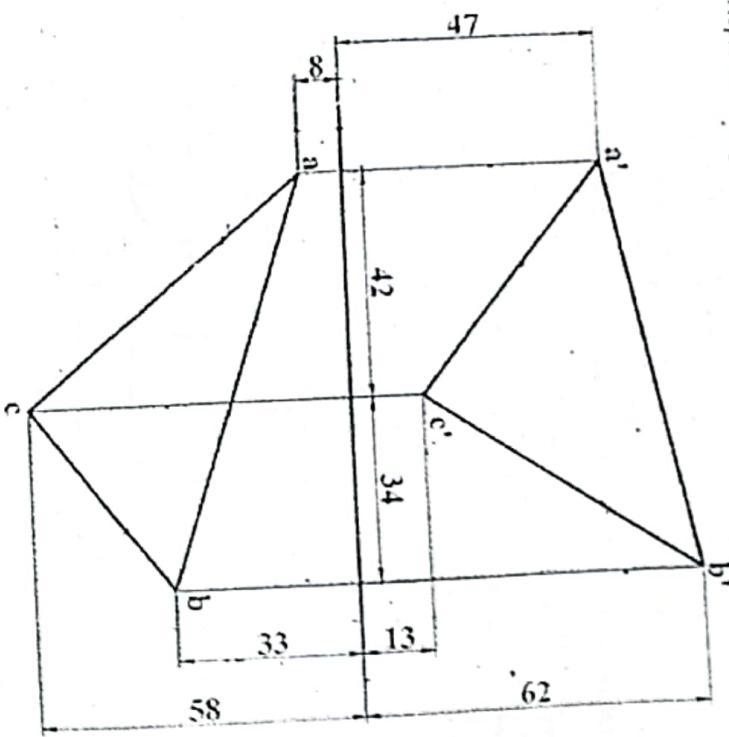


Figure-2

3. Make a complete orthographic drawing of the given object.

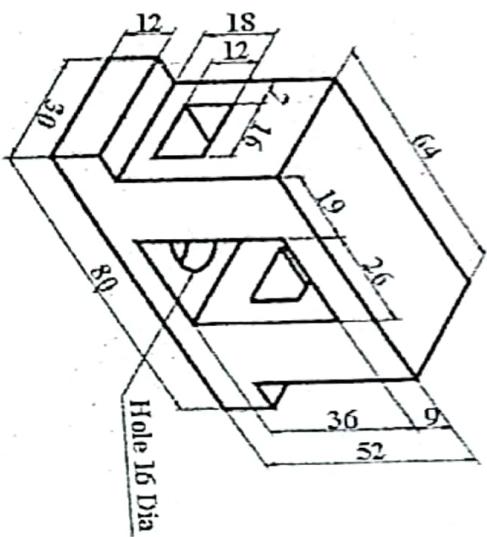


Figure-3

4. Draw the given views of assigned form and complete the intersection.

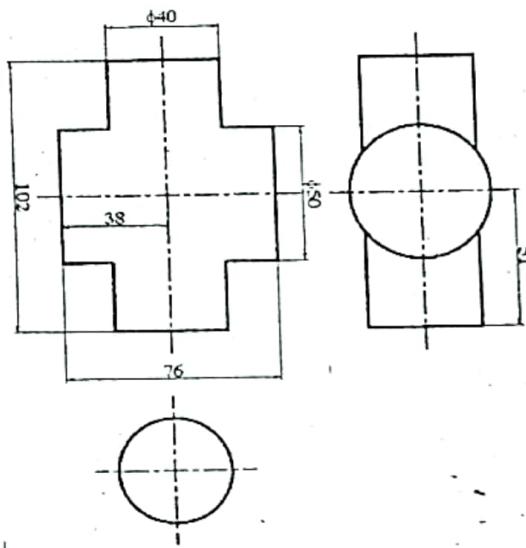


Figure-4

5. Assemble the given parts of Stuffing Box and draw its full sectional front view.

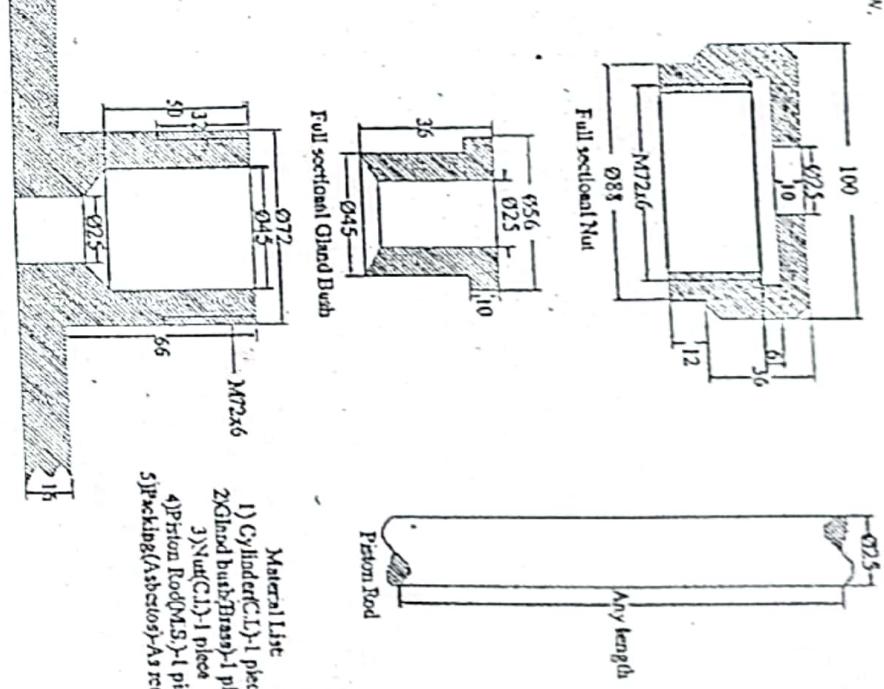


Figure-5

OR
Assemble the given parts of Universal Coupling and draw its full sectional front view.(Figure-5 'OR')

Details of Universal Coupling

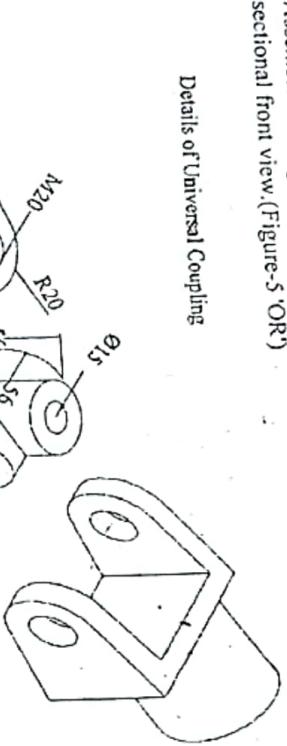


Figure-5 'OR'

4

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Engineering Drawing

Semester: Fall

Year : 2016
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

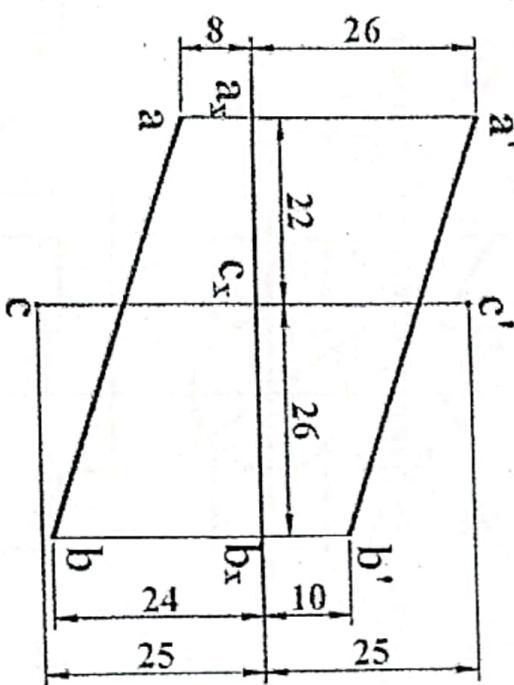
Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

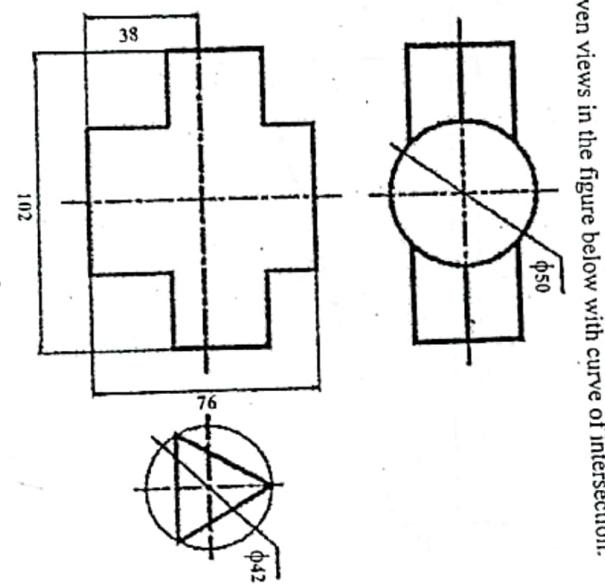
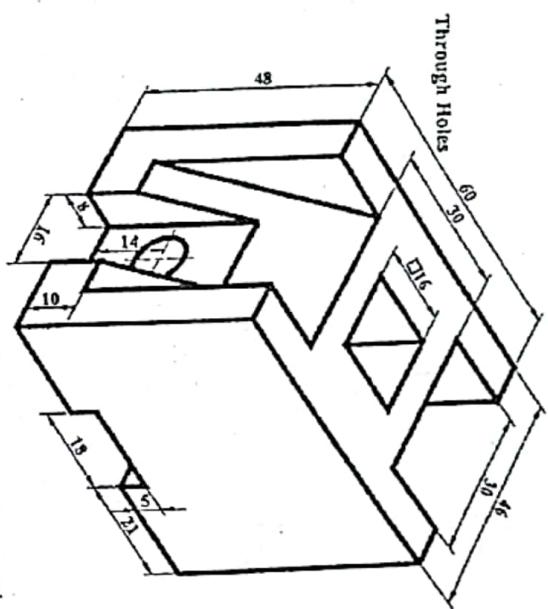
1. Construct one turn of cylindrical helix with diameter if 40 mm and pitch of 60 mm.
2. Determine the shortest distance between the line AB and the point C.

14



1

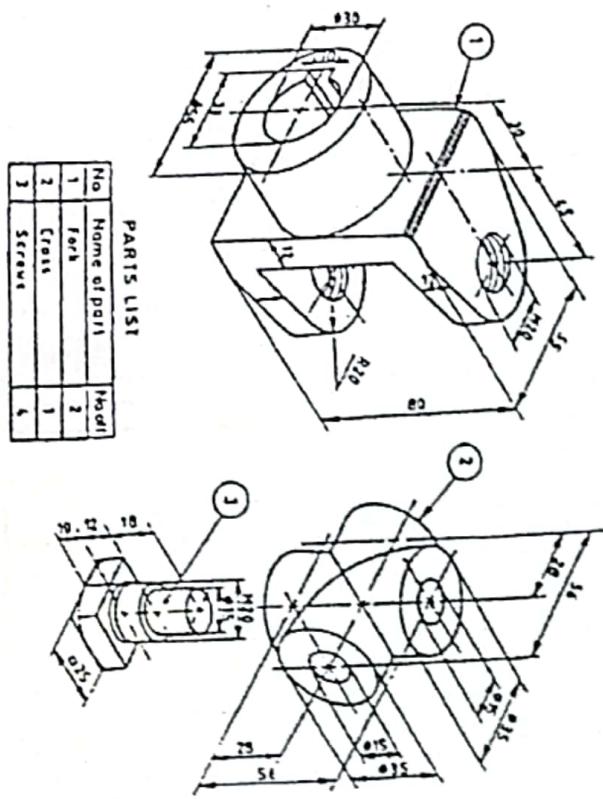
3. Draw complete orthographic views of the given object.



4. Draw the given views in the figure below with curve of intersection.

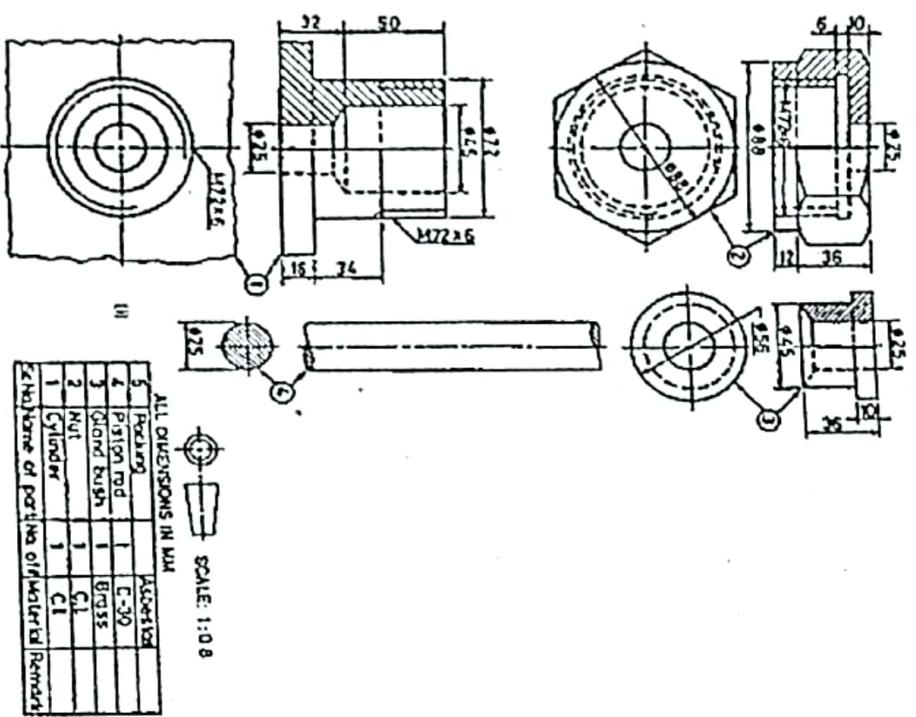
18

5. The figure below shows detail drawing of a UNIVERSAL COUPLING for connecting two shafts. Assemble the parts and draw the sectional front view of the assembly.



OR

Assemble the given parts of Stuffing Box and draw its half sectional front view.



Level: Bachelor
Programme: BE
Course: Engineering Drawing

POKHARA UNIVERSITY

Year : 2016
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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

Attempt all the questions.

1. Construct a crossed line tangent (crossed belt type) between two circles having radii 20 mm and 15 mm and centre to centre distance between them is 75 mm.

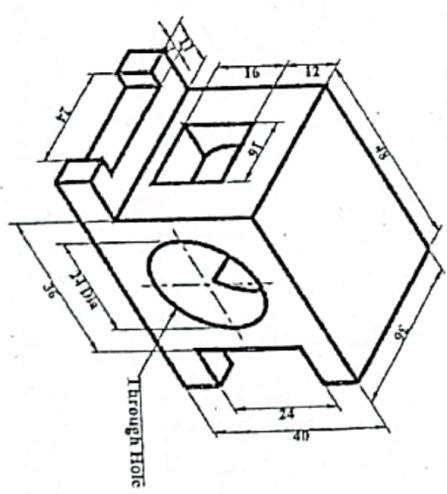
2. a) Draw true shape of given triangular plane from given co-ordinates.

| | X | Y | Z |
|---|----|----|----|
| A | 75 | 20 | 10 |
| B | 40 | 10 | 45 |
| C | 0 | 50 | 20 |

MM

14

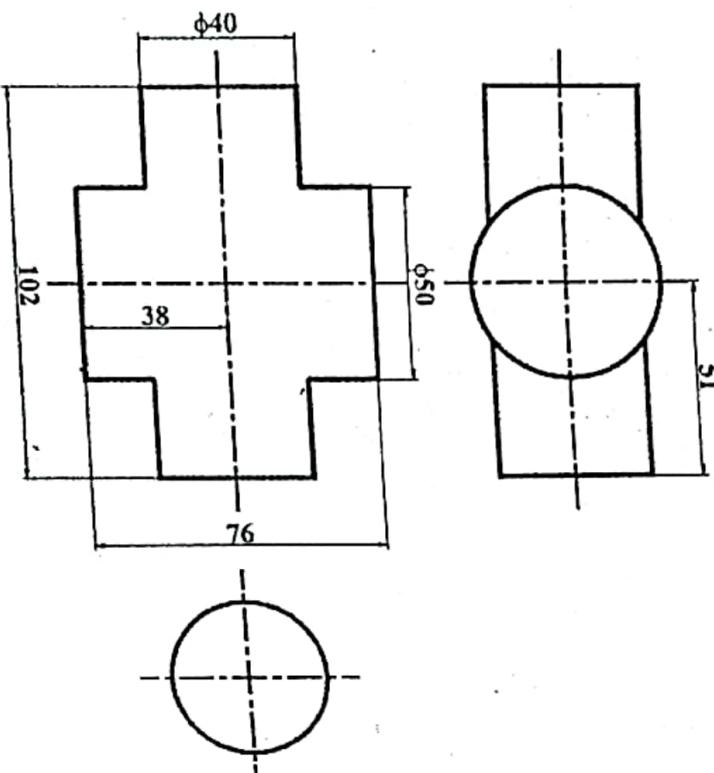
- b) Draw an octagon having side of 30 mm.
3. Draw complete orthographic views of the given object.



6
30

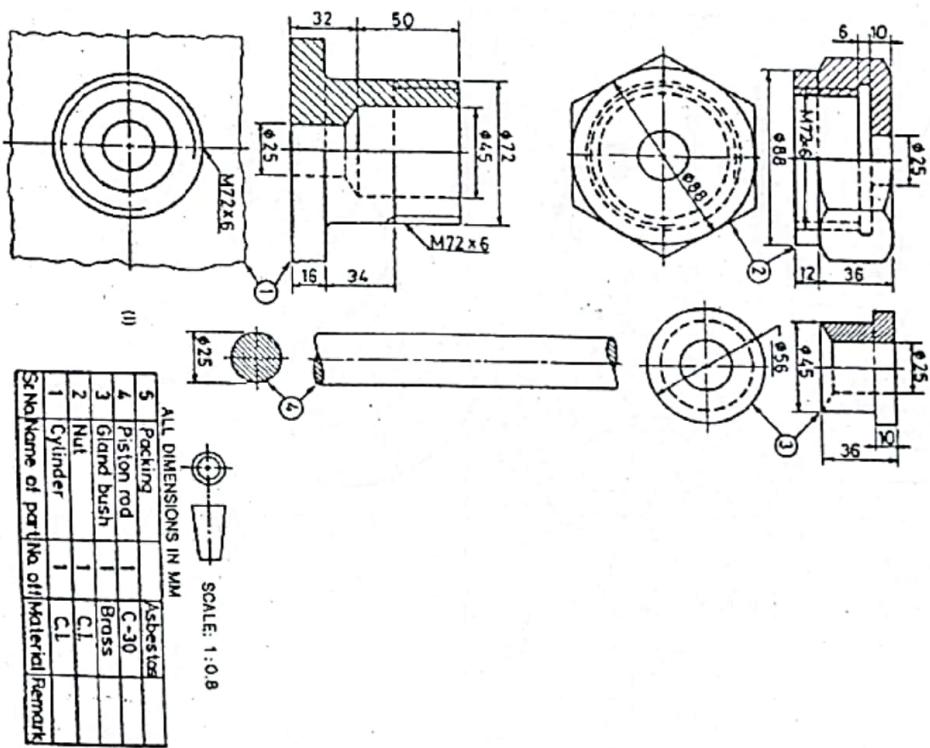
4. Draw the given views of the figure below with curve of intersection.

51



5. The figure below shows detail drawing of a STUFFING BOX for a Small Steam Engine. Assemble the parts and draw the half sectional front view of the assembly.

24



OR

The detail drawing of a SPLIT BEARING is shown in the figures below. Draw the assembled front view with section. Take any length for the shaft.

2

3

POKHARA UNIVERSITY

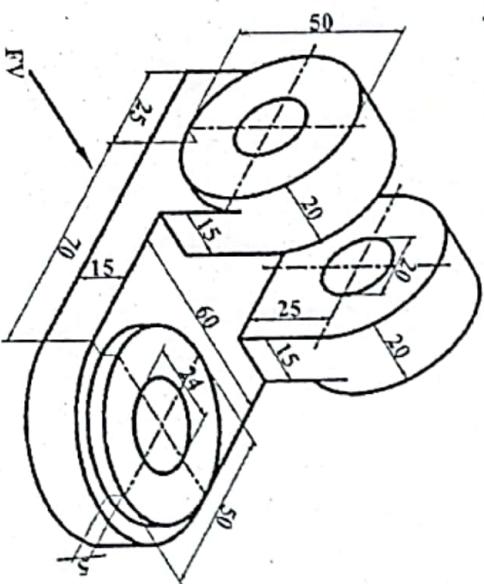
Level: Bachelor Semester: Spring
Programme: BE Course: Engineering Drawing

Year : 2016
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

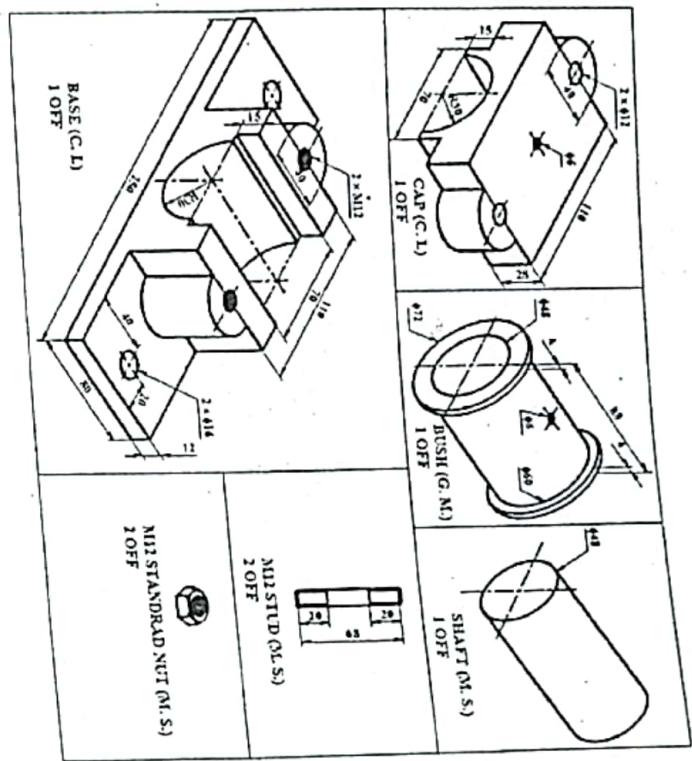
Candidates are required to make neat and accurate drawings with dimensions.
The figures in the margin indicate full marks.

Attempt all the questions.

