## PURBANCHAL UNIVERSITY
## 2023

B. E. Computer/ECA/Electrical/Biomedical/Second Semester/*Final*

Time: 03:00 hrs.                          Full Marks: 60 /Pass Marks: 24

**BSH2003: Chemistry (New Course)**

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

*The figures in the margin indicate full marks.*

**Attempt ALL questions.**

### Group A

Very short question:                                          4×2=8

1.  Establish the relation between pH and pOH.                     2

2.  Define the term (a) co-ordination number (b) Ligand.         1+1

3.  Trans isomer is more stable than cis isomer, why?            2

4.  What are the applications of paints (at least four)?         2

### Group B

Short question:                                             7×4=28

5.  Write the major factor that causes air pollution and also mention their effects.                                              4

6.  Derive Ostwald's dilution law. Write it's limitation.       3+1

7.  Explain the Geometry and Magnetic properties of $[Ni(co)_4]$ and $[Fe(CN)_6]^{3-}$ on the basis of VBT.                           2+2

8.  Define the term Enantiomers and mesomers giving the examples of optical acitivity of Tartaric acid.                          2+2

9.  What is Grignard's reagent? How can you prepare Grignard's reagent from haloalkane. Write the action of Grignard's reagent with (a) Formaldehyde (b) water.                            1+1+1

10. What is the monomer of natural rubber? What is the vulcanization of rubber?                                       1+3

11. What is buffer solution? A buffer solution contains 0.015M of $NH_4OH$ and 0.025M of $NH_4CL$. Calculate the pH of the solution, $K_b$ for $NH_4OH$ is $1.8 \times 10^{-5}$.                          1+3

**OR,**

What pollutants causes soil pollution? Write the methods of control of soil pollution.

4

## Group C

**Short question:**

$3 \times 8 = 24$

12. What is glass electrode? How can you determine the pH of solution using glass electrodes? Construct the galvanic cell by using the electrodes $E°Zn^{2+}/Zn = -0.76V$ and $E°Ag^+/Ag = +0.80V$; Given $[Zn^{2+}]=0.4M$ and $[Ag^+]=0.1M$. Also calculate the emf of the cell.

2+3+3

13. What are the transition elements? Write the electronic configuration of $Fe^{2+}$ and CU. Explain the magnetic and catalytic properties of transition element.

2+2+2+2

14. Write the mechanism and kinetics of hydrolysis of $CH_3Br$ and $(CH_3)_3Br$ in the presence of aqueous KoH .

4+4

### OR,

Write the Hazards and their control in petroleum Refineries and LPG bottling plants.

4+4

# PURBANCHAL UNIVERSITY
## 2023

B. E. Computer/Second Semester/Final

Time: 03:00 hrs.

**BEC: 2003 Digital Logic(New Course)**

Full Marks: 60 /Pass Marks: 24

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 questions.**

### Group A

**Very short question:**

1. Define digital system.

2. What is De Morgan's theorem?                          $4 \times 2 = 8$

3. Define HDL.

4. What are difference between sequential logic and combinational logic?

### Group B

**Short question:**

5. Subtract 1234— 1200 using 9's complement.

6. Implement XOR gate using basic gate.                    $7 \times 4 = 28$

7. What is multiplexer? Draw circuit for $4 \times 1$ mux.

8. Simplify the Boolean function $F(w, x, y, z) = \Sigma (2, 7, 8, 9, 10, 12)$ using k-map with don't cores at $(W,X,4,Z) = \Sigma (3,4,5,11)$.

9. Design half subtractor with truth table, k—map and logic diagram.

10. Design 2-bit magnitude comparator.

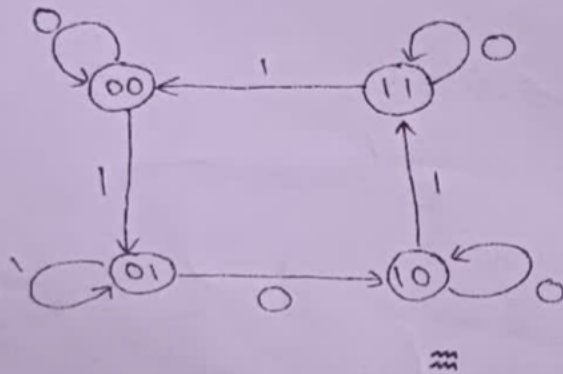11. How can you convert RS flip-flop into D flip-flop? Explain with diagram.

## Group C

**Short question:**

3×8=24

12. Explain about operation of BCD adder.

13. Design 4 bit asynchronous up down counter using JK flip-flop.

14. Design a sequential circuit specified by following state diagram using D flip-flop:

# PURBANCHAL UNIVERSITY
## 2023

B. E. Computer/ECA/ Electrical/Second Semester/Final

Time: 03:00 hrs.

Full Marks: 60 /Pass Marks: 24

**BCE2003: Object Oriented Programming in C++ (New Course)**

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

## Group A

**Attempt ALL questions.**

**Very short question:**

1. Define data abstraction and data encapsulation.                    4×2=8

2. What is namespace? Write syntax for declaring namespace.    1+1

3. What do you mean by exceptions and exceptional handling?

4. What do you mean by reference variable? Write the syntax to define reference variable.

1+1

## Group B

**Short question (Attempt any SEVEN):**

7×4=28

5. Differentiate between OOP and POP.

6. Write a program to find the volume of cube, sphere and cylinder using function overloading.

7. What do you mean by this pointer? Write a program to illustrate the use of 'this' pointer.

1+3

8. What is friend? Write advantages and disadvantages of friend function.

1+3

9. Write a program to illustrate Copy Constructor.

10. Define pure virtual function and abstract class. Write the syntax for pure virtual function and virtual function.

2+2

11. Write a program to input numbers and print the largest number using function template.

12. Write a program to illustrate static data member and static member function.

## Group C

**Long question (Attempt any THREE):**

3×8=24

13. Write a program to overload the binary '+' operator to add two complex numbers without using friend function.

2+6

14. Differentiate between overriding and overloading function. Write a program to illustrate hierarchical inheritance.

15. Explain different file pointers used in file handling. Write a program to open the file in write mode to write the name, roll and marks obtained in OOP of 'n' number of students.