- Construct a cycloid having a rolling circle of 60 mm diameter. Also draw a tangent and normal at any point P on the curve. 14
- Draw a line 80 mm long and divide it in the proportion of 1:2:3. 6
- Draw the projections of straight line AB 60 mm long parallel to H.P and inclined at angle of 40° to V.P. The end A is 30 mm above H.P and 20 mm in front of V.P. 8
- Draw complete and neat orthographic views of the following figure. 30



- A cylinder of diameter of base 40 mm and height 50 mm is standing on its base on H.P. A cutting plane inclined at 45° to the axis of the cylinder



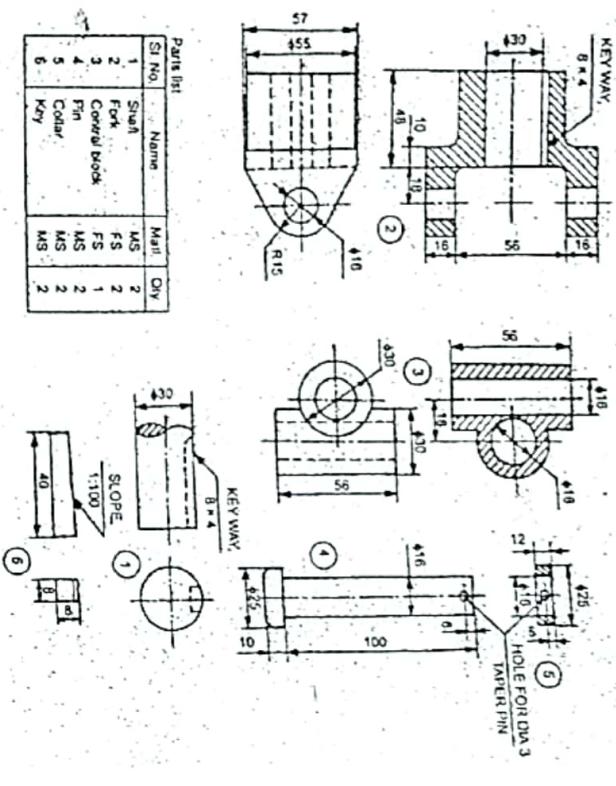
passes through the left extreme point of the base. Develop the lateral surface of the truncated cylinder.

OR

A cone of base 50 mm diameter and height 60 mm rests with its base on H.P and bisects the axis of the cone. Draw the development of the lateral surface of the truncated cone.

6. Assemble all the parts of universal coupling and draw the half sectional view from the front.

24

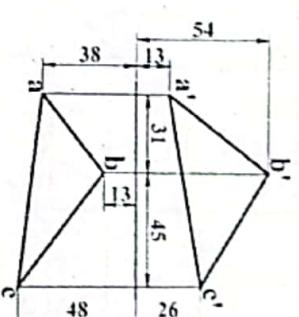


Level: Bachelor
Semester: Fall
Programme: BE
Course: Engineering Drawing
Time : 3hrs.

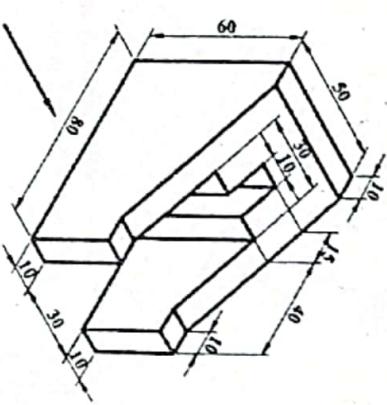
Candidates are required to draw neat and clear figures with appropriate dimensions.
The figures in the margin indicate full marks.

Attempt all the questions.

1. Draw one turn of a helix of pitch 60 mm on a cylinder of diameter 40 mm.
2. Draw the true shape of a plane for a figure shown below.



3. Draw complete orthographic views of the given object.

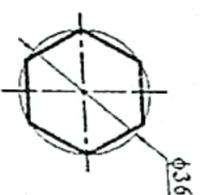
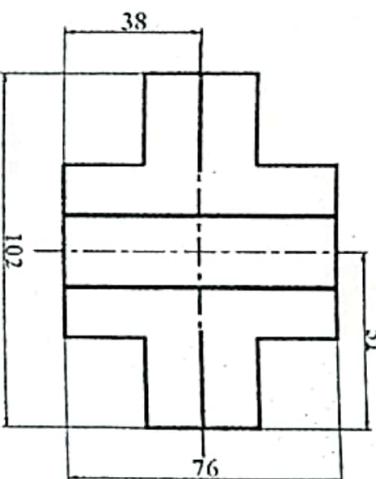
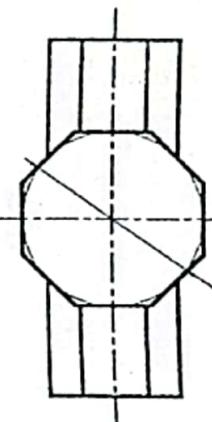


POKHARA UNIVERSITY

Year : 2017
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

4. Draw the complete orthographic drawing showing the curves of 18 intersection of solid for the figure shown below.

₹50



मुम्बाय देशीय संस्कृति एवं पर्यावरणी विज्ञान
कलाकारी विज्ञान १८-४१११११
NCIT College

POKHARA UNIVERSITY

Semester: Spring

Year : 2017

Level: Bachelor
Programme: BE
Course: Engineering Drawing

Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Candidates are required to make neat and clear drawings with accurate dimensions.

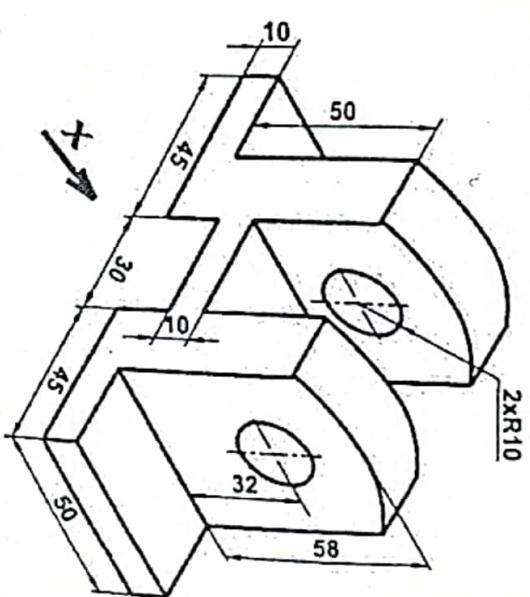
The figures in the margin indicate full marks.

All dimensions are in mm.

Attempt all the questions.

1. Draw an involute of a circle having diameter of 30 mm.
2. A hexagonal plate having negligible thickness of sides 25 mm is perpendicular to the H.P. and inclined to the V.P. at 45° . One side of the hexagon nearest to the H.P. is parallel to the H.P. and 20 mm above from it. The nearest corner to the V.P. is 20 mm in front of it. Draw its projection.
3. Draw complete and neat orthographic views of the following figure.

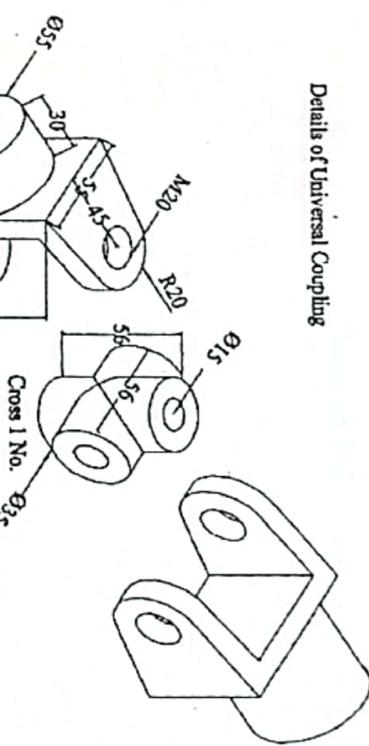
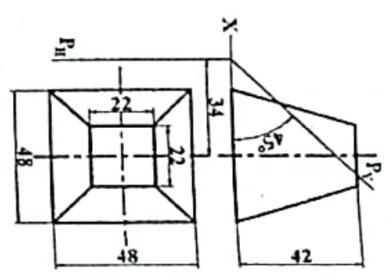
14
14
30



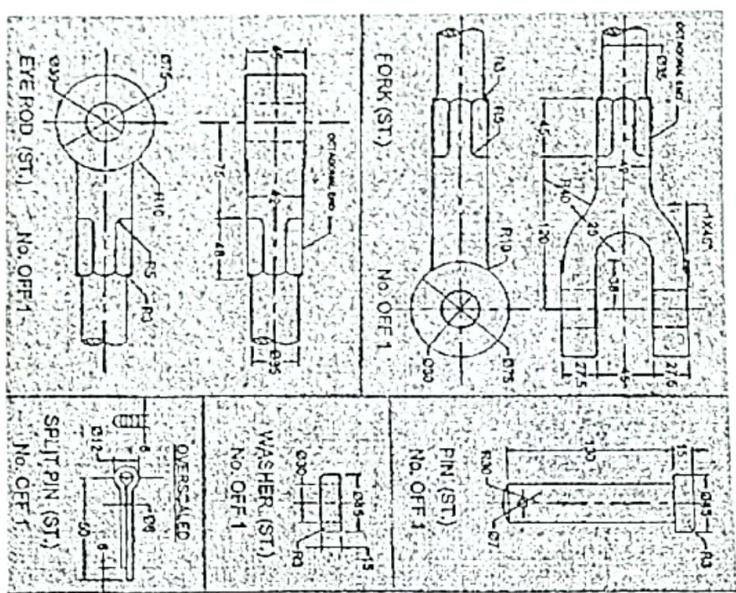
4. Draw a complete lateral surface development of the given figure. Also draw a sectional top view and true shape of the given figure.

Assemble the given parts of Universal Coupling and draw its full sectional front view.

Details of Universal Coupling



5. Assemble the given parts of Knuckle Joints and draw its full sectional front view. 24



OR

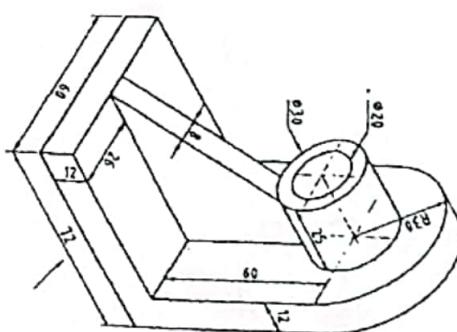
POKHARA UNIVERSITY

| | | |
|-----------------------------|----------------|-----------------|
| Level: Bachelor | Semester: Fall | Year : 2018 |
| Programme: BE | | Full Marks: 100 |
| Course: Engineering Drawing | | Pass Marks: 45 |
| | | Time : 3 hrs. |

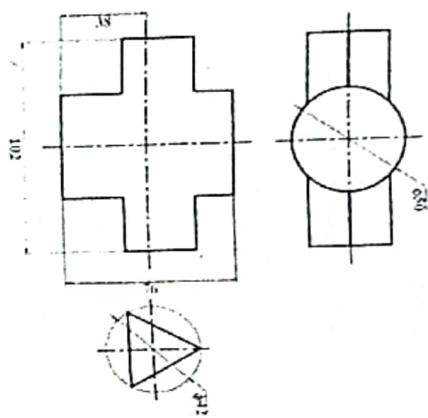
Candidates are required to make neat drawings with accurate dimensions.
The figures in the margin indicate full marks.
Assume suitable data if necessary.

Attempt all the questions.

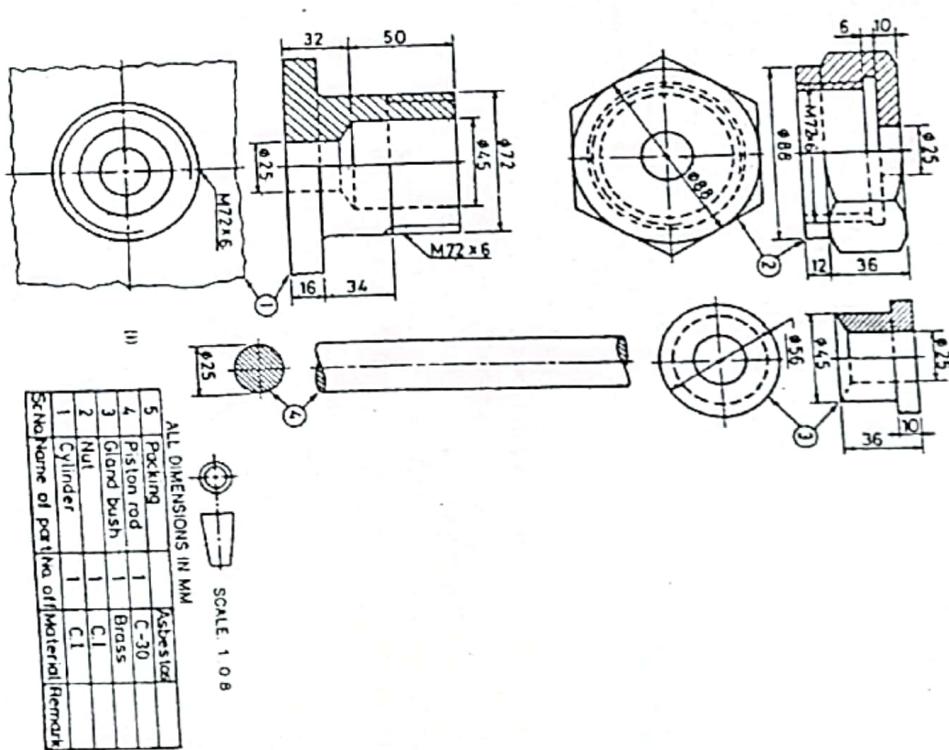
- 1 Draw a hypocycloid having a generating circle of diameter 50 mm and directing circle of radius 10 mm. Also draw a normal and a tangent at any point M on the curve. 14
- 2 A line AB, 90 mm long, is inclined at 30° to the H.P. Its end A is 12 mm above the H.P., and 20 mm in front of the V.P. Its front view measures 65 mm. Draw the top view of AB and determine its inclination with the V.P.
- 3 Draw complete and neat orthographic views of the following figure. 30



4 Draw the given views of assigned form and complete the intersection. 18



5 The figure below shows the detail drawing of the parts. Assemble the parts and draw the half sectional front view of the assembly. 24



POKHARA UNIVERSITY

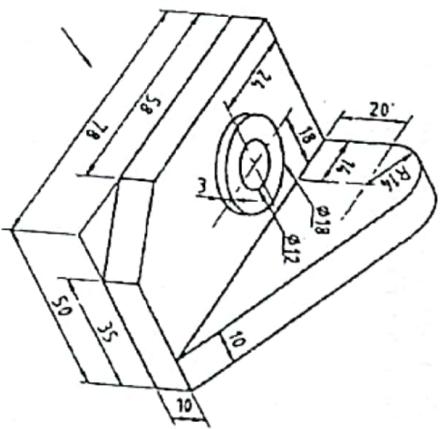
Level: Bachelor
Semester: Fall
Programme: BE
Course: Engineering Drawing

Year : 2018
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Candidates are required to make neat drawings with accurate dimensions.
The figures in the margin indicate full marks.
Assume suitable data if necessary.

Attempt all the questions.

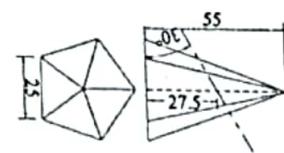
- 1 Draw an epicycloid of rolling circle of diameter 40 mm which rolls outside another circle (base circle) of 150 mm diameter for one revolution. Draw a tangent and normal at any point on the curve.
- 2 A line AB of 70 mm long, has its end A at 10 mm above H.P and 15 mm in front of V.P. Its front view and top view measure 50 mm and 60 mm respectively. Draw the projections of the line and determine its inclinations with H.P. and V.P.
- 3 Draw complete and neat orthographic views of the following figure.



4 A pentagonal pyramid is cut by a cutting plane as shown in figure below.

Reproduce the given figure and draw:

- Sectional top view
- True shape of the section
- Lateral surface development of the object



24

5 The detail drawing of a SPLIT BEARING is shown in the figure below. Draw the assembled front view with section. Take any length for the shaft (Figure 5a)

The figure below shows detail drawing of a UNIVERSAL COUPLING for connecting two shafts. Assemble the parts and draw the sectional front view of the assembly (Figure 5b)

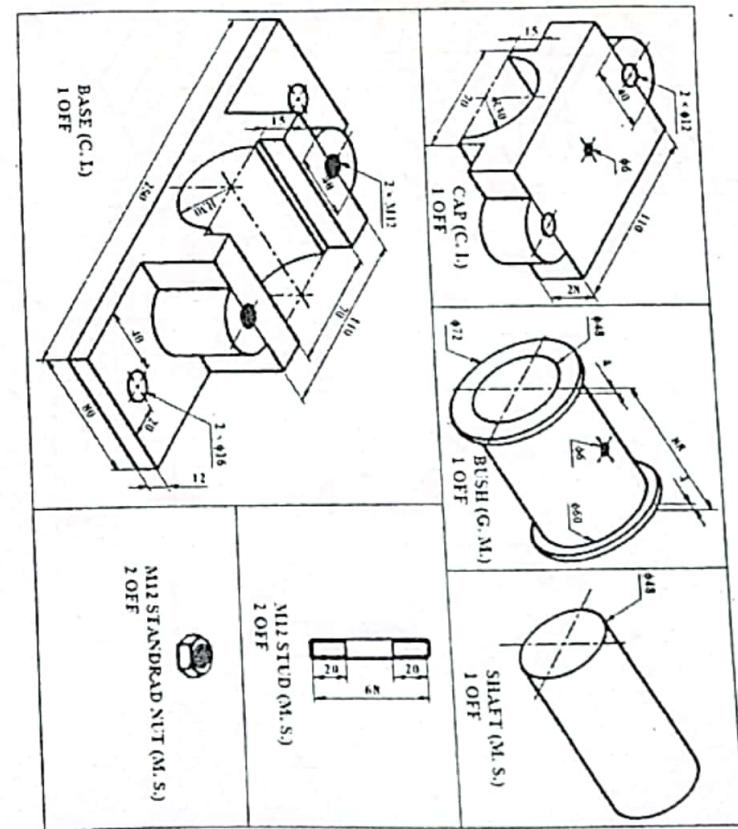


Figure 5a

POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2018

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

Candidates are required to make clear and accurate drawings in appropriate dimensions.
The figures in the margin indicate full marks.

The figures in the margin indicate full marks.
Assume suitable data if necessary. All dimensions are in mm.

Attempt all the questions.

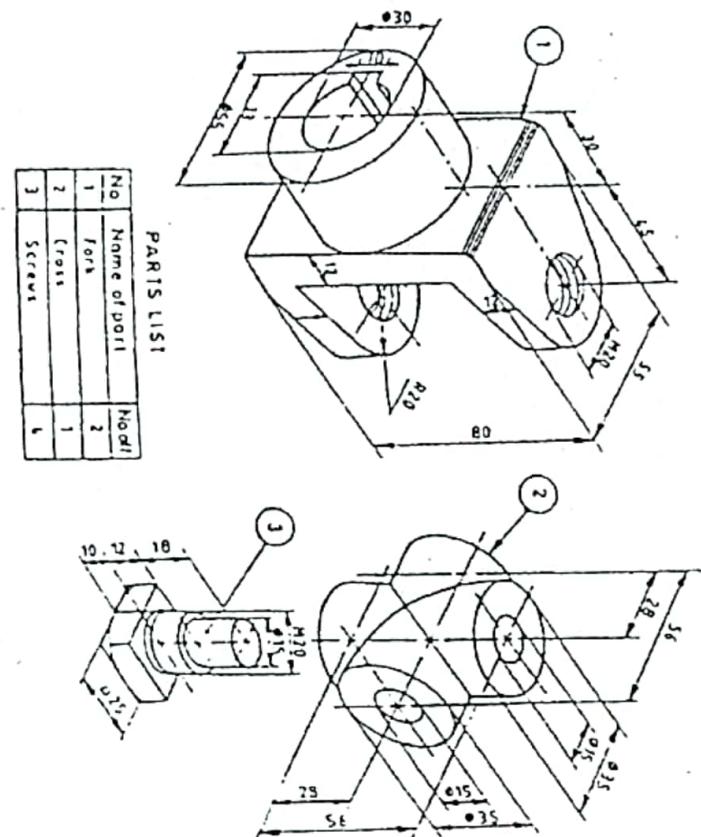


Figure 5b

- If a cutting plane cuts a right circular cone into given position, as shown in figure 2. Reproduce the given views of the object and draw sectional

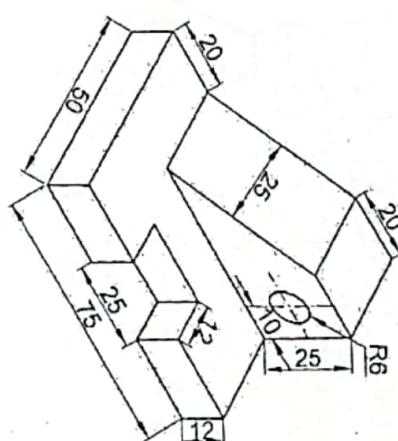


Figure 1

1

top view, true shape of the section and lateral surface development of the object.

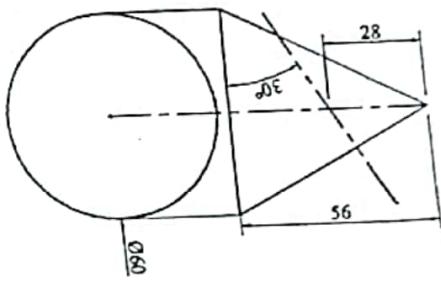


Figure 2

5. Figure 3 shows the detail of a Split Bearing. Draw the assembled front view with section.
- OR
- Assemble the parts of a knuckle joint, shown in figure 4 and draw, sectional view from the front.

24

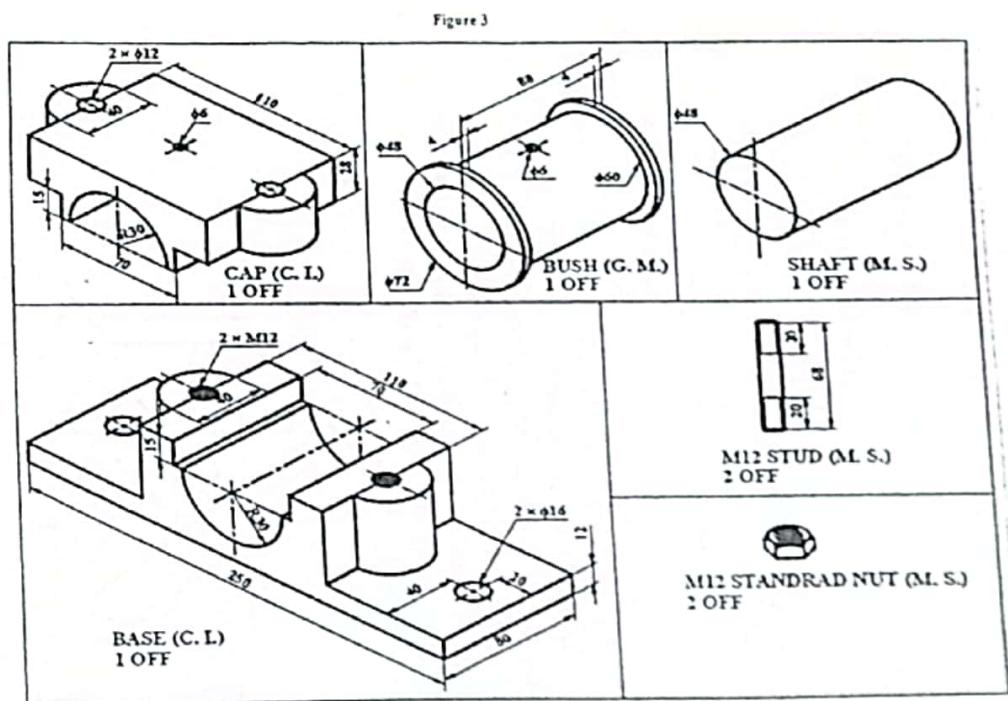


Figure 3

POKHARA UNIVERSITY

Year : 2019

Full Marks: 100

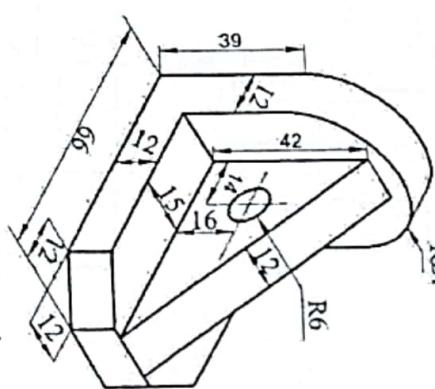
Pass Marks: 45

Level: Bachelor Semester: Fall
Programme: BE Course: Engineering Drawing
Time : 3hrs.

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

Attempt all the questions.

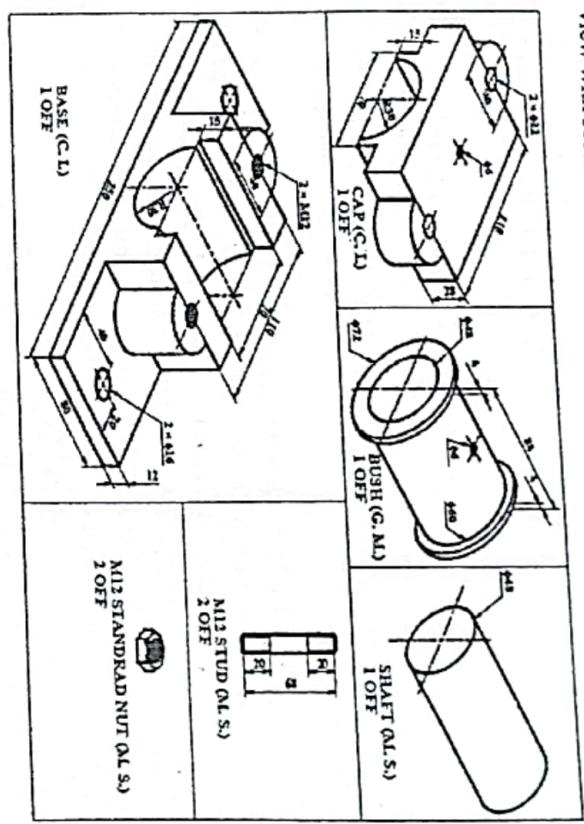
1. Draw a hyperbola, where the distance of vertex from focus is 15 mm and eccentricity is 3/2. Also draw a tangent on the hyperbola. 14
2. A straight line AB, 65 mm long, has its end A 15 mm behind VP and 10 mm below HP. It is inclined at 45° to the HP and 30° to the VP. Draw its projections when the line lies in the third quadrant. 30
3. Draw the complete orthographic views of the given object. R21



4. If a cutting plane cuts a square base pyramid in to given positions, as shown in figures. Reproduce the given views of the object and draw its complete surface development. 18

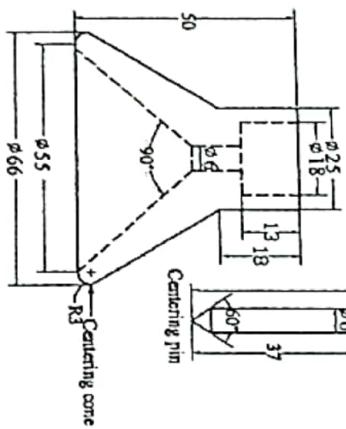
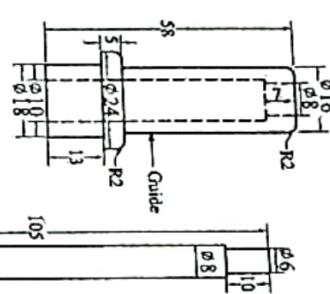
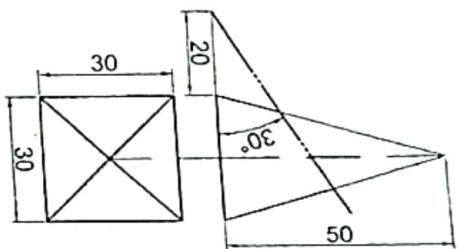
OR

Figure below shows the detail of a Split Bearing. Draw the assembled front view with section.



5. Assembled the given parts of *Centering cone* and draw its full sectional front view.

24



2

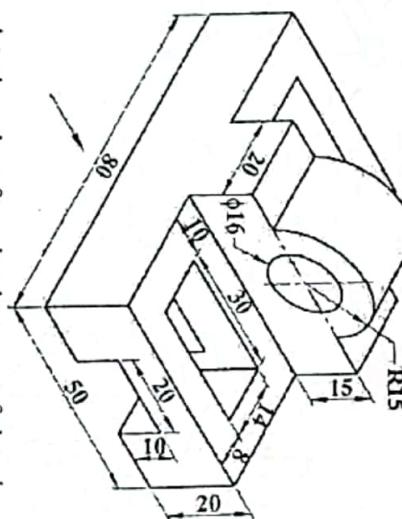
POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2019
Programme: BE Course: Engineering Drawing Full Marks: 100
Time : 3hrs. Pass Marks: 45

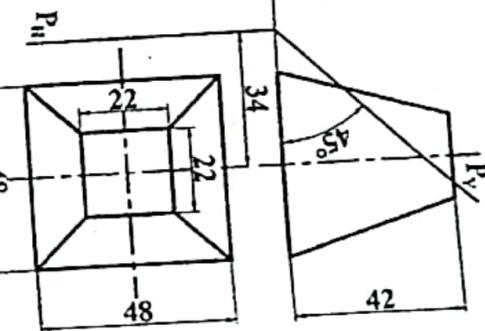
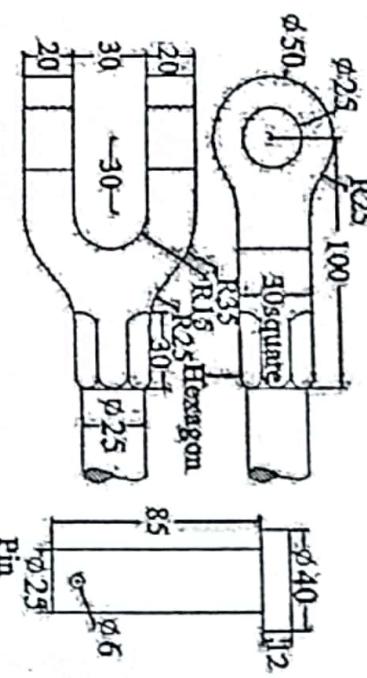
Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt all the questions.

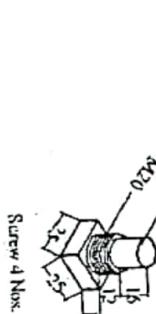
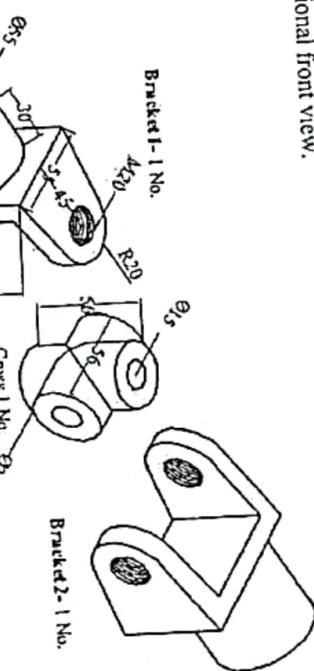
1. Draw an Archimedian's spiral of one convolution of radius 80 mm. 14
2. An equilateral triangle ABC having sides 45 mm has its corner A in HP and side AC inclined at 45° to VP. The corners A and B are in VP. Draw its projections, if the plane is perpendicular with HP. 14
3. Draw the complete orthographic views of the given object. 30
4. Draw a complete lateral surface development of the given figure. Also draw a sectional top view and true shape of the given figure. 18



front view.



5. Assembled the given parts of *Universal coupling* and draw its full sectional front view.
24



OR

- Assembled the given parts of *Knuckle Joint* and draw its full sectional front view.
2

Computer /SE/IT/Civil

POKHARA UNIVERSITY

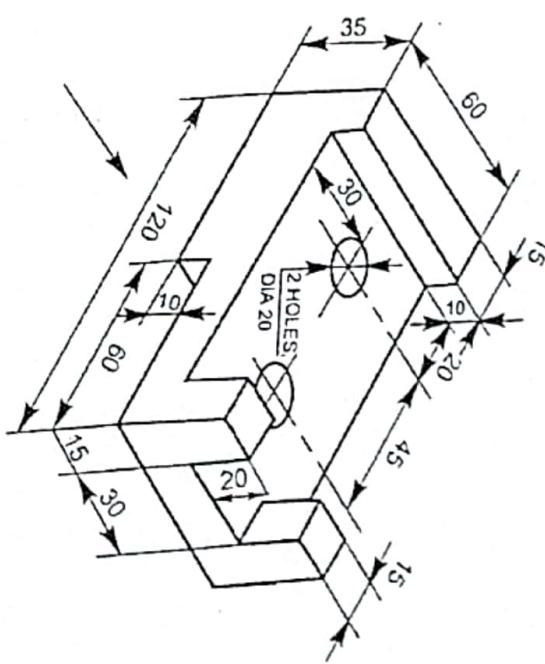
| | | |
|------------------------------------|-------------------------|------------------------|
| Level: Bachelor | Semester: Spring | Year : 2019 |
| Programme: BE | | Full Marks: 100 |
| Course: Engineering Drawing | | Pass Marks: 45 |
| | | Time : 3 hrs. |

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. Draw a helix of 72 mm pitch for one revolution around a right circular cone of diameter 60 mm and height 72 mm. Also show the top view of the helix. 14
2. A Square lamina ABCD, of 30 mm side, rests on one of its corners on ground. Its plane is inclined at an angle of 30° to the ground plane and diagonal BD inclined at 60° to the VP and parallel to the HP. Draw its projections.
3. Draw the complete orthographic views of the given object.
(Assume suitable data if necessary)



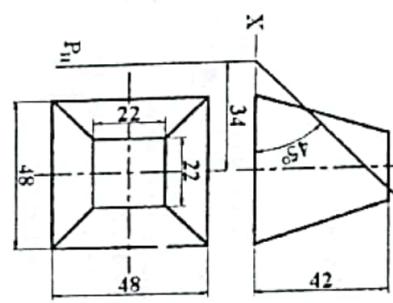
4. A square base pyramid is cut by a cutting plane as shown in figure.

Reproduce the given figure and draw:

a) Sectional top view

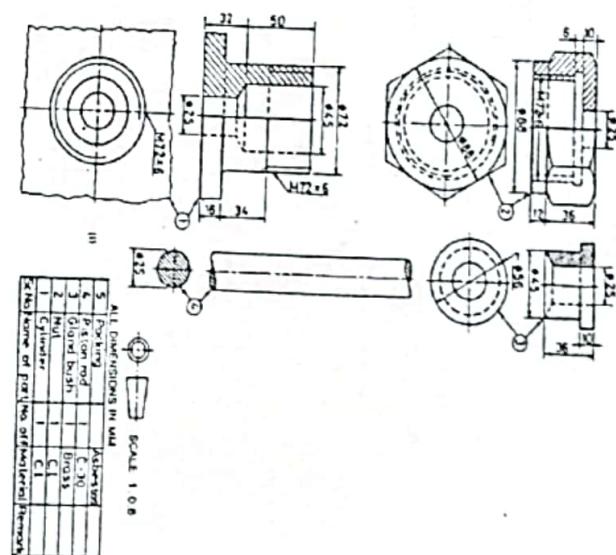
b) True shape of the section

- c) Lateral surface development of the object



18

5. Assembled the given parts of Stuffing Box and draw its half sectional front view.

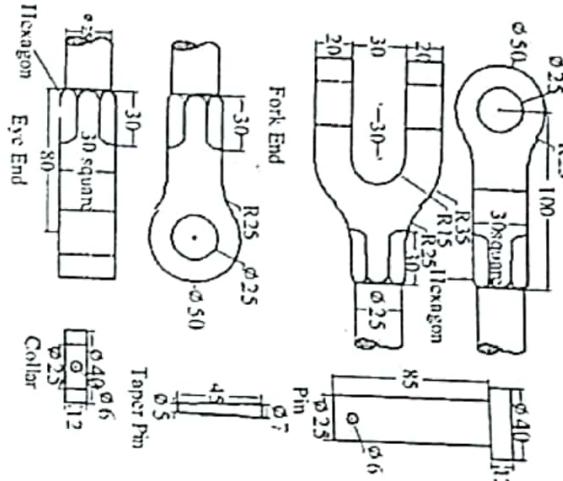


POKHARA UNIVERSITY

| | | |
|------------------------|------------------|----------------|
| Level: Bachelor | Semester: Spring | Year : 2013 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Logic Circuits | Time : 3 hrs. | |

OR

Assemble the given parts of Knuckle Joint and draw full sectional front view.



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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Describe in brief why most of system in the present days has been converted to digital rather than analog. 5
 - b) "8 4 - 2 - 1 code is self-complementing code." Justify this statement. 5
 - c) i) Perform the following subtraction $(34)_8 - (27)_8$ convert the given number into binary and perform subtraction using 2's complement.
ii) Determine the value of base x if $(321)_x = (57)_8$ 7
 2. a) Design even parity generator when a 3 bit message contains cyclic code. 5
 - b) Reduce the given expression in minimum number of literals using Boolean algebra and drive the truth table and implement in NAND logic. 8
- A+B[AC+B{AC+(B+C'D)}]
3. a) A logic circuit implements the following Boolean function $F = A'C + AC'D'$. It is found that the circuit input combination $A=C=1$ can never occur. Using K-map with proper don't care conditions, find a simplified expression and implement it using NAND gates only. 8
 - b) Derive a PLA program table for the combinational circuit that squares 3 bit number minimize the number of product term. 7
 4. a) Differentiate between PLA and ROM. Implement the given four Boolean function using 8×4 PLA
 $\Lambda(x,y,z) = \Sigma(0,1,6,7)$ 7

$$C(x,y,z) = \Sigma(2,6)$$

$$D(x,y,z) = \Sigma(1,2,3,5,7)$$

- b) Explain in detail about the positive edge triggered J.K flip-flop. Write its advantage over S-R flip-flop. 8

5. a) With suitable example explain about state reduction and assignment. Also, write the advantages of state reduction and assignment. 7

- b) What is shift register? Explain the operation of serial-In serial out shift register with its circuit diagram and timing diagram. 8

6. a) Design a 3 bit synchronous binary up counter using JK flip-flop. b) Design a 4-bit arithmetic circuits which performs eight different operations. What do you mean by 'Output Hazard Races'? With the help of diagram explain how Read/Write operation is performed in RAM. 8

7. Write short notes on: (Any Two) a) Status Register b) Nibble Adder c) Master Slave f/f. 7

2×5

| POKHARA UNIVERSITY | |
|------------------------|-----------------|
| I.level: Bachelor | Semester: Fall |
| Programme: BE | Year : 2014 |
| Course: Logic Circuits | Full Marks: 100 |
| | Pass Marks: 45 |
| | Time : 3hrs. |

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

Attempt all the questions.

1. a) What are the differences between Digital and Analog system. Why digital systems are preferred rather than Analog system. 5
b) Add and multiply the following number in the given base without converting to decimal. 5

i. $(1230)_4$ and $(23)_4$

ii. $(135.4)_6$ and $(43.2)_6$

- c) Perform the following conversion.

i. $(5849)_{10} = (?)_{\text{Excess-3}}$

ii. $(8412)_{10} = (?)_{221}$

iii. $(1010111)_{\text{GRAY}} = (?)_2$

सुन्म स्टेटरी सचिवार्थ एक प्रयोगी समिति
बाल्कुमारी नवीनतार १९७५१९७१२
NCTT College

2. a) Simplify the following expression using Boolean algebra 5

i. $(AB' + ABCY) + A(B + AB')$

ii. $[(BC' + A'D)(AB' + CD')]'$

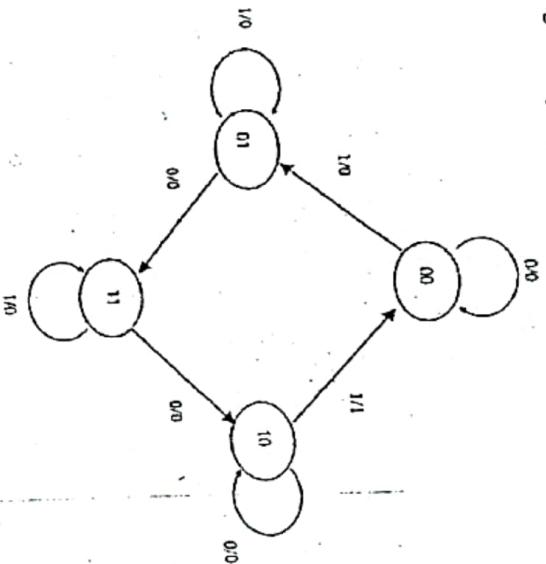
- b) Given the following Boolean function: $F = xy + x'y' + yz$
i. Implement it with OR and NOT Gate 5
ii. Implement it with only AND and NOT Gate

- c) A Boolean function is given by $F(A,B,C,D) = \Sigma(0,2,8)$. Simplify it using K-Map and implement using NAND gate only. 5

3. a) Design a combinational circuit that converts a decimal digit from the 2421 code to 84-2-1 code to binary. 8
b) Design a BCD to Excess -3 code converter circuit. 7
4. a) Design a Comparator circuit that compared two 4 bit numbers. The two numbers being A and B. It is required to obtain three possible 8

Level: Bachelor Semester: Spring Year : 2014
 Programme: BE Full Marks: 100 Pass Marks: 45 Time : 3hrs.

- outcomes, i.e. A>B, A<B and A=B.
 b) Implement the following with appropriate MUX:
 i. $F(A,B,C)=\sum(1,3,5,6)$
 ii. $F(A,B,C,D)=\sum(0,1,3,4,8,9,15)$
 5. a) Design a sequential circuit corresponding to the given state diagram using S-R flipflop.

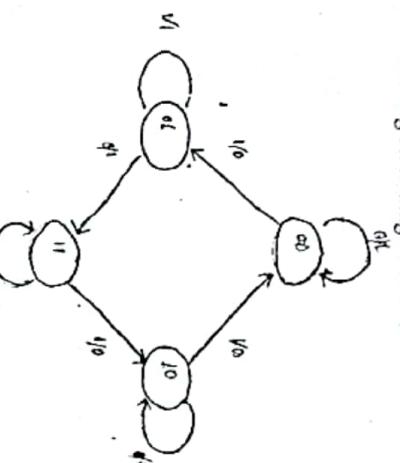


Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Defining positive and negative logic system. "Digital circuits are easier to design than analog circuit." Do you agree with this statement? Give reasons to support your answer. 8
- b) Find the value of X.
 i) $(777)_8 = (\quad)_{12}$
 ii) $(DEC)_H = (0101)_X$
 iii) $(563)_7 = (X)_3$
 iv) $(100111)_{Gray} = (X)_{Binary}$
2. a) State and Prove De-Morgan's Theorem. List out the factors to be considered while constructing the Logic Gates. 7
- b) What is Don't care condition? Simplify given function using K-map with circuit design.
 $F(W,X,Y,Z)=\sum(1,4,5,6,12,14,15)$ and don't care condition $D(W,X,Y,Z)=\sum(10,11)$. 8
3. a) Define universal gate. Design the three bit EX-OR circuit using only Universal gates. 7
- b) Design a combinational circuit that accepts a 3 bit number as input and generates the output binary number equal to the 2's complement of input number. 8
4. a) Show how a full adder can be converted to a full subtractor with the addition of one inverter circuit. 7
- b) Implement the following:
 i. $F(A,B,C)=\sum(1,3,5,6)$ (using MUX)
 ii. $F_1=\sum(0,2,5)$ $F_2=\sum(3,4,7)$ $F_3=\sum(6,7)$ (using ROM) 8

5. a) Realize the following state diagram into a circuit using j-k flip-flop.



8

7

Level: Bachelor
Semester: Fall
Programme: BE
Course: Logic Circuits

POKHARA UNIVERSITY

Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

Attempt all the questions.

1. a) Which system is more efficient for logical computation? Differentiate between Digital and Analog system. 5
- b) Perform the conversion as indicated (any two). 5
- i. $(243)_6 = ()_{\text{Excess-3}}$ 5
- ii. $(816)_{10} = ()_{2421}$ 5
- iii. $(BE)_{16} = ()_2$ 5
2. a) Use 2's complement to subtract the following: 5
- i. $(101)_2 - (10100)_2$ 5
- ii. $(3950)_{10} - (876)_2$ 5
- iii. $(378)_{BCD} - (256)_{BCD}$ 5
3. a) Prove the following Boolean expression. 5
- i. $\overline{AB} + BC + \overline{ABC} = \overline{A} + BC$
- ii. $X\bar{Y} + Y\bar{Z} + Z\bar{X} = \bar{X}Y + \bar{Y}Z + \bar{Z}X$
- b) Simplify the Boolean function F and don't care conditions d in (1) SOP (2) POS and (3) draw NAND-NAND equivalent logic. Given: 5
- $F = A'B'D + A'CD + ABC$
- $d = A'B'C'D + A'CD + AB'D'$
- c) A Boolean function is given by $F(A,B,C,D) = \Sigma(3,4,6,8,10,12,14)$ and don't care condition $d(A,B,C,D) = \Sigma(0,2,8)$. Simplify it using K-Map and implement using NAND gate only. 5
3. a) Design a single combinational logic circuit that performs the addition of two input bits (a and b) when third input bit c is set to 0 whereas, the same circuit performs the subtraction of same two input bits when c is set to 1. 7

POKHARA UNIVERSITY

Year : 2015
 Semester: Spring
 Full Marks: 100
 Programme: BE
 Course: Logic Circuit
 Time : 3 hrs.

8. a) Design a BCD synchronous up counter using T-flip flop. 8
4. a) Implement the following three Boolean function with a PLA 7
 $F_1 = \sum(0,1,2,4) F_2 = \sum(0,5,6,7) F_3 = \sum(0,3,5,7)$
- b) What do you mean by Decoder? Implement the following Boolean function $F = \sum(1,3,5,6)$ using 4×1 MUX. 8
5. a) Design a sequential circuit corresponding to the given state diagram using D Flip Flop for the following state diagram. 8

Design a sequential circuit corresponding to the given state diagram using D Flip Flop for the following state diagram.

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

The figures in the margin indicate full marks.

Attempt all the questions.