16. Discuss steps to create a header file with an example. Write a program to convert basic type to class type.

5+5

# PURBANCHAL UNIVERSITY
## 2023

B. E. Computer/Electrical/Second Semester/Final

Time: 03:00 hrs.

**BCI2003: Applied Mechanics (New Course)**

Full Marks: 60 /Pass Marks: 24

*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 questions.**

1. Mention the fundamental concepts and principle of mechanics? 4

2 (a) Describe Lami's theorem? List out the different types of forces? 3+1

(b) The moment of the force $\vec{F} = (2i - 3j + 4k)$ acting at B about point A is given by $\vec{M} = (-3i + 7j - 12k)$. Determine the dimension 'a' and 'b' of the rectangular box as shown in figure below. 10



$I_{zz} = I_{xx} + I_{yy}$
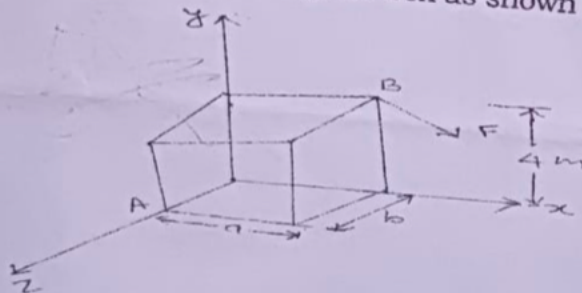
3 (a) State and proof perpendicular axis theorem? 2

(b) Compute the moment of inertia about centroidal X and Y axis. 6
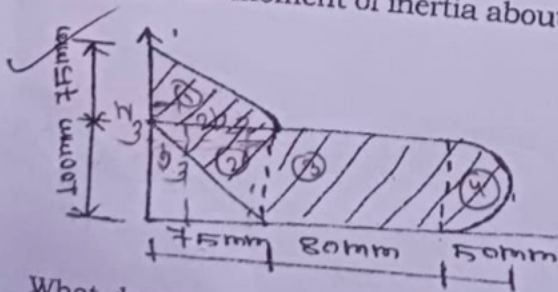


4. What do you mean by friction & state the Law of friction. Mention the condition of sliding? 1+3+2

5(a) Derive the expression for equation of motion for a particle moving along a rectilinear path when the acceleration is given function of velocity.

4

(b) The acceleration of the particle is defined by the relation $a=21-12x^2$, where a is expressed in $m/sec^2$ and x is in meter, the particle starts no initial velocity at the Position $x=0$. Determine:

6

(i) The velocity when $x=1.5m$.

(ii) The position where velocity is again zero.

(iii) The position where velocity is maximum.

$v = \dfrac{dx}{dt}$

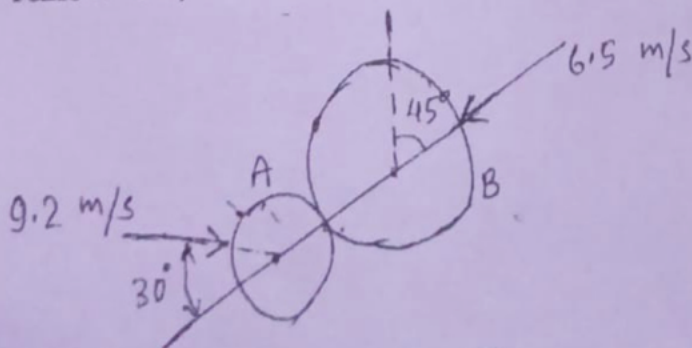6(a) Describe the angular momentum in brief?

2

(b) Two blocks as shown in fig. Starts from rest. The pulleys are friction less having zero mass. The kinetic coefficient of friction is 0.35, determine the acceleration of each blocks & tension in the cord.

6
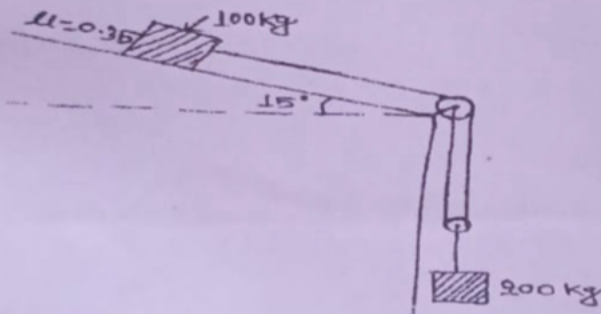


$x = v \cdot dt$

$v = \dfrac{dx}{dt}$

$dx = v \cdot dt$

7(a) Illustrate the potential and kinetic energy of a particle?

4

(b) The initial velocities and their directions of the balls are as shown in figure. Determine the final velocities and the direction after impact. Take $e=0.8$, mass of ball A=450g. mass of ball B=890g.

6



$F = ma$
$= m \cdot \dfrac{dv}{dt}$

$v \dfrac{dv}{dx}$