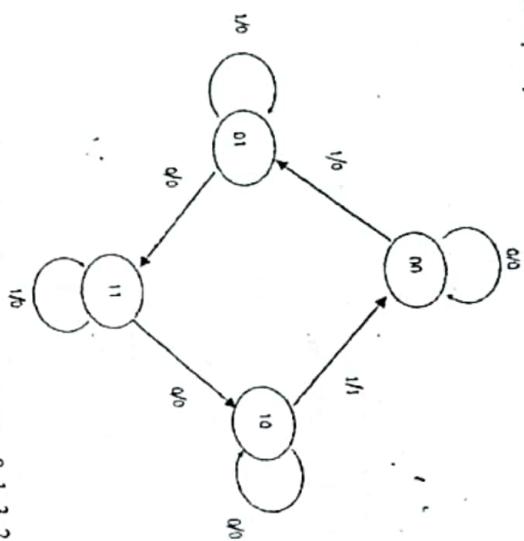
1. a) How can we represent the information? Differentiate between Digital and Analogue system. 7
- b) Perform the following conversion. 8
- $(573)_0 = (\quad)_{{\text{hex}}-3}$
 - $(842)_0 = (\quad)_{{\text{dec}}^2}$
 - $(1010111)_{{\text{bcd}}} \wedge Y = (\quad)_2$
 - $(FAB)_0 = (\quad)_{{\text{hex}}}$
2. a) Simplify the following expression using Boolean algebra 5
- $(AB' + AB'C')' + A(B' + AB')$
 - $[(BC' + A'D')(AB' + C'D')]'$
- b) Simplify the Boolean function F and don't care conditions $d(1)$ SOP (2) POS and (3) draw NAND-NAND equivalent logic. Given: 5
- $F = A'B'D' + A'CD + ABC$
 - $d = A'B'CD + ACD + AB'D$
- c) A Boolean function is given by $F(A,B,C,D) = \sum(3,4,6,8,10,12,14)$ and don't care condition $d(A,B,C,D) = \sum(0,2,8)$. Simplify it using K-Map and implement using NAND gate only. 5
3. a) Design a combinational circuit that converts a decimal digit from the 8
 2421 code to 84-2-1 code to binary.
- b) Design a circuit for 4 bit full Subtract adder. 7
4. a) Design a comparator circuit that compared two 4 bit numbers. The 8
 two numbers being A and B. It is required to obtain three possible outcomes. i.e., $A > B$, $A < B$ and $A = B$.
7. Write short notes on: (Any two) 2x5
- Random Access Memory.
 - Self complementing code.
 - Universal Gates.
2. 2
1. 1

b) Implement the following with appropriate MUX:

$$\text{i. } F(A,B,C)=\sum(1,3,5,6)$$

$$\text{ii. } F(A,B,C,D)=\sum(0,1,3,4,8,9,15)$$

5. a) Design a sequential circuit corresponding to the given state diagram using J-K flip flop.



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

Attempt all the questions.

1. a) What is Digital and Analog systems? Also list out the advantages of digital system over the analog system.
- b) Perform the conversion as indicated
- $(243)_6 = ()_{\text{Excess-3}}$
 - $(816)_{10} = ()_{2421}$
 - $(BE)_{16} = ()_2$
 - $(777)_8 = (212)_3$
2. a) Implement XNOR gate using only NAND gates and XOR gate using NOR gate only.
- b) Define Literal & term. Find Canonical SOP for this expression $F=abc+ab+c$.
3. a) Design a combinatorial circuit that converts a decimal digit from the 2421 code to BCD.
- b) A Boolean function is given: $F(w,x,y,z)=\sum(1,4,5,6,12,14,15)$ and don't care condition $d(w,x,y,z)=\sum(1011)$. Simplify it using K-map with logic gate implementation.
4. a) Design a comparator circuit that compared two 4 bit numbers. The two numbers being A and B. It is required to obtain three possible outcomes. i.e., $A>B$, $A<B$ and $A=B$.
- b) Realize the following state diagram into a circuit using T- flip-flop.
5. Write short notes on: (Any two)
- Magnitude comparator
 - Universality ofNAND and NOR gates
 - Output Hazard Races

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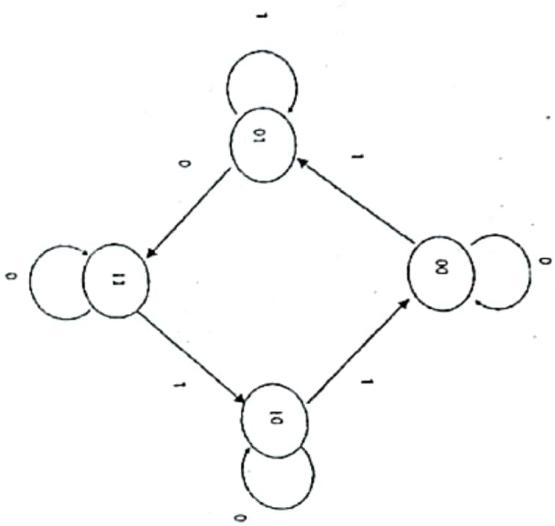
Level: Bachelor Semester: Fall Year : 2016
Programme: BE Full Marks: 100
Course: Logic Circuits Pass Marks: 45
Time : 3hrs.

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Level: Bachelor Semester: Spring Year : 2016
 Programme: BE Full Marks: 100
 Course: Logic Circuits Pass Marks: 45
 Time : 3 hrs.

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

Attempt all the questions.



5. a) What are major 5 differences between synchronous and asynchronous counters? Design a 4-bit up-down binary counter. 8
- b) What is counter? Differentiate between serial in serial out register and parallel in serial out register with associated diagrams. 7
6. Design an arithmetic circuit with two selection variables, s_1 and s_0 , that generates the following arithmetic operations. Draw the logic diagram of one typical stage. 15
- | s_1 | s_0 | $C_{in} = 0$ | $C_{in} = 1$ |
|-------|-------|--------------|--------------|
| 0 | 0 | $F = A+B$ | $F = A+B+1$ |
| 0 | 1 | $F = A$ | $F = A+1$ |
| 1 | 0 | $F = B'$ | $F = B'+1$ |
| 1 | 1 | $F = A+B'$ | $F = A+B+1$ |
- 2x5
7. Write short notes on: (Any two) 8
- a) Shift register
 b) D-flip flop
 c) PLA

OR

Design a circuit for 3-bit parity generation and 4-bit parity checker using even parity.

- b) Explain in detail about synchronous Up/Down counter. 7
4. a) Define the term LSI and MSI. Design 3:8 decoder with its logic circuit 7

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| | | |
|------------------------|-----------------|----------------|
| Level: Bachelor | Semester: Fall | Year : 2017 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Logic Circuits | Time : 3hrs. | |

8

and block diagram.

b) Implement the following :

$$i. F(A,B,C) = \sum(1,3,5,6)$$

(using MUX)
(using ROM)

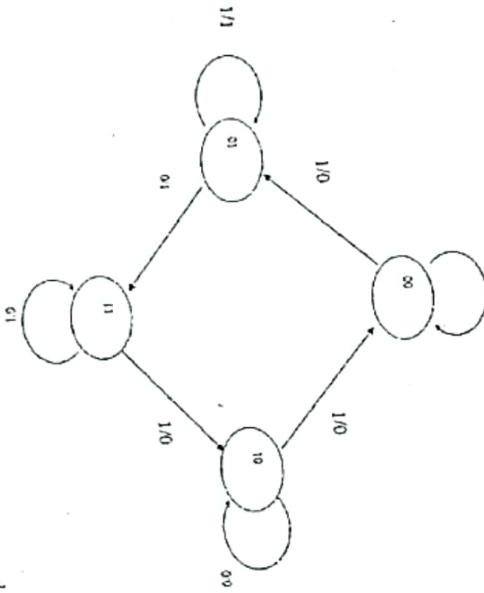
8

$$ii. F1 = \sum(0,2,5) \quad F2 = \sum(3,4,7) \quad F3 = \sum(6,7)$$

using S-R flip-flop.

5. a)

Realize the following state diagram into a circuit using S-R flip-flop.



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

Attempt all the questions.

1. a) 'Gray code is also known as reflected code'. Justify your answer with appropriate illustration.

5

b) Determine the value of base x if $(211)_x = (152)_8$.

5

c) Realize all the basic gates using NAND gate only.

5

2. a) Use K-map to simplify the given Boolean function in SOP from and implement the simplified function using NAND gate only.
 $F(A, B, C, D) = \sum(5, 7, 9, 12, 13, 14, 15,)$ and don't care, d(A, B, C, D) = $\sum(3, 6, 8)$

7

b) Design a circuit of a 3-bit parity generator and the circuit of a 4-bit parity checker for odd parity.

OR

Design a combinational circuit that has four inputs and two outputs one of the outputs is high when majority of inputs are high. The second output is high only when all inputs are of same type.

8

3. a) With the help of an example, show how you can construct a higher order MUX using two or more number of lower order MUXes.
OR
 b) Implement a full adder circuit with the help of two half adder circuit along with the truth table.

8

4. a) Explain the operation of clocked R-S flip-flop with the help of its logic diagram, characteristic table and characteristic equation.
 Differentiate RS and JK flip flop.

8

b) Design a synchronous 4 bit binary up counter using T flip flop which counts all possible odd numbers.

7

7. Write short notes on: (Any two)

- a) Parity method for error detection
- b) SOP and POS
- c) PLA
- d) Nibble Adder

2

What is a modulo-7 counter? Design such a counter using JK flip-flop.

2+

5. a) What do you mean by ALU? Design an arithmetic circuit to implement the following function table. A and B are 4 bit binary numbers.

| S1 | S0 | Cin | F |
|----|----|-----|-------|
| 0 | 0 | 0 | A |
| 0 | 0 | 1 | A+1 |
| 0 | 1 | 0 | A+B |
| 0 | 1 | 1 | A+B+1 |
| 1 | 0 | 0 | A+B' |
| 1 | 0 | 1 | A-B |
| 1 | 1 | 0 | A-1 |
| 1 | 1 | 1 | A |

- b) What is a shift register? Draw the block diagram for shifting the content of register A to register B. Describe the operation.

6. Compare and contrast *any three* of the following:

a) Synchronous and asynchronous logic.

b) Decoder and encoder

c) XOR and XNOR gates

d) Analog versus Digital System

7. Write short notes on: (Any two)

a) Accumulator

b) Don't care conditions

c) Parity method for error detection

5
5
5
 2×5

- POKHARA UNIVERSITY
- | | | |
|------------------------|------------------|-------------|
| Level: Bachelor | Semester: Spring | Year : 2017 |
| Programme: BE | Full Marks: 100 | |
| Course: Logic Circuits | Pass Marks: 45 | |
| | Time : 3 hrs. | |
- Candidates are required to give their answers in their own words as far as practicable.*
- The figures in the margin indicate full marks.*
- Attempt all the questions.*

1. a) Explain the digital Number system. Differentiate between analog and digital system. 5
- b) Perform the following subtraction using 2's Compliment method 5
- i. $(10001000)_2 - (1010100)_2$
- ii. $(11010)_2 - (10000)_2$
- c) What are the different types of Binary Codes? Explain each in brief. 5
2. a) How can you find the r's complement using (r-1)'s complement? Explain with example. 3
- b) "Excess 3 code is self complementary code" verify the statements 4
- c) What are the universal gates? Why they are called so? Construct NAND gate using NOR gate and NOR gate using NAND gate. 3+5
3. a) Use K-map to simplify the given Boolean function and once by considering the don't care condition and once by ignoring the don't care condition and realize it using the basic gates 8
- $F(A, B, C, D) = \sum(1, 4, 8, 12, 13, 15)$ and don't care, $d(A, B, C, D) = \sum(3, 14)$. 7
- b) Design a combinational circuit that has four inputs and two outputs one of the outputs is high when majority of inputs are high. The second output is high only when all inputs are of same type. 7
4. a) Design a combinational circuit using PLD device as PLA($4 \times 8 \times 4$) which is used to implement the full adder functions in which sum represented as Si and carry represented as Ci+1. 7
- b) How the drawback of RS flip-flop is overcome in J-K flip-flop? Explain the J-K flip-flop in detail. 8
5. a) Define counter. Design a BCD counter that counts the binary 7

sequence from 0000 to 1001 and returns to 0000 to repeat the sequence using T-flip-flops.

b) Explain the operation of RS flip-flop with the help of characteristics table. How it can be converted into T-flip-flop?

6. a) Design a synchronous binary 3-bit up counter using R-S flip-flop.

b) Draw arithmetic circuit logic diagram. Design arithmetic circuit with function table that perform eight major functions.

7. Write short notes on: (Any two)

a) Venn diagram

b) Master Slave Flip Flop

c) Edge Triggered flip-flop

2x5

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

The figures in the margin indicate full marks.

Attempt all the questions.

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Year : 2018
Semester: Fall
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Level: Bachelor
Programme: BE
Course: Logic Circuits

1. a) Define Analog and Digital Signal. Differentiate digital system and Analog system.

b) Convert the following conversions:

i. $(101001.101)_2 = (?)_{10}$

ii. $(ABD)_{16} = (?)_8$

iii. $(10101101)_2 = (?)_{gray}$

iv. $(175.351)_8 = (?)_{16}$

c) Define logic gates. Explain the universality of NAND and NOR gates.

2. a) Why NOR gate is called universal gate? State and prove De-Morgan's theorem.

b) Use K-map to simplify the given Boolean function with don't care condition and realize it using basic gates only: $F = \sum(1, 4, 8, 12, 13, 15)$ and $d = \sum(3, 7, 11, 14)$.

3. a) Design a combinational logic circuit that has four input and two outputs. One of the outputs is high when majority of inputs are high. The second output is high only when all inputs are of same type.

b) Design a circuit for 3-bit parity generation and 4-bit parity checker using odd parity.

4. a) A combinational circuit is defined by the function,

$$F_1(A, B, C) = \sum(3, 5, 6, 7)$$

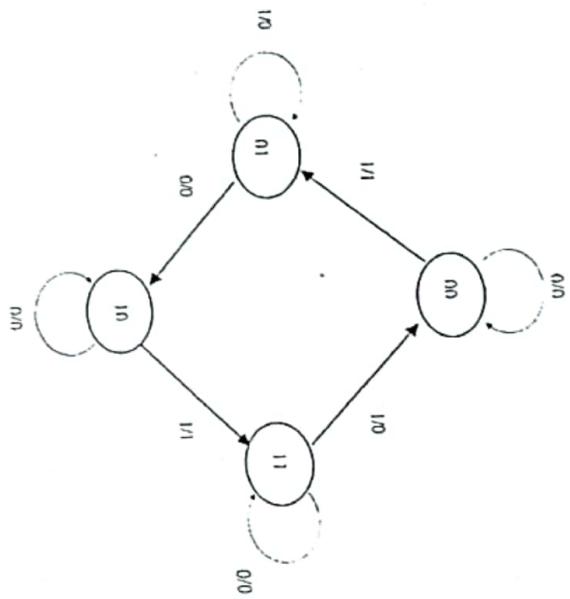
$$F_2(A, B, C) = \sum(0, 2, 4, 7)$$

b) What is magnitude comparator? Design a two bit magnitude

7

comparator whose outputs are $A > B$, $A < B$ and $A = B$.

5. a) Design a sequential circuit corresponding to the given state diagram using S-R FlipFlop for the following state diagram.



q 8

comparator whose outputs are $A > B$, $A < B$ and $A = B$.

Level: Bachelor
Programme: BE
Course: Logic Circuit

POKHARA UNIVERSITY

| | |
|------------------|-------------|
| Semester: Spring | Year : 2018 |
| Full Marks: 100 | |
| Pass Marks: 45 | |
| Time : 3hrs. | |

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

Attempt all the questions.

1. a) How does the logic system express data during computation?
Differentiate between Digital and Analog system. 5
- b) Perform the conversion as indicated (any two). 5
 - i. $(235)_6 = ()_{\text{Excess-3}}$
 - ii. $(369)_{10} = ()_{2421}$
 - iii. $(BCA)_{16} = ()_2$
- c) Use 2's complement to subtract the following: 5
 - i. $(1010)_2 - (10100)_2$
 - ii. $(957)_{10} - (876)_{10}$
 - iii. $(378)_{BCD} - (256)_{BCD}$
2. a) Why NAND and NOR are called Universal Gates? Construct $F = AB + CD$ using universal gates. 7
- b) Define K-Map. Simplify the expression mentioned below using K-Map. 8

$$F(A, B, C, D) = \sum(1, 3, 7, 10, 13, 15)$$

$$d(A, B, C, D) = \sum(0, 2, 8)$$

Where d denotes don't care. Also implement the simplified function using NOR gates only.
3. a) Design a combinational circuit that has four inputs and two outputs one of the outputs is high when majority of inputs are high. The second output is high only when all inputs are of same type. 7
 - b) Implement the following Boolean function using 16:1 Multiplexer 8
$$F(A, B, C, D, E) = \sum m(2, 4, 5, 7, 10, 14, 15, 16, 17, 25, 26, 30, 31)$$
4. a) Design a 4 bit parallel adder subtractor circuit with one selection variables M and two inputs A and B. For M = 0, the circuit required to 7

perform addition i.e. $(A+B)$ and for $M = 1$, the circuit must perform subtraction $(A - B)$ by taking 2'S complement of B.

b) Explain negative edge triggered S-R flip-flop with necessary logic diagram, characteristic table, characteristic equation and waveform.

5. a) Design a synchronous Mod-6 counter using clocked D Flip Flop

b) Define shift register. Draw diagram for parallel in serial out shift register and discuss its operation with necessary explanation.

6. a) Explain the process how does binary value of 4 flags in status register change with necessary diagram.

b) Design a 3-bit Synchronous DOWN Counter using T flip-flop.

7. Write short notes on: (Any two)
a) State Reduction and State Assignment
b) Random Access Memory
c) Self-complementing code

7. Write short notes on: (Any two)
a) State Reduction and State Assignment
b) Random Access Memory
c) Self-complementing code

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

Attempt all the questions.

1. a) Explain the digital Number system. List out the advantages of digital system over the analog system.
- b) "Excess-3" code is a self-complementing code". Justify your answer with appropriate illustration.
- c) Explain $(r-1)$'s complement with Example
2. a) Perform the conversion as indicated
 - i. $(123)_4 = ()_{bcd}$
 - ii. $(4FC)_{16} = ()_8$
 - iii. $(1011011)_{gray} = ()_2$
 - iv. $(45)_{10} - (99)_{10}$, using r's complement.
- b) State and Prove De-Morgan's Theorem. Explain the universal property of the NOR gate.
3. a) Simplify the following Boolean expression using K-map and implement using NGR gates only.

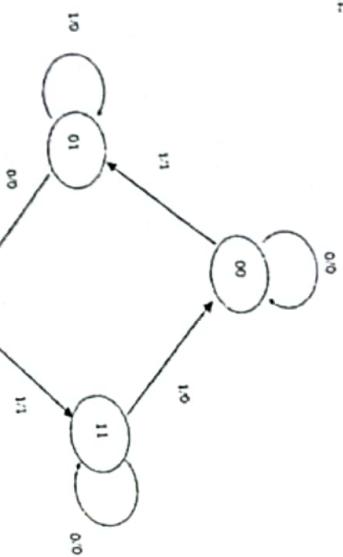
$$F(A,B,C,D) = \sum(0,2,4,6,12,15)$$

$$D(A,B,C,D) = \sum(8,10,14)$$
- b) Design a code conversion circuit to convert Binary Code into Gray Code.
4. a) Define Multiplexer and De-Multiplexer. Construct 8x1 MUX using 4x1 MUX and explain with the truth table.
- b) Design a combinational circuit using PLD device as PLA (4X8X4) that is used to implement full adder function in which sum is represented as S_i and carry as C_i .
5. a) Differentiate between Latches and Flip-flop. Draw JK flip-flop circuit to further convert it into T flip-flop with state table and state equation.

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|-----------------------|-----------------|----------------|
| Level: Bachelor | Semester: Fall | Year : 2019 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Logic Circuit | Time : 3hrs. | |

- b) Design a sequential circuit using JK Flip Flop for the following state diagram.



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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) With characters differentiate between Digital and Analog system. 5

- b) Perform the conversion as indicated (any two). 5

i. $(543)_6 = (?)_{\text{Excess-3}}$

ii. $(708)_{10} = (?)_{2421}$

iii. $(BBA)_{16} = (?)_2$

- c) Use 2's complement to subtract the following: 5

i. $(1011)_2 - (10100)_2$

ii. $(952)_{10} - (873)_{10}$

iii. $(368)_{\text{BCD}} - (256)_{\text{BCD}}$

2. a) Prove the following Boolean expression 5

i. $\overline{AB} + BC + \overline{A}\overline{B}C = \overline{A} + BC$

ii. $X\bar{Y} + Y\bar{Z} + Z\bar{X} = \bar{X}Y + \bar{Y}Z + \bar{Z}X$

- b) Simplify the Boolean function F and don't care conditions d in (1) SOP (2) POS and (3) draw NAND-NAND equivalent logic. Given: 5

$$F = B'CD' + A'CD + ABC + A'B'C'D'$$

- c) A Boolean function is given by $F(A,B,C,D) = \sum(0,1,2,3,10,13,14)$ and don't care condition $d(A,B,C,D) = \sum(4,7,12)$. Simplify it using K-Map and implement using NAND gate only. 5

3. a) Design a combinational circuit that converts decimal digits from 8-4-2-1 to Excess 3 8

- b) Design a combinational circuit using PLD device as PLA (4X8X4) that is used to implement full Subtract or function in which difference is represented as Di and borrow as Br. 7

4. a) Illustrate the process how does binary value of 4 flags in status registers change with necessary diagram. 8

- b) Implement the following with appropriate MUX: 7

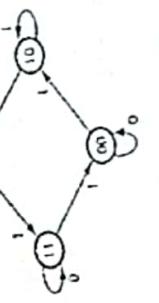
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| Level: Bachelor | Semester: Spring | Year : 2019 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Logic Circuits | Time : 3 hrs. | |

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|------------------------------------|-----------------|----------------|
| Level: Bachelor | Semester – Fall | Year : 2013 |
| Programme: BE | Pull Marks: 100 | Pass Marks: 45 |
| Course: Engineering Mathematics II | Time : 3 hrs. | |

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

Attempt all the questions.

Describe with diagram the working and characteristics of JK flipflop.

7

b) Explain operation of J-K Flip-flop with its logic diagram, truth table.

b) Explain operation of J-K Flip-flop with its logic diagram, truth table excitation table

a) What are shift registers? Explain Parallel in serial out and Serial in parallel out shift register with diagrams.

b) Design 3 bit up counter using T flip-flop

8
2x5

Write short notes on: (Any two)

a) Computational Logic Design Procedure

b) Johnson Counter

c) Self-complementing code

6. a) Realize the following state diagram into a circuit using SR flip-flop.

F(A,B,C)=\sum(1,4,5,6)
F(A,B,C,D)=\sum(0,1,3,8,9,15)

- i. F(A,B,C)=\sum(1,4,5,6)
ii. F(A,B,C,D)=\sum(0,1,3,8,9,15)
- a) Realize the following state diagram into a circuit using SR flip-flop.

8

8

1. Find the shortest distance between the lines
a) $\frac{x}{2} = \frac{y}{-3} = \frac{z}{1}$ and $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$. Also find the equations of shortest distance.

Or

Find the condition that the lines

$$\frac{x-x_1}{l_1} = \frac{y-y_1}{m_1} = \frac{z-z_1}{n_1} \text{ and } \frac{x-x_2}{l_2} = \frac{y-y_2}{m_2} = \frac{z-z_2}{n_2}$$

coplanar.

b) Find the equation of sphere through the circle $x^2+y^2=4$, $z=0$ and is cut by the plane $x+2y+2z=0$ in a circle of radius 3.

2. a) State and prove Euler's theorem on homogeneous function of two variables of degree n.

$$\text{If } u = \cos^{-1}\left(\frac{x+y}{\sqrt{x+y}}\right), \text{ show that } x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{1}{2} \cot u = 0.$$

b) Find the minimum value of $f=x^2+y^2+z^2$, such that $x+y+z=1$ and $xyz=1$

3. a) Sketch the region of integration of $\int_0^{2-a^2} \int_0^{x e^{2y}} \frac{x e^{2y}}{4-y} dy dx$ and evaluate by interchanging the order of integration.

b) Find the volume enclosed between the cylinders $x^2+y^2-2ax=0$ and $z^2=2ax$.

7

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Level: Bachelor
Semester: Fall
Programme: BE
Course: Engineering Mathematics II

Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

4. a) Solve the differential equation $\frac{dy}{dx} + \frac{y \log y}{x} = \frac{y(\log y)^2}{x^2}$ 8
 b) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = \frac{12e^t}{x^3}$ by using Wronskian's Method 7
5. a) Solve by power series method $\frac{d^2y}{dx^2} + 4y = 0$ 8
 Or
 Define Bessel function of the first kind of order n. Show that

$$\frac{d[x^n J_n(x)]}{dx} = x^n J_{n-1}(x)$$

- b) Solve the initial value problem
 $y'' - y' = 0, y(0) = -4, y'(0) = -17$

6. a) Define Laplace transform of any function f(t). Find the Laplace transform of

i) cosht ii) cosht sinbt

- b) Using Laplace transform, solve the initial value problem
 $y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1.$

7. Write short notes on any two:

- a) Find the equations of the line passing through (1, 5, 3) and normal to $2x+y+7z=0$

$$y'' - 4y' + 3y = e^{-t}, y(0) = y'(0) = 1.$$

- b) Find the direction cosines of the line joining the points A(4, 3, 5) and B(-2, 1, -8).

- c) Write the equation of the cylinder if generators of the cylinder are parallel to z-axis.

- d) Find Laplace transform of $f(t) = t \sin wt$

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

1. a) Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-1} = \frac{y+7}{2} = \frac{z-6}{-3}$ also find the equation

of the line of shortest distance.

OR

Show that the lines $x+y+z-3=0=2x+3y+4z-5$ and $5x-y+5z-7=0=2x-5y-z-3$ are coplanar. Find the equation of the plane in which they lie.

2. a) Find the equation of the sphere which passes through the circle $x^2+y^2+z^2-6x-2z+5=0$, $y=0$ and touch the plane $3y+4z+5=0$.

b) State and prove Eulers theorem for function of two variables. Using it show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = t \sin u$, where $\sin u = \frac{x^2+y^2}{x+y}$.

3. a) Find the extreme values of the function $f(x) = x^2 + y^2 + z^2$ such that $x+z=1$ and $2y+z=2$.

- b) Evaluate $\int_0^2 \int_{y^2}^{t^4} y \cos x^2 dx dy$, by interchanging the order of integration if it necessary.

- c) Find the volume of the solid whose base is the region in the xy-plane that is bounded by the parabola $y = 4 - x^2$ and line $y = 3x$ while the top of the solid is bounded by the plane $z = x+4$.

4. a) Solve $y'' + 9y = \operatorname{cosec} 3x$ by using variation of parameter.
 b) Define order and degree of the partial differential equation with

$$\text{examples and evaluate } \frac{dy}{dx} + \frac{y \log y}{x} = \frac{y(\log y)^2}{x^2}$$



5. a) Find the power series solution of the differential equation: $y'' + 8y =$ 7

0. OR
Define Bessel equation and find its solution.

b) Solve: $y'' + y' = 2 + x + x^2$, given that $y(0) = -1$ and $y'(0) = 1$. 8

6. a) Using Laplace transformation solve the initial value problem 7

$y'' + y' - 2y = t$ $y(0) = 1$, $y'(0) = 0$.

b) Find the Laplace transform of $t^2 \sin 2t$.

c) Find the inverse Laplace transform of $\log\left(\frac{s+a}{s+b}\right)$. 4

Ans

7. Answer the followings:
a) Find the equation of sphere whose centre is at $(1, -3, 5)$ and radius 2. 7

b) Write down the equation of right circular cylinder whose axis is

$\frac{x-a}{l} = \frac{y-\beta}{m} = \frac{z-\delta}{n}$ and having radius a.

c) Find the equation of plane through the point $(1, 1, 0), (1, 2, 1)$ and $(-2, 2, -1)$.

d) Find the laplace transform of $f(t) = t \cosh 2t$.

Level: Bachelor
Programme: BE
Course: Engineering Mathematics II

Semester: Spring
Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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

Attempt all the questions.

1. a) Find the image of the point $(1, 2, 3)$ in the plane $2x - y + z + 3 = 0$. 8

Or

Define shortest distance between two Skew lines in space. Find the length and equation of shortest distance between the lines

$$\frac{x}{2} = \frac{y}{-3} = \frac{z}{1} \text{ and } \frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+3}{2}$$

b) Find the equations of tangent planes to the sphere

$$x^2 + y^2 + z^2 - 2x + 4y - 6z + 10 = 0$$

$$\frac{x+3}{14} = \frac{y+1}{-3} = \frac{z-5}{4}$$

which passes through line

2. a) State and prove Euler's theorem for homogeneous function of two variables and hence if $u = \tan^{-1}\left(\frac{x^1 + y^1}{x + y}\right)$, $x \neq y$. and

$$\text{Show that } x \frac{du}{dx} + y \frac{du}{dy} = \sin 2u.$$

b) If $f(x, y) = xy \frac{x^2 - y^2}{x^2 + y^2}$ when x and y are not simultaneously zero when

$$x=0, y=0 \text{ show that at } (0, 0) f_{xy} \neq f_{yx}$$

3. a) Evaluate $\int_0^{2\sqrt{4-y^2}} \int_0^y \cos(x^2 + y^2) dx dy$ by changing the order of integration 8

b) Find the volume in the first octant bounded by the co-ordinate planes, the cylinder $x^2 + y^2 = 4$ and the plane $z + y = 3$. 7

4. a) Define Bernoulli's equation. And

Solve $\frac{dy}{dx} + \frac{1}{x} \sin 2y = x^3 \cos^2 y$

- b) Solve the differential equation by using Wronskian's method of

$$y'' + 9y = \csc 3x.$$

5. a) Solve the differential equation $y'' + y = 0$, by using power series method.

Or

- Write the Bessel's function of first kind of order n. Prove that

$$\frac{d}{dx} [x^n J_n(x)] = x^n J_{n-1}(x).$$

- b) Solve the following initial value problem. $y'' - y' - 2y = 3e^{2x}$; $y(0) = 0$; $y'(0) = 2$.

6. a) Define Laplace transform. State and prove second shifting theorem of Laplace transform.

Or

Evaluate:

$$i. L\left\{\frac{\sin nt}{t}\right\}$$

$$ii. L^{-1}\left(\cot^{-1}\frac{x}{w}\right)$$

- b) Using Laplace Transform solve the initial value problem

$$y'' + 4y' + 2y = e^t, y(0) = 1, y'(0) = 1$$

7.

Write short notes on:

- a) Find the angle between the planes: $x+3y+5z=0$ and $x-2y+z=10$

- b) Define unit step function and find its Laplace transforms.

- c) Solve $(x+1)y' = x(y^2+1)$

- d) If $f = (ax^2 + 2hxy + by^2)$. Verify $f_{xy} = f_{yx}$.

7

2x2.5
=10

ordinates.

- b) Find the volume in the first octant bounded by co-ordinate planes, the cylinder $x^2+y^2=4$ and plane $z+y=3$.

4. a) State the condition for the exactness of differential equation. Hence solve $x^2ydx - (x^3+y^3)dy = 0$

- b) Find the general solution of the differential equation:

$$y'' - 2y' + y = \frac{12e^x}{x^3}.$$

5. a) Solve the differential equation $y'' - 4y = 0$, by using power series methods.

OR

- Define Legendre's equation. Also derive the solution of Legendre's equation.

- b) Solve the following initial value problem. $y'' + 2y' + y = e^x$, $y(0) = -1$, $y'(0) = 0$

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|------------------------------------|----------------|----------------|-----------------|
| Level: Bachelor | Semester: Fall | Year : 2015 | Full Marks: 100 |
| Programme: BE | | Pass Marks: 45 | |
| Course: Engineering Mathematics II | | Time : 3hrs. | |

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Find the equation of plane through (α, β, γ) and the line $x = py + q = rz + s$.
b) Find the image of the point $(1, 2, 3)$ in the plane $2x - y + z + 3 = 0$.

2. a) State the Euler's theorem for a homogeneous function of two variables and evaluate, if $u = \cos^{-1}\left(\frac{x+y}{\sqrt{x+y}}\right)$, then show that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{\cot u}{2} = 0.$$

- b) A rectangular box, open at the top, is to have a volume of 32c.c. Find the dimension of the box requiring least material for its construction.

3. a) Evaluate the integral $\int_0^a \int_{y^2/a}^y \frac{x^2 - y^2}{x^2 + y^2} dx dy$ changing into polar co-

- ordinates.
b) Find the volume in the first octant bounded by co-ordinate planes, the cylinder $x^2 + y^2 = 4$ and plane $z+y=3$.

4. a) State the condition for the exactness of differential equation. Hence solve $x^2ydx - (x^3+y^3)dy = 0$

- b) Find the general solution of the differential equation:

$$y'' - 2y' + y = \frac{12e^x}{x^3}.$$

5. a) Solve the differential equation $y'' - 4y = 0$, by using power series methods.

OR

- Define Legendre's equation. Also derive the solution of Legendre's equation.

- b) Solve the following initial value problem. $y'' + 2y' + y = e^x$, $y(0) = -1$, $y'(0) = 0$

$y'(0)=1$

6. a) State and prove second shifting theorem on laplace transform. Using it

evaluate $L(e^{-3t}u_2(t))$.

b) State and prove existence theorem on laplace transform.

OR

Solve the differential equation: $y'' - 3y' + 2y = 4t + e^{3t}$, when $y(0) = 1$ and $y'(0) = -1$, by using Laplace transform.

7. Write short notes on

a) Find the centre and radius of a sphere $x^2+y^2+z^2+4x-6y+8z=10$

b) Solve: $(x \log x)y' = y$

c) Find the laplace transform of $f(t) = t \cosh t$.

d) Find the integrating factor of the differential equation:

$$2dx - e^{y-x}dx = 0$$

POKHARA UNIVERSITY
Level: Bachelor
Programme: BE
Course: Engineering Mathematics II

Semester: Spring

Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

Attempt all the questions.

1. a) Find the co-ordinate of the foot of the perpendicular from the origin in the straight line $x + 2y + 3z + 4 = 0$, $x + y + z + 1 = 0$.
OR

Find the magnitude and equation of the shortest distance between the

$$\text{lines } \frac{x-5}{3} = \frac{7-y}{16} = \frac{z-9}{7} \text{ and } \frac{x-9}{3} = \frac{y-13}{8} = \frac{z-5}{5}$$

- b) Find the equation of sphere passing through $(1, 0, 0)$, $(0, 1, 0)$ and $(0, 0, 1)$ and their radius as small as possible.

2. a) State Euler's Theorem for partial derivatives of homogeneous

function of two variables. If $u(x, y) = \sin^{-1} \left(\frac{x+y}{\sqrt{x+y}} \right)$ show that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$$

- b) Find the dimension of the rectangular box, open at the top of maximum capacity whose surface is 432sq unit .
3. a) Find the volume of the tetrahedron bounded by the coordinate planes and the plane $x+y+z=1$.

- b) Evaluate $\int_{-4y}^4 \int_{-x}^x e^{x^2} dx dy$, by changing the order of integration.

4. a) Solve $\frac{dy}{dx} + \frac{1}{x} \sin 2y = x^3 \cos^2 y$

b) Solve $\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + y = 12 \frac{e^x}{x^3}$

5. a) Solve by power series method $y'' - 4y = 0$.

Write the Bessel's function of first kind of order n. Prove that

$$\frac{d}{dx} [x^n j_n(x)] = x^n j_{n-1}(x).$$

- b) Solve the following initial value problem

$$y'' - y' - 2y = 3e^{2x}; y(0) = 0; y'(0) = 2$$

6. a) Evaluate the following

i. $L(t^2 \cos wt)$

ii. $L(\cot^{-1} \frac{x}{w})$

- b) Using Laplace Transform solve the initial value problem

$$y'' + 4y' + 3y = e^t, y(0) = 0, y'(0) = 1$$

7. Write short notes on: (Any two)

- a) Find the equation of tangent plane on the

$$x^2 + y^2 + z^2 + 4x + 7y + 9 = 0 \text{ at } (1, 3, 7).$$

- b) Find the cosine angle between planes $x + 2y + 3z = 4$ and $3x + 4y + 5z = 10$

- c) Find the laplace transform of $f(t) = t \cosh t$

- d) Find the centre and radius of a sphere $x^2 + y^2 + z^2 + 4x - 6y + 8z = 10$.

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2016

Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

OR

$$\frac{d}{dx} [x^n j_n(x)] = x^n j_{n-1}(x).$$

- b) Solve the following initial value problem

$$y'' - y' - 2y = 3e^{2x}; y(0) = 0; y'(0) = 2$$

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Find the distance of the point (1, -3, 5) from the plane $3x - 2y + 6z = 15$

- along a line with direction cosines proportional to (2, 1, -2).

OR

Find the shortest distance between the lines

$$\frac{x-5}{3} = \frac{7-y}{16} = \frac{z-3}{3} \quad \text{and} \quad \frac{x-9}{3} = \frac{y-13}{8} = \frac{15-z}{5}$$

also find the equation of the line of shortest distance.

- b) Find the equation of the sphere having the circle $x^2 + y^2 + z^2 = 9$, $x - 3x + 4y + 5z = 10$

- and $2y + 2z = 5$ as a great circle.

OR

A sphere of radius K passes through the origin and meets the axes in A, B, C. Prove that the centroid of the triangle ABC lies on the sphere

$$9(x^2 + y^2 + z^2) = 4K^2.$$

2. a) State and prove Euler's theorem on homogeneous function of x and y

- with degree n. If $u = \tan^{-1}(\frac{y^3 + x^3}{x - y})$, $x \neq y$, then find the value of

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$$

- b) Find the minimum value of $f = x^2 + y^2 + z^2$, such that

$$xy + yz + zx = 3a^2.$$

3. a) Sketch the region of integration of $\int_0^\infty \int_0^\infty \frac{e^{-xy}}{x} dy dx$, and evaluate by

interchanging the order of integration.

b) Find the volume enclosed between the cylinders

$$x^2 + y^2 - 2ax = 0 \text{ and } z^2 = 2ax$$

4. a) Solve the equation: $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = 21x^4$.

b) Solve:

$$y'' + 9y = 6\cos 3x$$

5. a) Find power series solution of the equation: $y'' + 4y = 0$

b) Solve the initial value problem

$$y'' - y' - y = 0, y(0) = -4, y'(0) = -17$$

6. a) i) Find Laplace transform of $f(t) = \sin 2t u(t)$.

ii) Find $f(t)$ if $F(s) = \log \frac{s(s+1)}{s^2 + 4}$

OR

State and prove the convolution theorem for Laplace transform. Use it to find $f(t)$ where $F(s) = \frac{1}{s^2 + 4}$.

b) Solve the initial value problem by Laplace transform method:

$$y'' + 4y' + 3y = e^{-t}, y(0) = 0, y'(0) = 1.$$

OR

State and prove convolution theorem of Laplace transform.

4x2.5

7. Attempt all

a) Find the cosine angle between planes $x + 2y + 3z = 4$ and

$$3x + 4y + 5z = 10$$

b) Find the equations of the plane which passes through $(2, -3, 1)$ and is normal to line joining the points $(3, 4, -1)$ and $(2, -1, 5)$.

c) Find the equation of tangent plane on the

$$x^2 + y^2 + z^2 + 4x + 7y + 9 = 0 \text{ at } (1, 3, 5)$$

d) Find Laplace transform of $f(t) = \cos wt$.

7 7 7 7 7 7 7 7 7 7

Level: Bachelor
Semester: Spring
Programme: BE
Course: Engineering Mathematics II

Year : 2016
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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

Attempt all the questions.

1. a) Find the equation of the plane through $(2, 2, 1), (1, -2, 3)$ and parallel to the line joining the points $(2, 1, -3)$ and $(-1, 5, -8)$.

OR

Find the condition that the lines,

$$\frac{x-x_1}{l_1} = \frac{y-y_1}{m_1} = \frac{z-z_1}{n_1} \text{ and } \frac{x-x_2}{l_2} = \frac{y-y_2}{m_2} = \frac{z-z_2}{n_2}$$

b) Find the equation of the sphere having the circle $x^2 + y^2 + z^2 = 9$,

$$x-2y+2z=5$$
 as a great circle. Also determine its center and radius.

2. a) State and prove Euler's theorem on homogenous function of two independent variable of degree n. If $u = \sin^{-1} \left(\frac{x^3+y^3+z^3}{ax+by+cz} \right)$ prove that

$$x \frac{du}{dx} + y \frac{du}{dy} + z \frac{du}{dz} = 2 \tan u.$$

- b) Find the extreme values of a suggestion $f(x, y, z) = x^2 + y^2 + z^2$ such that $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$.

$$3. a) \text{ Change the Cartesian Integral } \int_0^2 \int_0^{\sqrt{4-y^2}} \cos(x^2 + y^2) dx dy \text{ into an equivalent polar integral and evaluate it.}$$

- b) Find the volume in the first octant bounded by the coordinate planes, the cylinder $x^2 + y^2 = 4$ and the plane $z + y = 3$.

4. a) Solve $\frac{dy}{dx} + \frac{1}{x} \sin 2y = x^3 \cos^2 y$

- b) Find the general solution of the differential equation:

$$y'' - 4y' + 4y = 6 + \frac{e^{2x}}{x}$$

5. a) Find a power series solution of a differential equation: $y'' - 4y = 0$.

2

- b) Find the general solution of $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 4e^{-x} \sec^3 x$.
6. a) Evaluate the following:
- $L(t^2 \cos wt)$
 - $L^{-1}\left(\frac{1}{s^2(s^2+w^2)}\right)$

b) Solve the differential equation: $y'' - y' - 2y = 3e^{2t}$, $y(0) = 0$, $y'(0) = -2$, by using Laplace transform.

OR

Find laplace inverse of following functions:

i. $\frac{1-e^{-st}}{s^2-9}$

ii. $\log\left(\frac{s+1}{s+5}\right)$

2.5×4

7. Attempt all the questions:
- Find center and radius of a sphere $x^2 + y^2 + z^2 + 4x - 6y + 8z = 10$.
 - Solve: $(x^2 + xy^2)dx + (x^2y + y^2)dy = 0$.
 - Find Laplace transform of $f(t) = \frac{\sin 2t}{t}$.
 - Find Laplace transform of $f(t) = \text{Sin}at$.

मात्र स्नेहात्मक दोस्ती का संरक्षण
नित तप्त १८७५१९९२
वाल्मीकि
NCTA College

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

1. a) Reduce the equation of a line $x+y+z+1=0$, $4x+y-2z+2=0$ in symmetrical form.

OR

Find the equation of the line through the point $(1,6,3)$ perpendicular to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.

- b) Find the equation of the sphere which passes through the circle $x^2 + y^2 + z^2 = 5$, $x+2y+3z = 3$ and touch the plane $4x+3y = 15$.

2. a) State and prove Euler's theorem for a homogeneous function of two variable of degree n and hence if $v = \log \frac{x^2 + y^2}{x + y}$, show that

$$x \frac{\partial v}{\partial x} + y \frac{\partial v}{\partial y} = 1.$$

- b) Write down the necessary condition that $f(x, y, z)$ to have maximum or minimum value. Show that the function $u = y^2 + x^2 y + x^4$ has a minimum value at $(0, 0)$.

3. a) Sketch the region of integration of $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} dy dx$, and evaluate by interchanging the order of integration.

- b) Find the volume of the solid whose base is the region in xy -plane that is bounded by the parabola $y = 3 - x^2$, $y = 2x$ while the top is bounded by the plane $z = x + 1$.

4. a) Solve $\frac{dy}{dx} - \frac{\tan y}{1-x} = (1+x)e^x \sec y$.
- b) Solve $y'' + 9y = 6\cos 3x$, $y(0) = 1$, $y'(0) = 0$.

POKHARA UNIVERSITY

| | | |
|------------------------------------|------------------|----------------|
| Level: Bachelor | Semester: Spring | Year : 2017 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Engineering Mathematics II | Time : 3hrs. | |

5. a) Solve by power series method $y' = 2xy$.
 b) Use method of variation of parameter to solve
 $y'' + 2y' + y = e^{-t} \cos x$
6. a) i) Find Laplace transform of $f(t) = e^{-3t} \sin 2t$.
 ii) Find $f(t)$ if $F(s) = \log \frac{s(s+1)}{s^2+4}$.
- b) Solve the following initial value problem by using Laplace transform
 $y'' + 2y' + 17y = 0, y(0) = 0, y'(0) = 12$

OR

- State and prove the convolution theorem for Laplace transform. Use it to find $f(t)$ where $F(s) = \frac{1}{(s^2+1)^2}$.

4x2.5

7. Attempt all

- a) Find the equations of the plane which passes through $(-1, 3, 2)$ and is normal to the planes $x+2y+2z=5$ and $3x+3y+2z=8$.
 b) Express the equation of cone having three mutually perpendicular generators if $a+b+c=0$
 c) Prove that $\mathbf{l}^2 + \mathbf{m}^2 + \mathbf{n}^2 = 1$
 d) Find Laplace transform of $\sin(wt + \theta)$

7

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

Attempt all the questions.

1. 1. a) Prove that the lines $\frac{x+1}{1} = \frac{y+1}{2} = \frac{z+1}{3}$; $x+2y+3z-8=0=2x+3y+4z-11$

are coplanar and find the point of contact and equation of plane containing them.

b) Prove that the circles

$$x^2 + y^2 + z^2 - 2x + 3y + 4z - 5 = 0, 5y + 6z + 1 = 0 \text{ and } x^2 + y^2 + z^2 - 3x - 4y + 5z - 6 = 0, x + 2y - 7z = 0$$

lie on the same sphere and find its equation.

2. a) State and prove Eulers theorem for homogeneous function of two variables in x and y of degree n . If

$$u = \sin^{-1} \left(\frac{x+y}{\sqrt{x+y^2}} \right), \text{ show that } x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u.$$

b) What are the criteria for a function of two independent variables to have extreme values? Find the minimum value of $f = x^2 + y^2 + z^2$ such that $x+y+z=1$ and $xyz=1$.

3. a) Draw the region of integration of $\int_0^\pi \int_x^\pi \frac{\pi \sin y}{y} dy dx$, and find its value interchanging the order of integration.

OR

Find the volume of the solid in the first octant bounded by the coordinate planes, the cylinder $x^2 + y^2 = 4$ and the plane $z + y = 3$.

- b) Evaluate $\int_0^a \int_y^a \int_{\sqrt{a^2-y^2}}^a \log(x^2 + y^2) dx dy$, ($a > 0$) by changing into polar

8

integral.

4. a) Define Bernoulli's differential equation and solve

$$\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^x \sec y$$

8

Level: Bachelor
Programme: BE
Course: Engineering Mathematics II

Year : 2018
Semester: Fall
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

- b) Solve $\frac{d^2y}{dx^2} - \frac{dy}{dx} + 4y = \frac{e^x}{x}$ by method of variation of parameter.

7

5. a) Solve by power series method
 $(1-x)y' = y$

OR

Define Bessel's differential equation and find the Bessel function of first kind.

- b) Solve the following initial value problem.

8

$$y'' + 2y' + y = e^{-x}, y(0) = -1, y'(0) = 1$$

8

6. a) Define Laplace transform of a function. Using Laplace transform prove the following:

$$i. L(\sin at \cos at) = \frac{a(s^2 - 2a^2)}{s^4 + 4a^4}$$

$$ii. L^{-1}\left\{\frac{1}{s^2(s^2 + w^2)}\right\} = \frac{1}{w^2}\left(t - \frac{\sin wt}{w}\right)$$

7

- b) Using Laplace Transform solve the initial value problem

$$y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1$$

4x2.5

7. Attempt all questions

- a) Find the equation of the line through (1,3,5) and (2,3,4) perpendicular to the plane $3x - 4y + 5z = 0$.

3.

- b) Verify Euler's theorem for $f(x, y) = x^3 + y^3 + z^3$
c) Solve the differential equation

$$(1+x)y dx + (1+y)x dy = 0$$

- d) Find the Laplace transform of te^{2t}

4.

- a) Solve $\frac{dy}{dx} + \frac{1}{x} \sin 2y = x^3 \cos^2 y$

8

- b) Solve, $y'' + 9y = \sec 3x$; (method of variation of parameter)

8

5. a) Solve the differential equation : $(1+x^2)y'' + xy' - y = 0$, by using power series methods.

OR

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

Attempt all the questions.

1. a) Find the image of the point (1,2,3) in the plane $2x-y+z+3=0$.

OR

Find the shortest distance between the lines $ax + by + cz + d = 0$, $a_1x + b_1y + c_1z + d_1 = 0$ and z -axis.

- b) Find the equation of sphere, its centre and radius which has the circle $x^2 + y^2 + z^2 = 9$, $x - 2y + 2z = 5$ as a great circle.

2. a) Write down the criteria for a function $f(x, y)$ of two variables x and y to have maximum or minimum values at a point.

If the sum of the dimension of a rectangular swimming pool is given. Prove that the amount of water in the pool is maximum when it is cube.

- b) State and prove Euler's theorem for homogeneous function of two variables. If $v = \log\left(\frac{x^2 + y^2}{x + y}\right)$ Prove that $x \frac{\partial v}{\partial x} + y \frac{\partial v}{\partial y} = 1$.

7

- a) Evaluate $\int \int \int x^2 dy dz$ by changing the order of integration.

8

- b) Find the volume of the solid whose base is the region in the xy -plane that is bounded by the parabola $y = 4-x^2$ and line $y=3x$ while the top of the solid is bounded by the plane $z = x+4$.

7

4. a) Solve $\frac{dy}{dx} + \frac{1}{x} \sin 2y = x^3 \cos^2 y$
b) Solve, $y'' + 9y = \sec 3x$; (method of variation of parameter)

8

5. a) Solve the differential equation : $(1+x^2)y'' + xy' - y = 0$, by using power series methods.

Define Bessel Equation and Bessel function of order n. Also show that

$$\frac{d}{dx} [x^{-n} J_n(x)] = -x^{-n} J_{n+1}(x).$$

- b) Solve the initial value problem: $y'' - 4y' + 3y = 10e^{-2x}$ where $y(0) = 1$ and $y'(0) = 3$.
 8
 6. a) Define convolution theorem for inverse Laplace Transform and use it

$$\text{to find } L^{-1} \left[\frac{s}{(s^2 + w^2)^2} \right]$$

- b) Using Laplace Transform solve the initial value problem

$$y'' - 4y' + 3y = e^{-t}, \quad y(0) = y'(0) = 1$$

7
 Write short notes :

- a) Find the equation of the plane through $(-1, 1, -1)$ and $(6, 2, 1)$ and normal to the plane $2x+y+z=5$.

- b) Solve $e^{xy} dx + e^{yx} dy = 0$.

- c) If $f(x,y,z) = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$, then show that $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} + z \frac{\partial f}{\partial z} = 0$.

- d) Find $f(t)$ if $F(s) = \frac{1}{s^2 + 36}$

7
 2.5*4

| | | |
|------------------------------------|------------------|-------------|
| Level: Bachelor | Semester: Spring | Year : 2018 |
| Programme: BE | Full Marks: 100 | |
| Course: Engineering Mathematics II | Pass Marks: 45 | |
| | Time : 3 hrs. | |

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Find the length of perpendicular from the point $(3, -1, 11)$ to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$. Also find the equation of perpendicular.

OR

Find the shortest distance between the lines: $ax+by+cz+d=0$ and $a_1x+b_1y+c_1z+d_1$ and z -axis.

- b) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 = 1$, $2x + 4y + 5z = 6$ and touching the plane $z = 0$.

2. a) If $u = \sin^{-1} \left(\frac{x+y}{\sqrt{2x+y}} \right)$ show that: $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\sin u \cos 2u}{4 \cos^3 u}$

- b) If the sum of the dimension of a rectangular swimming pool is given, show that the amount of water in the pool is maximum when it is a cube.

3. a) Evaluate $\int_0^2 \int_0^{\sqrt{4-x^2}} \frac{xy}{\sqrt{x^2 + y^2}} dy dx$ by changing polar integral.

- b) Find the volume of the solid whose base is the region in xy -plane that is bounded by the parabola $y = 3 - x^2$, $y = 2x$ while the top is bounded by the plane $z = x + 1$.

4. a) Define order and degree of differential equations with suitable examples. Solve $\frac{dy}{dx} - y \tan x = 3e^{-\sin x}$ where $y(0) = 4$.
 8
 b) Find the general solution of the differential equation $y'' - y = 2e^x + 6e^{2x}$.

5. a) Solve by power series method: $(1+x)y' = y$

OR

If $J_v(x)$ is the Bessel's function of order v . Prove that $J_{v-1}(x) - J_{v+1}(x) = 2J'_v(x)$

b) Use method of variation of parameter to solve $y''' + 4y' + 5y = 10e^{2x}$

6. a) Find the Laplace transform of

i. $t \cosh at$

ii. $t^2 e^{-t}$

- b) Solve by using Laplace transform:

8

8

7. Attempt all the questions:

- a) Find the equation of the line passing through $(1, 5, 3)$ and normal to the plane $2x+3y+7z=0$.
- b) Find the general solution of: $y'' - a^2 y = 0$.
- c) If $f(x, y, z) = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$ show that $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} + z \frac{\partial f}{\partial z} = 0$
- d) Define Laplace transformation of $f(t)$ and evaluate Laplace transform of $\sin(wt + \theta)$.

4

2.5x

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

1. a) Define shortest distance between two skew lines in space. Find the length and equation of the shortest distance between the lines.

$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{-1} \& \frac{x+3}{-3} = \frac{y+7}{1} = \frac{z-6}{4}$$

- b) Find the equation of the sphere through the circle $x^2+y^2+z^2=1$, $2x+4y+5z=6$ and touching the plane $z=0$.

2. a) State and prove Euler's theorem for function of two variables with degree n. If $u(x, y) = \sin^{-1}(\frac{x}{\sqrt{x}} + \frac{y}{\sqrt{y}})$ Show that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u.$$

- b) If $f(x, y) = xy(\frac{x^2 - y^2}{x^2 + y^2})$ when x and y are not simultaneous zero

when $x=0, y=0$ show that at $(0, 0)$ $f_{xy} + f_{yx}$

Find the minimum value of $f = x^2 + xy + y^2 + 3z^2$ such that $x+2y+4z=60$.

OR

3. a) Evaluate the integral $\int_0^a \int_{y^2/4a}^y \frac{x^2 - y^2}{x^2 + y^2} dx dy$ changing into polar co-ordinates.

- b) Find the volume in the first octant bounded by coordinate planes, the cylinder $x^2 + y^2 = 4$ and the plane $z + y = 3$.

4. a) Define order of differential equations with suitable examples. Solve:

POKHARA UNIVERSITY

Semester: Fall

Year : 2019
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Level: Bachelor
Programme: BE
Course: Engineering Mathematics II

$$\frac{dy}{dx} - \frac{\tan y}{1+x} = e^x(1+x)\sec y.$$

7

$$\text{b) Solve: } \frac{d^2y}{dx^2} + 10 \frac{dy}{dx} + 25y = e^{-5x}$$

7

5. a) Solve by power series method $y'' - 4y = 0$.

OR

Write Bessel function of the first kind of order n. Show that

$$\frac{d}{dx}[x^n j_n(x)] = x^n j_{n-1}(x)$$

- b) Solve the following initial value problem Solve the initial value

problem

$$y'' - 4y' + 3y = 0, y(0) = -1, y'(0) = -5$$

6. a) Define Laplace transform. State and prove Second shifting theorem of

Laplace transform. Find the Laplace transform of

$$\text{i) } L(t^2 \cos \omega t)$$

$$\text{ii) } L(\cot^{-1} \frac{x}{w}).$$

7

- b) Using the method of Laplace transform, solve the initial value

2.5x4

$$\text{problem } 9y'' - 6y' + y = 0, y(0) = 3, y'(0) = 1.$$

7. Write short notes on:

- a) Find the direction cosine of line perpendicular to plane

$$3x - 4y + 5z = 7.$$

b) Write the general equation of a cone with its vertex at the origin.

- c) Define unit step function and find its Laplace transform

$$\text{d) Find Laplace transform of } \frac{1 - \cos 2t}{4}$$

8

4. a) Solve the equation $\frac{dy}{dx} + \frac{y \log y}{x} = \frac{y(\log y)^2}{x^2}$

$$\text{b) Solve the initial value problem, } y'' + y' - 2y = 14 + 2x - 2x^2, y(0) = 0,$$

$$y'(0) = 0.$$

5. a) Solve $y'' - 4xy' + (4x^2 - 2)y = 0$ by using power series method.

OR

Define Bessel equation and Bessel function of order n Also show that

$$\frac{d}{dx}[x^n j_n(x)] = x^n j_{n+1}(x)$$

POKHARA UNIVERSITY

Semester: Spring

Year : 2019
Full Marks: 100

Pass Marks: 45

Time : 3hrs.

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

Attempt all the questions.

1. a) Find the equation to the plane through the line $2x + 3y - 5z - 4 = 0 = 3x - 4y + 5z - 6$, parallel to the z-axis.

- b) Find the equation of the sphere through the circle $x^2 + y^2 + z^2 = 4$, $z = 0$ and is cut by the plane $x + 2y + 3z = 0$ in a circle of radius 3.

2. a) State and prove Euler's Theorem on homogenous function of two independent variable of degree n. if $u = \sin^{-1} \left(\frac{x^2 + y^2 + z^2}{ax + by + cz} \right)$ prove that

$$x \frac{du}{dx} + y \frac{du}{dy} + z \frac{du}{dz} = 2 \tan u$$

- b) A rectangular box open at the top, is to have a volume of 32C.C. Find the dimensions of the box requiring least material for its construction.

3. a) Evaluate the integral $\int_0^{4a} \int_{y^2/4a}^{4a} \frac{x^2 - y^2}{x^2 + y^2} dx dy$ changing into polar co-

ordinates.

- b) Find the volume of the solid cut from the first octant by the surface $Z = 4x^2 - y$.

- c) Find the volume of the solid cut from the first octant by the surface $Z = 4x^2 - y$.

4. a) Solve the equation $\frac{dy}{dx} + \frac{y \log y}{x} = \frac{y(\log y)^2}{x^2}$

$$\text{b) Solve the initial value problem, } y'' + y' - 2y = 14 + 2x - 2x^2, y(0) = 0,$$

$$y'(0) = 0.$$

5. a) Solve $y'' - 4xy' + (4x^2 - 2)y = 0$ by using power series method.

OR

8

- b) Find the general solution of
 $y'' - 4y' + 5y = e^{2x} \csc x$ by using method of variation of parameter.

6. a) Define Laplace transform. Evaluate

i) $L(t \sin wt)$ ii) $L^{-1}\left(\frac{1}{s^2(s^2 + w^2)}\right)$

7

- b) Using Laplace Transform solve the initial value problem
 $y'' - 3y' + 2y = 4t + e^{3t}$
 $y(0) = y'(0) = -1$.

4x2

5

7. Attempt all the questions.

- a) Find the equation of plane which through (1,1,1) and parallel to the plane $3x - 4y + 5z = 0$.
b) Find Laplace transform of $e^{2x} \cos t$.
c) Solve $\frac{dy}{dx} + y \cot x = e^{\cos x}$,
d) If $V = \sqrt{x^2 + y^2 + z^2}$ Show that $V_{xx} + V_{yy} + V_{zz} = \frac{2}{V}$

POKHARA UNIVERSITY

Semester – Fall
Full Marks: 100.

Level: Bachelor
Programme: BE
Course: Mathematical Foundation of Computer

Science

Year : 2013
Pass Marks: 45
Time : 3hrs.

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

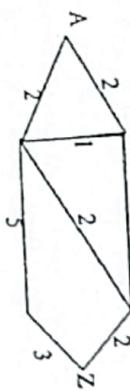
The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define Euler Graph. Prove that if G is connected and every vertex has even degree, then it has Euler's cycle.
b) Define adjacency matrix and incidence matrix. What are the differences between them? Draw the graph represented by the following adjacency matrix. Also write its incidence matrix.

$$\begin{bmatrix} 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 2 & 0 & 1 & 2 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 2 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

2. a) Find the shortest path from A to Z in the following graph using Dijkstra's Algorithm.



8

- b) Define Planar graph with example. If G is a connected planar graph with e edges, V vertices and f faces, then prove that $f = e - V + 2$.
3. a) State Principle of mathematical induction. Use mathematical induction to prove that for all $n \geq 1$ $1/1.3 + 1/3.5 + 1/5.7 + \dots + 1/(2n-1) (2n+1) = n/2(n+1)$
b) Define the term tautology. Prove that $p \leftrightarrow q$ is logically equivalent to $(p \wedge q) \vee (\neg p \wedge \neg q)$.

4. a) Define formal proofs. Give an argument using rules of inference to show that the conclusion follows from the hypothesis.

Hypothesis: Everyone in the class has a graphing calculator. Everyone who has a graphing calculator understand the trigonometric functions.

Conclusion: Ralphie, who is in the class, understand the trigonometric functions.

- b) Differentiate between direct and indirect proof. Give a direct proof of the theorem "for all integers m and n, if m is odd and n is even then $m+n$ is odd."

- c) Assume that the deer population of Rustic County is 1000 at time $n=0$ and the increase from time $n-1$ to time n is 10% of the size at time $n-1$. Write a recurrence relation and an initial condition the define the deer population at time n and then solve the recurrence relation.

- b) Suppose the number of virus in a colony triples every hour. Find If 100 virus were there in a colony in the beginning, how many virus will be there after 12 hours.

- a) Draw the transition diagram of a finite state automaton that accepts the string starts with baa over {a,b}.

- b) Define grammar and language. Construct a grammar that generates non palindrome binary strings.

7. Write short notes on any two:

- a) Universal and Existential quantifiers quantification

- b) Resolution by refutation

- c) Types of grammar

$$\neg p \vee q \vee r \\ \neg q \\ \neg r$$

Therefore, $\neg p$

7. Write short notes on any two:

- a) Universal and Existential quantifiers quantification

- b) Resolution by refutation

- c) Types of grammar

7. a) Solve the following recurrence relation:

$$a_n = 7a_{n-1} - 10a_{n-2} + 16n$$

- b) A Fibonacci series is given by the recurrence relation $f_n = f_{n-1} + f_{n-2}$, $n \geq 3$, and initial conditions $f_1 = 1$, $f_2 = 2$. Find the explicit formula for the fibonacci sequence.

4. a) Define a planar graph. Show that in any simple planar graph, $e \leq 3v - 6$.

- b) Show that, for a complete graph with n vertices, the number of edges is given by $n(n-1)/2$.

5. a) Explain Dijkstra's Shortest Path algorithm with an example.

- b) A connected planar graph has nine vertices having degrees 2, 2, 2, 3, 3, 3, 4, and 5. How many edges are there? How many faces are

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Mathematical Foundation for Computer Science

Semester: Fall
Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Give a proof by contradiction that, if four teams play seven games, some pair of teams play at least two times.

- b) Use mathematical induction to prove the following:
 $5^n - 1$ is divisible by 4 for $n=1, 2, \dots$

2. a) We are given the following hypothesis: Everyone loves either Microsoft or Apple. Lynn does not love Microsoft. Show that the conclusion, Lynn loves Apple follows from the hypothesis.

- b) Use resolution and proof by contradiction to prove the following expression

$$\neg p \vee q \vee r \\ \neg q \\ \neg r$$

7. a) Solve the following recurrence relation:

$$a_n = 7a_{n-1} - 10a_{n-2} + 16n$$

- b) A Fibonacci series is given by the recurrence relation $f_n = f_{n-1} + f_{n-2}$, $n \geq 3$, and initial conditions $f_1 = 1$, $f_2 = 2$. Find the explicit formula for the fibonacci sequence.

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5. a) Explain Dijkstra's Shortest Path algorithm with an example.

- b) A connected planar graph has nine vertices having degrees 2, 2, 2, 3, 3, 3, 4, and 5. How many edges are there? How many faces are

6. a) Differentiate between Finite State Machine and Regular
example. Explain Context Sensitive. Context-free and Regular
Grammar.
- b) Draw the transition diagram of a finite state automaton that accepts
the string starts with zero over {0, 1}.

- c) Write about minimization (Key term)
- d) Euler Cycle
- e) Hamiltonian Graph
- f) Direct and Indirect Proof.

2+5

Level Bachelor
Semester: Spring
Programme: III
Course: Mathematical Foundation of Computer
Science

Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

- g) Write about minimization (Key term)
- h) Euler Cycle
- i) Hamiltonian Graph
- j) Direct and Indirect Proof.

2+5

*Candidates are required to give their answers in their own words as far
as practicable
Figures in the margin indicate full marks*

Attempt all the questions.

1. a) Prove or disprove. "A complete graph with 5 vertices cannot be a planar graph".
- b) Differentiate between Euler graph and Hamilton graph. Prove that if G is a connected graph and every vertex has even degree, then G has an Euler circuit.

2. a) What is the shortest path problem? Write the algorithm to find the shortest path in graph G.

b) State and prove Euler's formula for planar graph.

3. a) What do you mean by logical equivalence? Show that the implication and its contra positive are logically equivalent.

b) Differentiate between universally quantified and existentially quantified statement. What is the truth value of the statement, for every real number x , $x^2-1>0$.

4. a) State the rules of inference for quantified statements. Give an argument using the rules of inference to show that the conclusion follows from the hypotheses.

Hypotheses:
It is not sunny this afternoon and it is colder than yesterday. We will go swimming only if it is sunny. If we do not go swimming, then we will take a canoe trip. If we take a canoe trip, then we will be home by sunset.

Conclusion:

We will be home by sunset.
b) What is difference between direct proof and proof by contradiction?
Using indirect proof, show that if $3n+2$ is odd then n is odd.

$$5. \text{ a) Solve the recurrence relations } a_n = 6a_{n-1} + 8a_{n-2} = 3 \text{ where } a_0 = 10 \text{ and } a_1 = 25.$$

- b) What is logical equivalence? State and prove DeMorgan's Laws using laws of logic.

6. a) Define finite state machine. What is the difference between DFA and NFA? Construct a FA using the following transition table.

| Q\Σ | a | b | c |
|----------------|----------------|----------------|----------------|
| q ₀ | q ₁ | q ₀ | q ₂ |
| q ₁ | q ₀ | q ₃ | q ₀ |
| q ₂ | q ₁ | q ₂ | q ₀ |
| q ₃ | q ₁ | q ₀ | q ₁ |

- b) Consider the following grammar where $T=\{a, b\}$, $N=\{\sigma, A\}$ with production rules $\{\sigma \rightarrow b\sigma, \sigma \rightarrow aA, A \rightarrow a\sigma, A \rightarrow bA, A \rightarrow a, \sigma \rightarrow b\}$. Determine whether the given grammar is context-sensitive, regular or context-free, or none of these.

7. Write short notes on: (Any two)

- a) Rules of Inference.
b) Modus Ponens Vs Modus Tollens.
c) Euler's graph Vs Hamiltonian graph.

2x5

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

1. a) Differentiate between directed and undirected graph. Give an example of something in the real world that can be modeled by directed graph.
b) State and explain the different ways of computer representation of graph.
2. a) State and prove Euler's formula for planar graph.
b) What is a shortest path? Write an algorithm that finds the shortest path between two vertices, with an example.
3. a) Define logical equivalence. Show that the propositions $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent.
b) State the rules of inference for propositional logic. Verify that the following argument is valid using the rules of inferences.
If Clinton does not live in France, then he does not speak French. Clinton does not drive a Datsun. If Clinton lives in France, then he rides a motorcycle. Either Clinton speaks French or He drives a Datsun. Hence Clinton rides a motorcycle.
4. a) Differentiate between proof by contradiction and proof by contra positive with an example.
b) Differentiate between universally quantified and existentially quantified statement. What is the truth value of the statement, for every real number x , $x^2 - 1 > 0$.
5. a) Define recurrence relation. Find an explicit formula for Fibonacci numbers.
b) Write a recursive relation that computes the amount of money at the end of n years assuming an initial amount of Rs 10,000 and an interest rate of 12 percent compounded annually.

1

2

5. 6. a) Define Chomsky hierarchy of grammar. Generate the following string using following production rules.

$\langle \text{expression} \rangle ::= (\langle \text{expression} \rangle) \langle \text{expression} \rangle + \langle \text{expression} \rangle |$

$\langle \text{expression} \rangle^* ::= (\langle \text{expression} \rangle)^* |$

$\langle \text{expression} \rangle | \langle \text{variable} \rangle$

$\langle \text{variable} \rangle ::= x | y$

Also construct a derivation tree for $(x^*y) + x$ in this grammar.

- b) Draw the transition diagram of finite state machine,

$$I = \{a, b, c\}$$

$$O = \{0, 1, 2\}$$

$$S = \{s_0, s_1, s_2, s_3\}$$

And

| I | | | | | | |
|----------------|----------------|----------------|----------------|---|---|---|
| S | a | b | c | a | b | c |
| s ₀ | s ₁ | s ₀ | s ₂ | 1 | 1 | 2 |
| s ₁ | s ₀ | s ₂ | s ₂ | 2 | 0 | 0 |
| s ₂ | s ₃ | s ₃ | s ₀ | 1 | 0 | 1 |
| s ₃ | s ₁ | s ₁ | s ₀ | 2 | 0 | 2 |

2x5

7. Write short notes on: (Any two)

- a) Application of graph
b) Predicate logic
c) Finite state automata

POKHARA UNIVERSITY

Semester: Spring Year : 2015

Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Level: Bachelor
Programme: BE
Course: Mathematical Foundation of Computer Science

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Give a proof by contradiction that, if four teams play seven games,

some pair of teams play at least two times.

8

b) Briefly explain Rules of Inference for Quantified Statements.

7

2. a) We are given the following hypothesis: Everyone loves either Microsoft or Apple. Lynn does not love Microsoft. Show that the

conclusion, Lynn loves Apple follows from the hypothesis.

8

- b) Use resolution and proof by contradiction to prove the following expression

$$\neg p \vee q \vee r$$

$$\neg q$$

$$\neg r$$

$$\therefore \neg p$$

- Therefore, $\neg p$
Solve the following recurrence relation:

$$a_n = 7a_{n-1} - 10a_{n-2} + 16n$$

8

3. a) Solve the following recurrence relation

$$f_n f_{n+1} f_{n+2} = 0, n \geq 3, \text{ and initial conditions } f_1 = 1, f_2 = 2$$

Find the explicit formula for the fibonacci sequence.

8

4. a) Define a planar graph. Show that in any simple planar graph, $e \leq 3v - 6$

6

- b) Show that, for a complete graph with n vertices, the number of edges is given by $n(n-1)/2$.

8

5. a) Explain Dijkstra's Shortest Path algorithm with an example.
b) A connected planar graph has nine vertices having degrees 2, 2, 2, 3,

3, 3, 4, 4 and 5. How many edges are there? How many faces are there?

7

6. a) Differentiate between Finite State Machine and Automata with

1

8

2

example. Explain Context Sensitive, Context-Free and Regular Grammar.

b) Draw the transition diagram of a finite state automaton that accepts the string starts with baa over { a, b }

7. Write short notes on: (Any two)

a) Euler Cycle

b) Hamiltonian Graph

c) Direct and Indirect Proof

POKHARA UNIVERSITY

Semester: Fall Year : 2016

Full Marks: 100

Pass Marks: 45

Course: Mathematical Foundation of Computer Science

Time : 3 hrs.

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

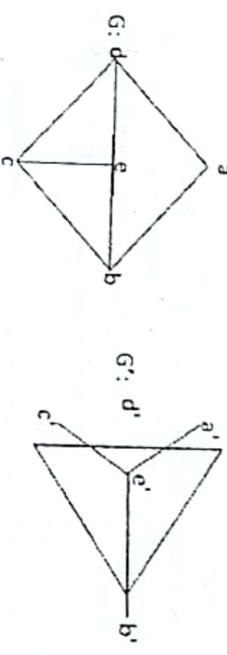
The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Draw the undirected graph G , corresponding to the given adjacency matrix. 7

$$\begin{bmatrix} 1 & 2 & 0 & 0 \\ 2 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$$

- b) Show that the graphs G and G' are isomorphic. 8



2. a) Is it planar graph or not, prove it. If it is planar graph re-draw it. 5



- b) Derive a formula for number of edges in k_n . 5
- c) When does a complete bipartite graph $k_{n,n}$ contains a Hamiltonian cycle? Prove it by showing an example. 5

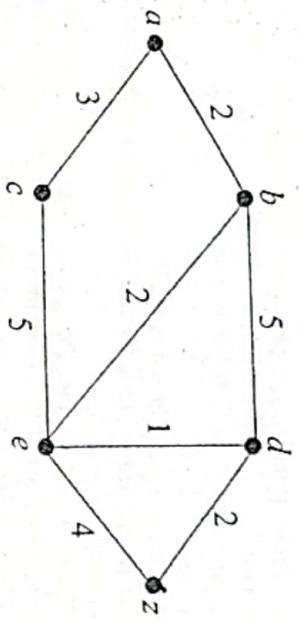
3. a) Show that: $p \rightarrow q \equiv (\neg p \vee q) \rightarrow (\neg p \wedge q)$ using:
 i. Truth Table
 ii. Algebra of propositions
- b) Use mathematical induction to show that if $r \neq 1$, then $a + ar + ar^2 + \dots + ar^n = \frac{a(r^{n+1} - 1)}{r - 1}$
4. a) Rewrite the following arguments using quantifiers, variables and predicate symbols.
 i. All birds can fly.
 ii. Not all birds can fly.
 iii. Some men are genius.
 iv. Some numbers are not rational.
 v. Some real numbers have square root.
 vi. Every student either can speak English or Knows programming JAVA.
 vii. There is a student who likes MFCS but not Applied Mechanics.
- b) What is logical equivalence? State and prove DeMorgan's Laws using laws of logic.
5. a) Solve the recurrence relation: $2a_n = 7a_{n-1} - 3a_{n-2} + 2^n$
 b) Prove that $6n \equiv 0 \pmod{9}$ for all integers $n \geq 2$
6. a) Design DFAs for $\Sigma = \{m, n\}$, that accepts the sets consisting of
 i. All the strings with exactly one 'm'.
 ii. All the strings with at least one 'm'.
 iii. All strings have at least one 'm' and followed by exactly two 'n'.
 iv. All strings have even no of 'm' and odd no. of 'n'.
 b) Write a grammar that generates the string having the given properties. String over {a,b} ending with ba
7. Write short notes on: (Any two)
 a) Euler's graph vs Hamiltonian graph
 b) Predicate logics
 c) FSA

POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2016
 Programme: BE Full Marks: 100
 Course: Mathematical Foundation of Computer Pass Marks: 45
 Science Time : 3 hrs.

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

1. a) Use Dijkstra's algorithm to find the length of the shortest path between the vertices a and z in the weighted graph displayed below.



- b) Explain the Euler path and Euler circuit with the help of a diagram. State the necessary and sufficient conditions for Euler circuits and paths.
2. a) In a round-robin tournament the Tigers beat the Blue Jays, the Tigers beat the Cardinals, the Tigers beat the Orioles, the Blue Jays beat the Cardinals, the Blue Jays beat the Orioles, and the Cardinals beat the Orioles. Model this outcome with a directed graph. Draw the figure for the complete bipartite graph $K_{3,4}$.
 b) Show that an undirected graph has an even number of vertices of odd degree. Explain the Hamiltonian path and Hamiltonian circuit with the help of a diagram.
3. a) Use mathematical induction to prove that $2 - 2 \cdot 7 + 2 \cdot 7^2 - \dots + 2 \cdot (-7)^n = (1 - (-7)^{n+1})/4$ whenever n is a non-negative integer

- b) Express the following statements using quantifiers.

i. "Every student in the class has studied calculus." Assume that

the domain consists of all people.

ii. "Some student in this class has visited Mexico". Assume that

the domain consists of all people.

4. a) We are given the following hypotheses:

If the Chargers get a good linebacker then the Chargers can beat the

Broncos

If the Chargers can beat the Broncos, then the Chargers can beat the

Jets.

If the Chargers can beat the Broncos, then the Chargers can beat the

Dolphins.

The Chargers get a good linebacker.

Show using the rules of inference that the conclusion, the Chargers

beat the Jets and the Chargers can beat the Dolphins, follows from the

hypotheses.

b) Differentiate between direct and indirect proofs with suitable

examples. Prove that $\sqrt{2}$ is irrational by giving a proof by

contradiction.

5. a)

Find all solutions of the recurrence relation

3+4

7

$a_n = 5a_{n-1} + 6a_{n-2} + 42 \cdot 4^n$

with initial condition $a_1 = 56$ and $a_2 = 278$.

7

2+6

b) Derive the recurrence relation for the Tower of Hanoi and solve it

using an iterative approach.

6. a) Define Finite State Machine. Design a Finite State Automata that

accepts precisely those strings over {a, b} that contain an odd number

of b's. Your design should include the proper definition of the

finite-state automaton, transition table and the transition diagram.

b) Discuss regular expressions and regular languages in detail with

suitable examples. Explain the different properties of regular

languages.

2x5

10

10

7. Write short notes on: (Any two)

a) Adjacency and Incidence Matrix

b) Converse and Contrapositive statements

c) Equivalence Relation

3. a) Rewrite the following arguments using quantifiers, variables and

predicate symbols

- All fish can swim.
- Not all birds can fly.
- Some men are dumb.
- Some numbers are not complex.

2

POKHARA UNIVERSITY

Year : 2017

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

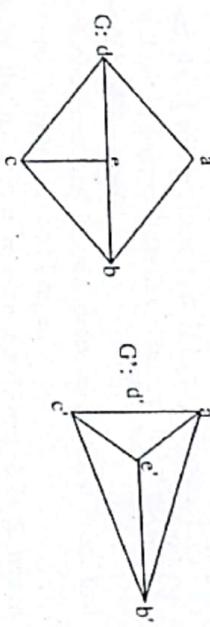
Level: Bachelor
Semester: Fall
Programme: BE
Course: Mathematical Foundation of Computer
Science

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

Attempt all the questions.

1. a) What are the applicable fields of graph theory? Explain Hamilton graph with their properties.

- b) Show that the graphs G and G' are isomorphic.



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2. a) For a given graph define incidence and adjacency matrix.

10

7. Write short notes on: (Any two)

a) Adjacency and Incidence Matrix

b) Converse and Contrapositive statements

c) Equivalence Relation

3. a) Rewrite the following arguments using quantifiers, variables and

predicate symbols

- All fish can swim.
- Not all birds can fly.
- Some men are dumb.
- Some numbers are not complex.

1

- Some real numbers have square 3.
- Every IT student can speak English or Knows programming JAVA.

8
7
7

- There is a student who likes MPCS but not English.

8

JAVA.

- What is induction? Illustrate with an example.
- Use Mathematical induction to prove the given statement.

8

6.7ⁿ-2.3ⁿ is divisible by 4, for n = 1,2,3,...

- b) $p \leftrightarrow r$
- i. Use resolution to derive conclusion: $r \frac{r}{\wedge p}$

8
8

5. a)

- Solve the recurrence relation: $2a_n=9a_{n-1}+5a_{n-2}+2$.
- b) Solve the recurrence relation of Fibonacci series.

8
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6. a)

- Define Alphabet and Language in Finite State Automata. Describe working principle of DFA.
- b) State the rules to be in Regular expression. Design a DFA which accepts the string ends with '00' (eg. 1100, 10100, 00)

2x5

7. Write short notes on: (Any two)

- a) Eular Graph
- b) Truth functions
- c) Preposition vs. Predicate logic

8

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

The figures in the margin indicate full marks.

Attempt all the questions.

POKHARA UNIVERSITY

| Level: Bachelor Programme: BE | Semester: Spring | Year : 2017 |
|---|------------------|----------------|
| Course: Mathematical Foundation of Computer Science | Full Marks: 100 | Pass Marks: 45 |
| | Time : 3hrs. | |

- 1. a) Define proposition and predicate logic. Use truth table to show that $p \rightarrow q \equiv \neg p \vee q$
- b) Prove $\neg(A \vee B)$ and $(\neg A) \wedge (\neg B)$ are equivalent.

8
8

- 2. a) Show that $n^2 > 2n+1$ for $n \geq 3$ by the mathematical induction.
- b) 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."

8
8

- 3. a) Describe direct and indirect proof techniques. Proof that product of two odd integer is an odd integer.
- b) Solve the recurrence relation $F_n = 5F_{n-1} - 6F_{n-2}$ where $F_0 = 1$ and $F_1 = 4$.

8
7

4. a)

- Define the terms: Multigraph, pseudograph, complete graph, platonic graph. List out the application of graph theory.
- b) A connected graph contains Eulerian trail, but not Eulerian circuit if and only if it has exactly two vertices of odd degree. Prove it.

8
8

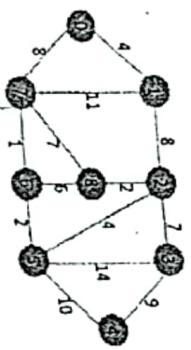
5. a)

- State Dirac's & Ore's theorem. Let 'G' be a connected planar graph with 20 vertices and the degree of each vertex is 3. Find the number of regions in the graph.
- b) What is minimum spanning tree? Find the minimum spanning tree of the graph using Kruskal algorithm.

8
8

POKHARA UNIVERSITY

Year : 2018
 Semester: Fall
 Full Marks: 100
 Programme: BE
 Course: Mathematical Foundation of Computer
 Science
 Time : 3 hrs.



6. a) Define DFA. Design a DFA for a language:
 $L = \{w \in \{0,1\}^* \mid \text{Second symbol of } w \text{ is '0' and fourth input is '1'}. \}$
 b) Define regular expression. Design a Finite automata from regular expression $01(10+11)^*$.

2x5

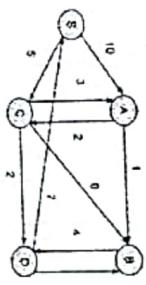
7. Write short notes on: (Any two)

- a) Hamiltonian Circuit
 b) Alphabet, language, string
 c) Tautology and contradiction

Attempt all the questions.

1. a) Show that the premises "Everyone in this college has purchased a computer" and "Pankaj is a student in this college" imply the conclusion "Pankaj has purchased a computer".
 b) Prove that following propositions are tautology:
- a) $\neg(p \wedge q) \vee q$ b) $p \rightarrow (\neg p \vee q)$
2. a) Explain the mathematical induction theorem with example.
 b) Show that the 't' is valid conclusion from the premises $p \rightarrow q$, $q \rightarrow r$, $r \rightarrow s$, $\neg s$ and $p \vee t$.
3. a) What are the major differences between direct proof and indirect proof techniques? Explain with example. Prove that $\sqrt{2}$ is irrational by contradiction method.
 b) Solve the recurrence relation:

$$a_{n+2} - 5a_{n+1} + 6a_n = 2 \text{ with initial condition } a_0 = 1 \text{ & } a_1 = -1$$
4. a) Briefly explain & prove the Handshaking theorem in undirected graph.
 b) Describe Euler's theorem with an example. For what values of 'n' the graph of K_n is Eulerian? Explain.
5. a) Define regular and isomorphic graph. Differentiate between Walk, Path & Trail in graph.
 b) State Dijkstra's Shortest Path Algorithm. Find the shortest path of the graph using Dijkstra's algorithm.



6. a) Describe the working mechanism of Finite automata. Design finite automata which accepts even number of 'a's.

$L = \{w \in \{0,1\}^* \mid \text{Second symbol of } w \text{ is '0' and fourth input is '1'}$. Define regular with formal definition. Show that $aa^*(a+b)^*a$ is a regular expression.

7. Write short notes on: (Any two)
- Bipartite graph
 - Hamiltonian circuit
 - Universal & Existential quantifier

8

POKHARA UNIVERSITY

| | | |
|---|------------------|----------------|
| Level: Bachelor | Semester: Spring | Year : 2018 |
| Programme: BE | Full Marks: 100 | Pass Marks: 45 |
| Course: Mathematical Foundation of Computer Science | Time : 3 hrs. | |

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

Attempt all the questions.

1. a) Define tautology, show that $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology.
- b) Define conditional statement. Write inverse, converse & contrapositive of conditionals with truth table.

2. a) 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 job or I will not work hard."

- b) Use direct proof to prove "if x is odd than x^2 " is also odd. Show by giving a proof by contradiction that if 100 balls are placed in 9 boxes some box contains 12 or more balls.

3. a) What are regular expression? Design a DFA which accepts the string with even number of a's and b's over $\{a,b\}$.

- b) How can you convert NFA in to DFA explain with suitable example.

4. a) Define the terms: Multigraph, Pseudo graph, bi-partite graph and regular graph with suitable example.
- b) What is minimum spanning tree? Find the minimum spanning tree of the graph using Prim's algorithm.

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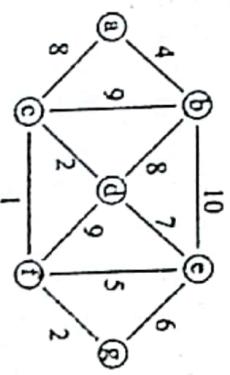
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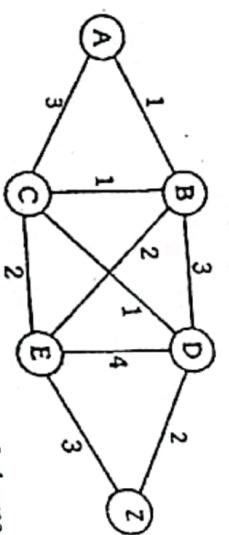
7



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5. a) Show that for a complete graph with n vertices, the number of edges is given by $n(n-1)/2$. 7

- b) Find the shortest path from a to z using Dijkstra's Algorithm. 8



6. a) Define linear homogeneous recursion relation of degree K with constant coefficient with suitable examples. What is the solution of the recurrence relation $a_n = a_{n-1} - 2a_{n-2}$ with initial conditions $a_0 = 2$ and $a_1 = 7$. 8

$$b) \text{ Solve the recurrence relation: } 2a_n = 7a_{n-1} - 3a_{n-2} + 2^n \quad 7 \\ 2 \times 5$$

7. Write short notes on: (Any two) 7

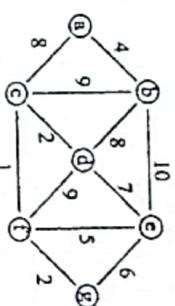
- a) FSM Properties
b) Bipartite graph
c) Euler cycle vs Hamilton cycle

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

| | | |
|---|-----------------|-------------|
| Level: Bachelor | Semester: Fall | Year : 2019 |
| Programme: BE | Full Marks: 100 | |
| Course: Mathematical Foundation of Computer Science | Pass Marks: 45 | |
| | Time : 3hrs. | |

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1. a) How can you show that two graphs are isomorphic? Discuss invariants that can be used to show that two graphs are not isomorphic with suitable example. 7
- b) What is Euler's formula for planar graphs? How can Euler's formula for planar graphs be used to show that a simple graph is non-planar. 8
2. a) Explain different graph representation technique with suitable example. 7
- b) What is minimum spanning tree? Find the minimum spanning tree of the graph using Kruskal's algorithm. 7



3. a) Differentiate between universally quantified and existentially quantified statements. What is the truth value of the statement, $\forall x \exists y > 0$ for every real number x . 7
- b) Use mathematical induction to show that if $r \neq 1$ then $a+ar+ar^2+\dots+ar^{r-1}=a(r^r-1)/(r-1)$. 8
4. a) Hypothesis: "Everyone in the Discrete Math class loves proofs. Someone in the discrete math class have never taken calculus." Use rule of inference to prove it. 7
- b) i) Use direct proof to prove "if x is odd then x^2 is also odd. 4+4

- ii) Show by giving a proof by contradiction that if 100 balls are placed in 9 boxes Some box contains 12 or more balls.

5. a) Define linear homogeneous recursion relation of degree K with constant coefficient with suitable examples. What is the solution of the recurrence relation $a_n = 2a_{n-1} - 2a_{n-2}$ with $a_0 = 2$ and $a_1 = 7$

- b) Suppose that a person deposits Rs. 10,000/- in a fixed account at a bank yielding 11% per year with interest compounded annually. How much will be in the account after 10 years? Solve the problem with modelling it into recursion relations.

6. a) Define deterministic finite state automata. Construct a DFA whose language is the set of strings that ends with 111 and contains odd number of one's.

- b) What is CFG? Write the CFG that can accept all the palindrome string over $\Sigma = \{0, 1\}$ and also construct derivation tree.

2x5

7. Write short notes on: (Any two)

- a) Tautology, Contradiction and Contingency
b) Euler Graph
c) Chomsky hierarchy of grammar

8

POKHARA UNIVERSITY

| | | |
|---|------------------|--------------|
| Level: Bachelor | Semester: Spring | Year : 2019 |
| Programme: BE | Full Marks: 100 | |
| Course: Mathematical Foundation of Computer Science | Pass Marks: 45 | Time : 3hrs. |

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Explain the importance of predicate logic in computer science. Use truth table to prove that $(p \rightarrow q) \vee \sim p \equiv \sim p \vee q$

- b) Prove $(P \vee Q) \wedge \sim (P \vee Q)$ is a contradiction.

2. a) Show that $n^3 + 2n$, for all n is divisible by three through mathematical induction.

- b) Analyze the validity of the following argument "If he does not have an explanation then he will be found guilty. He either has an explanation or he has been framed. Therefore, if he has been framed he will be found guilty."

3. a) Describe techniques of direct and indirect proofs. Prove that product of two odd integer is an odd integer and the product of two even integers is even.

- b) Solve the recurrence relation $2a_n = 7a_{n-1} - 3a_{n-2} + 2n$ where $a_0 = 1$ and $a_1 = 4$.

4. a) Define the terms: Multigraph, pseudograph, complete graph and bipartite graph. List out the application of graph theory.
b) What is an Eulerian graph? How can we tell that a graph is Eulerian.

- Explain with the help of an example.
5. a) State Dirac's & Ore's theorem. Show that a connected simple planar graph all of whose vertices have degree at least 5 must have at least 12 vertices.

QUESTION BANK

- 1) Explain what is meant by *Context Free Grammar*.
2) Explain the difference between LR(0), LR(1) and LR(2) grammars.
3) Explain the difference between LR(0) and LR(1) grammars.
4) Explain the difference between LR(0) and LR(1) grammars.
5) Explain the difference between LR(0) and LR(1) grammars.
6) Explain the difference between LR(0) and LR(1) grammars.
7) Explain the difference between LR(0) and LR(1) grammars.
8) Explain the difference between LR(0) and LR(1) grammars.

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5) Explain the difference between LR(0) and LR(1) grammars.
6) Explain the difference between LR(0) and LR(1) grammars.
7) Explain the difference between LR(0) and LR(1) grammars.

2×5

7. Write short notes on any two:

- a) Use of frameset and iframe tag
- b) Multimedia in HTML
- c) Using Class & ID in CSS
- d) Event and Event handling in Javascript

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

Attempt all the questions.

- | | | |
|-------|--|---|
| 1. a) | What is a web service? Why is http protocol called as a stateless protocol? | 7 |
| b) | What do you mean by URL? Differentiate URL with URI | 7 |
| 2. a) | Explain about the HTML document structure. Explain about the syntax and fundamental tags used in HTML. | 8 |
| b) | Frames provide a helpful mechanism for dividing a web page into pieces. Justify your answer with a suitable example script. Can a table be employed for creating the pages as an alternative to frames? Modify your frame example by using tables. | 8 |
| 3. a) | Explain about the style class and style specification format. | 5 |
| b) | Explain about <div> and with an appropriate example. How can your position an element (e.g. heading text) relative to browser window by using css. | 5 |
| c) | Create a page with a button and textbox. The textbox should display a value 'zero' i.e. 0 initially. Write a javascript function so that when you click the button the value of textbox increases with 1 per click. | 5 |
| 4. a) | What is Document Object Model? Provide an example script for stacking elements. | 8 |
| b) | What is DOM event model? Write a javascript program for locating mouse cursor. | 7 |
| 5. a) | What is type conversion? How PHP deals with type conversion issue? | 7 |
| b) | How PHP supports pattern matching? Write a php program to find if a string of text "php" is present using pattern matching. | 8 |
| 6. a) | Create a html form with name and email as input. When you click the submit button the target php should validate the email. Finally the | 8 |

POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2013
Programme: BE Full Marks: 100
Course: Web Technology Pass Marks: 45
Time : 3 hrs.

valid data should be displayed in the browser.

- b) Create a MySQL database named library. Create a table named movie (date), with id(number), movie_name(string), release_date in the table director(string) and language(string) fields. Insert data in the table and access the inserted data from the table.

2x5

7. Write short notes on: (Any two)

- a) Displaying image in html pages
b) WAP
c) Session vs cookie

7

POKHARA UNIVERSITY
Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Level: Bachelor
Semester: Fall
Programming: BE
Course: Web Technology

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What is a web server? How is domain name conversion carried out?
b) Differentiate between SMTP and POP.
c) How can you specify Hypertext Links? Design a simple frame using HTML notations.
2. a) Write HTML codes to create the following list.

World:

1. Asia:

- Nepal
- China
- Bangladesh

सुन स्क्रिप्टरी सलाहर्स एड कॉर्पोरेशन

वालपुरमा, नालितपुर ९८५५१५५१२
NCIT College

2. Europe:

- i. England
- ii. France

3. Africa:

- a. Ghana
- b. Uganda

4. Australia

- b) What are style sheets? What are the various levels of style sheets supported by CSS? Illustrate with simple example for each of them.
3. a) Why is JavaScript called as client side scripting language?
- Write the code for email validation in JavaScript.

2

10

- b) Why is DOM used in JavaScript? Explain DOM structure using an example.

4. a) How does JavaScript handle events? Is it possible to change the color of the text displayed in HTML document using JavaScript? Write a simple program for illustrating it.

- b) How does PHP support looping? Explain with an example script.

5. a) Write a PHP code to create a database 'hotel' with a table 'guest'. The table must have the fields 'id', 'name', 'address', 'email' and 'date'. Also, assign one of the fields as primary key.

- b) Create a form for getting the data for question 5(a). Then write a PHP script that reads the data submitted from the form and inserts them to the 'guest' table in the database. Also, apply a validation mechanism to ensure that the 'name' contains only alphabetic characters (A-Z, a-z).

6. a) Why do you need session in PHP? Explain with an example?

- b) What do you mean by cookie? How does it differ from session?

- c) How does PHP support pattern matching? Explain with example.

7. Write short notes on *any two*:

- a) MIME
b) Style Classes
c) Multimedia in HTML

| | | | |
|--|--|--|-----|
| | | | 7 |
| | | | 10 |
| | | | 5 |
| | | | 5 |
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| | | | 5 |
| | | | 2×5 |

| POKHARA UNIVERSITY | | Year : 2014 |
|--------------------|----------------|------------------|
| | | Full Marks: 100 |
| | | Pass Marks: 45 |
| | | Time : 3 hrs. |
| Level: | Bachelor | Semester: Spring |
| Programme: | BE | |
| Course: | Web Technology | |

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What is Intranet? Explain the term web architecture with example.
b) What is url? Explain the Web, MIME and HTTP.

2. a) Write a HTML for creating the following table.

| S.N. | Name | In Figures | Marks |
|------|----------------|------------|--------------|
| 1. | Dinesh Sapkota | 81 | Eighty-One |
| 2. | Arbind koirala | 88 | Eighty-Eight |

3. a) What is the purpose of external style sheets? What is the advantage of document-level style sheets over inline style sheets?
b) Why must background images be chosen with care? What properties are used to set margins, borders, paddings around elements? Briefly explain the uses of span and dir tag.
4. a) Describe the semantic of join, slice method in javascript. Write a function in javascript to reverse the string supplied using prompt.
b) What do you mean by DOM in javascript? How XHTML element positioning, visibility, stacking are possible in java script.
5. a) What are the main uses of PHP in web programming? Why PHP is called as Server Side Scripting Language?
b) Explain the importance of Session in PHP with suitable code.
6. a) What is CCS-P? Explain Events and Events Handling with example in javascript.

- b) Write a PHP program that perform add and delete operation of MySQL table name abc, having field names XX, YY and ZZ of type integer string and string.

Write short notes on: (Any two)

- Table join command.
- Dragging and dropping element.
- Replace () and match () function.

POKHARA UNIVERSITY
Year : 2015
Semester: Fall
Full Marks: 100
Programme: BE
Pass Marks: 45
Course: Web Technology
Time : 3 hrs.

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

Attempt all the questions.

- a) Define DNS. Explain about web server operations in detail. 7
- b) Differentiate between SMTP & POP protocols. Explain about web server. 8
- a) What tag is used to define a link and explain its attributes with example? 7
- b) Explain types of list with their attributes and examples. 8
- a) What is the purpose of style sheets? What is the advantage of external style sheets over inline and document-level style sheets? 7
- b) Explain CSS box model with an appropriate example? What is the purpose of class selector? 8
- a) What do you know about JavaScript DOM? Explain different kinds of dialog boxes. 7
- b) Using JavaScript event write a program that changes the visibility of HTML elements. 7
- a) Why JavaScript is useful in WebPages? Give the difference between Java & JavaScript with examples. 7
- b) Explain session and cookies with examples. 8
- a) Write a server side script for user registration having input fields name, password, age, email, phone with a proper client side validation. 8
- b) Write a PHP program that creates a table "Employee (id, name, department, phone, age, address)" and insert query to insert a new row in that table. 7
- Write short notes on: (Any two) 2x
- a) Array in PHP. 7
- b) JavaScript Event 7
- c) Pattern Matching in PHP 7

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Web Technology

Semester: Spring
Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

Attempt all the questions.

1. a) What do you mean by protocols? Explain the use of following protocols:

- i. HTTP
- ii. DHCP
- iii. POP3
- iv. FTP

- b) What are META tags? Explain with suitable example.
2. a). Write a HTML code to generate following table with form elements.

Fill the form below

| | |
|--|---|
| Name: | |
| Password: | |
| Feedback: | <input type="text"/> |
| Gender: | <input type="radio"/> Male <input checked="" type="radio"/> Female |
| Subject: | <input type="checkbox"/> Web <input type="checkbox"/> Math <input type="checkbox"/> Graphics <input type="checkbox"/> English |
| <input type="button" value="SUBMIT"/> <input type="button" value="RESET"/> | |

- b) What is a Frame? List out the advantages and disadvantages of using a Frame.
3. a) Why CSS is used in Web designing? Explain different levels (types) of style sheets with example. Also write advantages and disadvantages of each.

POKHARA UNIVERSITY

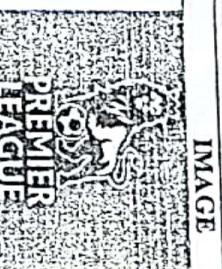
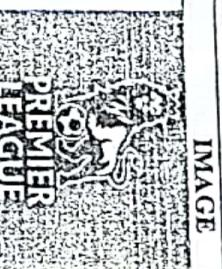
Year : 2016
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

Level: Bachelor
Semester: Fall
Programme: BE
Course: Web Technology

7. a) List out the Font, Background, Text & Border properties with values. 7
 b) Explain uses of Span & Div tag. 7
4. a) What is Document Object Model (DOM) in JavaScript? Explain with example. 8
- b) Write a program in JavaScript to display a prompt for 2 numbers, and show its sum in alert box. 8
5. a) What are the main uses of PHP in web programming? Why PHP is called as Server Side Scripting Language? 7
 b) Explain the importance of Session in PHP with suitable code. 7
6. a) Write a PHP and MySQL code to check authorized user for your web site. 8
 b) Explain select, insert, update, delete and join MySQL Command with an example. 8
7. Write short notes on: (Any two) 2x5
- a) Domain Name Registration
 b) Event and Event handling in JavaScript
 c) Dragging and dropping element

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

1. a) Is the Internet and Web same? Write about the differences between internet, intranet and extranet. 7
 b) Discuss the terminologies HTTP, POP and SMTP in web technology in detail. 8
2. a) What is HTML? Explain basic syntax of HTML? How HTML differs from XHTML? 6
 b) Write HTML code for following: 9

| LIST with Links | IMAGE |
|---|---|
| 1. EPL <ul style="list-style-type: none"> o Man City o Chelsea o Liverpool |  |
| 2. LALIGA <ul style="list-style-type: none"> • Real Madrid • Barcelona |  |

3. a) What is CSS? What are the different levels of style sheets? Illustrate all types with example. 10
 b) What DOM stands for? Describe DOM model in JavaScript. 5
4. a) Can JavaScript be used as server side script? How element visibility can be changed using JavaScript? Explain with example. 7

- b) Write a program in Java Script to validate a form. One user will includes user name, phone no. and submit button. On clicking the submit button validate the following:
- If the name or phone no. fields are blank.
 - If the phone number contains numeric digits only.

5. a) Write about PHP. What are the main uses of PHP in web programming? Explain different kinds of array in PHP. In PHP with file handling and Explain about Form handling and File handling with examples.

6. a) Discuss the use of cookies and sessions with example scenario of each in PHP.
- b) Write CRUD queries required to connect, fetch, delete and update data in PHP from MySQL.

7. Write short notes on: (Any two)
- MIME
 - Lists in HTML
 - Changing colors and fonts with JavaScript.

5
2×5

POKHARA UNIVERSITY Year : 2016
Level: Bachelor Semester: Spring Full Marks: 100
Programme: BE Pass Marks: 45
Course: Web Technology Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define DNS. List the different MIME headers and explain them.
- b) Discuss the need of web browser and web server in accessing the Internet.

2. a) Write the HTML code to create the following list.

Barclays Premier League

- Manchester United
- Manchester City
- Chelsea
- Arsenal

LaLiga

- Real Madrid
- Barcelona

गुण सेवारी सञ्चालन एवं फोटोकमी सर्विस
बालदुम्पारी, नलितपुर १८८७४३९२
NCIT College

Bundesliga

- Bayern Munchen
- Borussia Dortmund

La Liga

Champions League

Europa League

Uefa Cup

Europa League

- b) What is a Frame? List out the advantages and disadvantages of using a Frame.
3. a) Why CSS is used in Web designing? Explain different levels (types) of style sheets with example. Also write advantages and disadvantages of each.
- b) Why JavaScript is called as Client Side Scripting Language? Explain the Prompt Box in JavaScript with syntax only.

4. a) Write a JavaScript program which validates the user data (name, email, contact no) and displays the success message if validated successfully. Also create the HTML form for entering the data.

2

7

8

b) Write a Program to alter the visibility of an image of HTML.

7

b) Write a Program to alter the visibility of an image of HTML using JavaScript.

8

5. a) What are the main uses of PHP in web programming? Explain different Kinds of array in PHP.

7

b) How do you connect PHP with MySQL? Write a PHP code that retrieves the name & password from database.

7

6. a) Explain PHP Programming Language? How (PHP) supports cookies?

8

b) What are the uses of session? Is it possible to work with sessions in PHP? Explain with an example.

8

7. Write short notes on: (Any two)

2×5

a) CSS Box Model

7

b) SMTP

7

c) DOM Model

7

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

Attempt all the questions.

7. 1. a) What protocol is used by all computer connections to the Internet?

7

Describe a fully qualified domain name with example

8

b) What is the purpose of a MIME type specification in a request/response transaction between a browser and a server?

8

2. a) Write an HTML to create the following table:

| Life Expectancy By Current Age | | | |
|--------------------------------|-------|-----|-------|
| 65 | | 40 | |
| Men | Women | Men | Women |
| 65 | 78 | 40 | 20 |
| Men | Women | Men | Women |
| 82 | 85 | 77 | 81 |

Click here for more details.

b) Create an HTML document that contains five different headlines from a newspaper headline. Each headline should use a different heading tag and a different color. Make all the text use the Helvetica font.

Every verb in the text must have a line through it.

3. a) What is the difference in behavior between a group of checkbox buttons and a group of radio buttons? Under what circumstances is a select menu used instead of a radio button group?

8

b) What do you mean by CSS? What is the advantage of external style sheets over inline and document-level style sheets?

7

4. a) Explain DOM? Explain Handling event from page load and button elements with an example.

7

b) Create an HTML form that takes user's email address and password. Validate the form using JavaScript when the submit button is clicked.

8

Make sure that the fields are not empty and the email address is a

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Semester: Fall

Year : 2017
Full Marks: 100
Pass Marks: 45

Time : 3 hrs.

Level: Bachelor
Programme: BE
Course: Web Technology

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Year : 2017
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5. a) Explain constructor in JavaScript with example.
b) How are cookie and session different? Give examples to support your answer.

6. a) Write MySQL query to:
- Create a database named management and use it.
 - Create a table named users with id(integer), name(string), email(string), password(string), subscriber(Boolean).
 - Insert data in the table
 - Extract data from the table

- b) Write a server side script for user registration having input fields name, password, age, email, phone with a proper client side validation.

7. Write short notes on: (Any two)
- Web hosting
 - Array in PHP
 - frameset

7 2x5

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

Attempt all the questions.

1. a) Explain in brief about the domain name registration and hosting process.
b) How does HTTP works? Describe.
c) Describe the structure of standard HTML document.
2. a) Write HTML tags to generate the following form:

Student Directory

| | |
|----------|----------------------|
| Name | <input type="text"/> |
| Class | <input type="text"/> |
| Roll No. | <input type="text"/> |
| E-mail | <input type="text"/> |

- b) What are the different levels of style sheets? Mention different style specification formats with appropriate examples.
3. a) Describe different properties and property values associated with fonts, lists, colors and images.
b) What do you mean by DOM in Java Script? Why is Java Script called client side scripting language?
4. a) How do you move elements, change font styles of the texts and drag & drop elements with Java Script? Explain with appropriate examples.
b) Write a program in Java Script to validate a form. The user form includes user email, password and submit button. On clicking the submit button validate the following:
- if the email or password fields are blank

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- ii. if the format used for email is right. 7
5. a) What is type conversion? How do php deal with type conversions? 7
- b) Explain.
6. a) Write necessary php scripts to make connection with the database and insert/save form data in question no. 2(a) into database. 8
- b) What is session? What is the importance of session handling in web programming? Explain 8
7. Write short notes on: (Any two) 2x5
- a) MIME
- b) Frames
- c) File handling in php

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

Attempt all the questions.

1. a) Define DNS. Explain about HTTP and MIME protocols.
b) A company asked you to develop website for it. Which language and tools will you use for the development and why? Also how can you put the website online? 10

2. a) Write a HTML code to generate following table with form elements 7
- | | |
|--|---|
| Fill the form below | |
| Name: | <input type="text"/> |
| Password: | <input type="password"/> |
| Feedback: | <input type="text"/> |
| Gender: | <input type="radio"/> Male <input type="radio"/> Female |
| Subject: | <input type="checkbox"/> Web <input type="checkbox"/> Math <input type="checkbox"/> Graphics <input type="checkbox"/> English |
| <input type="button" value="Reset All"/> <input type="button" value="Submit Above Details"/> | |
- b) Discuss how events are handled in JavaScript. 5

3. a) Why CSS is used in Web designing? Explain different levels (types) of style sheets with example. Also write advantages and disadvantages of each. 10
- b) Explain the DOM model used in JavaScript. 5
4. a) Write JavaScript code to illustrate element positioning, stacking elements and mouse cursor. 8

5. a) Explain the origin, major features and arrays of PHP. 7
 b) Write a program in PHP to list out all prime numbers within a given range. 7
6. a) Why JavaScript is called as Client Side Scripting Language? Explain 8
 b) What is Popup Box in Javascript with syntax only? 8
6. a) What are cookies? How can we write a cookie on user computer? 7
 b) Explain with a sample code. 7
7. a) How do you connect PHP with MySQL? Write a PHP code that retrieves the name and password from database. 2×5
 b) How do you connect PHP with MySQL? Write a PHP code that retrieves the name and password from database. 2×5
7. Write short notes on: (Any two) 7
- a) Session Handling
 b) Multimedia in HTML
 c) RSS feed

7
 8

POKHARA UNIVERSITY
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 Programme: BE
 Course: Web Technology

Year : 2018
 Full Marks: 100
 Pass Marks: 45
 Time : 3 hrs.

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

Attempt all the questions.

1. a) What is image map in HTML? Write a HTML code to show the mapping of image. 8
 b) What is the function of Domain Name System? Write about the differences between LAN, WAN, MAN, PAN and Web. 8
2. a) Explain the following: 7
- URL vs URI
 - MIME Headers
 - HTTP vs HTTPS
 - SMTP vs POP3
- b) Create an HTML form with one textbox for getting name, one textbox for getting password, two radio buttons for getting gender (male and female), dropdown for getting subjects (Web, Math) and textarea for getting feedback. 7
3. a) What are the main purposes of id and class selectors? Explain with respective examples. 8
 b) Define DOM. Write JavaScript function to validate a form input field for onblur event whether it is blank or not and contains number or not. 5
4. a) Is JavaScript Object Oriented Programming Language? Illustrate your answer with suitable reasons and examples. 5
 b) Write JavaScript code to find the factorial of a number requesting a number from user using prompt. 5
 c) How dragging and dropping of XHTML elements is possible in JavaScript? 5
5. a) Explain the use of PHP \$_GET and \$_POST variables. 5
 b) Explain the CRUD operation in MySQL along with example. 5

5

8

- c) Explain the uses of pattern matching in PHP with suitable example.
6. a) Describe Starting, Storing and Destroying a Session. Explain with sample codes.
- b) Write a PHP code that connects with the database and insert (firstname,lastname,age) in a table using insertion query.

2×5

7. Write short notes on: (Any Two):

- a) Domain Registration Process
- b) Div and Span
- c) MySQL Joins

7

Level: Bachelor
Programme: BE
Course: Web Technology

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

The figures in the margin indicate full marks.

Attempt all the questions.

7

8

1. a) What are the functions of MIME? Explain the protocols that are used in e-mail.

- b) Explain the essential difference between:
- URL and URN
 - HTTP and FTP

2. a) Why table-less design is preferred more than table-based design?
Write HTML code for following :

| Roll no: | Name | Subjects | | | |
|----------|----------|----------|-----|------|-----|
| | | C | Web | Math | C++ |
| 1 | Abhishek | 50 | 45 | 60 | 70 |
| 2 | Suresh | 50 | 45 | 45 | NQ |
| 3 | Yodhin | 80 | 85 | 90 | 75 |

Contact to department if Not Qualified(NQ)

- b) What is image map in HTML? Explain with an example.
3. a) What are the advantages of using CSS over tables to create websites? Explain different CSS selectors with examples.
- b) How can you validate form in JavaScript? Write a program to explain it. Your program must contain email, password and submit button. On clicking validate whether the fields are blank and the format for the email is right.
4. a) What do you mean by event and event handling? Explain the handling mechanism in javascript.
- b) What is the difference between '==' and '===' in JavaScript? How dynamic contents and stacking of XHTML elements are made possible in JavaScript?
5. a) What are the main uses of PHP in web programming? How a file handling is done in PHP?

7

Year : 2019
Semester: Fall
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

- b) Make a login form with e-mail and password. Write a program to make dynamic login using php and MySQL query. Your program must contain database connection file from php to MySQL. 8

6. a) How is array implemented in PHP? Differentiate between *foreach* loop and *each* O function with example. 8
b) Explain the uses of pattern matching in PHP with suitable example. 2x5

7. Write short notes on: (Any two)
a) Levels of style sheets
b) DOM Hierarchy in JavaScript
c) SQL Joins

8

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Level: Bachelor
Programme: BE
Course: Web Technology

Semester: Spring
Year : 2019
Full Marks: 100
Pass Marks: 45
Time : 3 hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. Define Internet. Explain two-tiered and three-tiered web architectures. 7

8

a) Define URL and domain name. Explain about HTTP, FTP and WAP protocols. 8

8

2. a) Create an HTML form with one textbox for getting name, one text box for getting password, two radio buttons for getting gender (male and female), dropdown for getting subjects(WT, Math, C, C++) , text area for getting feedback with examples. Explain the uses of each. 7

8

b) Define Empty HTML Elements with examples of each. <frame>, <iframe> and <table> tags in HTML with examples of and <div> tags with examples. 8

8

3. a) Define CSS. Why it is important? Explain and <div> tags with examples. 7

7

b) Write a program to explain e-mail validation. Your program must contain email, password and submit button. On clicking, validate whether the fields are blank and the format for the email is right. 7

7

4. a) Define event. Explain about event handling mechanism in Javascript with example. 8

8

b) Is there any possibility of dynamic stacking of images in JavaScript? Explain your answer with an example. 7

7

5. a) What type of programming is PHP programming? Explain about its general syntactic characteristics. 8

8

b) Write a PHP and MySQL code for the following:
i. Create a database 'institute' with a table 'tbl_users' and fields on table as 'id', 'name', 'roll', 'mobile_number', 'email', 'status' with 'id' as primary key.

8

ii. Create HTML form for getting data on (i). Write PHP code to read data submitted from the form and insert it on 'tbl_users'. Also, apply the server side validation mechanism for empty inputs.

8

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example codes of each. 7
7. Write short notes on: (Any two) 2x5
a) Box model in CSS
b) Dragging and dropping elements in javascript
c) Indexed and associative arrays in PHP

Level: Bachelor
Semester: Fall
Programme: BE
Course: Logic Circuit

Year : 2013
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

- Candidates are required to give their answers in their own words as far as practicable.*
The figures in the margin indicate full marks.
- Attempt all the questions.**
1. a) Define analog and digital systems. Which system do you prefer and why? 7
 - b) i) Subtract $(100101)_2$ from $(111101)_2$ using 2's complement method. 8
 - ii) Subtract $(7729)_{10}$ - $(842.4)_{10}$ using 9's complement. 8
 2. a) Explain the universal property of NOR gate with appropriate logic gates. 7
 - b) Design a logic circuit to implement the Boolean function
 $F(A,B,C,D) = \sum(1,3,7,11,15)$
 $D(A,B,C,D) = \sum(0,2,5)$ in the term of
 i. Sum of products
 ii. Implement with NAND-NAND gate only 8
 3. a) Design a combinational circuit with four input lines that represent a decimal digit in BCD and four output lines that generate the 9'S complement of the input digit. OR 8
- Design a combinational circuit which takes three input numbers and produces an output equal to square of the input. 7
- b) A combinational circuit is defined by the following three functions
 $F_1 = x'y' + xyz'$ $F_2 = x'y$ $F_3 = xy + x'y'$
 Design the circuit with a decoder and external gates. 7
4. a) Give the truth table logic circuit and characteristic equation of J-K flip flop. How it can be converted into T flip flop. 7
- b) Design a counter with the following binary sequence 0, 1, 3, 2, 6, 4, 5, 7 and repeat. Use T flip flop. 8

5. a) Design an adder/substractor circuit with one selection variable S and

two inputs A and B. When $S=0$ the circuit performs $A+B$ when $S=1$ the circuit performs $A-B$ by taking the 2's complement of B.

b) What is PLA? Derive the programming table for the combinational circuit that squares a 3-bit input number.

7
8

6. a) Explain in brief about:

i. Gray code

ii. Modulo 2 system.

5
5

b) Differentiate between synchronous and asynchronous logic.

c) What do you understand by output hazard races?

2x5

7. Write short notes on (Any two):

a) Nibble Adder

b) Magnitude comparator

c) Master Slave flip-flop