POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2022
Programme: BE Full Marks: 100
Course: Basic Engineering Drawing 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.

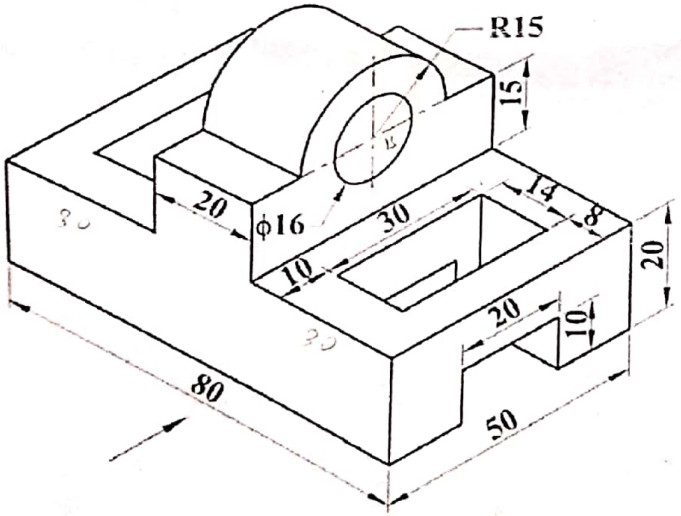
Attempt all the questions.

1. Draw a helix for one convolution on a cylinder of 50 mm diameter and 100 mm pitch. 20

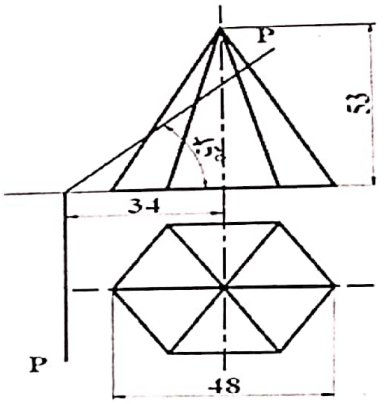
OR

Draw an external common tangents between two different circles of diameter 70mm and 40mm respectively, where center to center distance is 80mm.

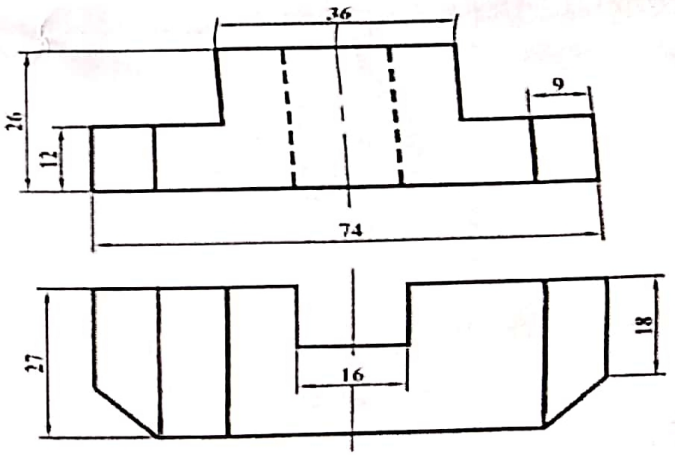
2. Make a complete orthographic drawing and dimension it. 35



3. Make a complete orthographic drawing of a geometrical solid cut by a plane figure as shown below. Find the true shape of the section. Construct the development of the surface of the solid 15

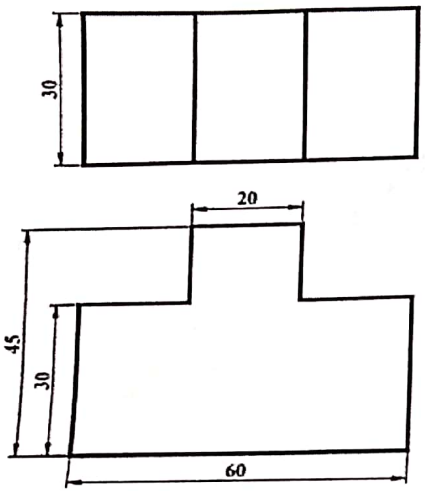


4. Draw the isometric drawing of the following orthographic drawings. 20



OR

Draw parallel perspective view from given orthographic views.



5. *Draw the symbols of the following objects.* **(Any Ten)** 10

a) Fuse
b) Switch
c) Motor
d) Battery
e) Two conductors
f) Direct current
g) Voltmeter
h) Antenna
i) Amplifier
j) Contours
k) Line
l) Revision Cloud
m) Spline
n) Ellipse
o) Bell

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Calculus I

Semester: Fall

Year : 2022
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 continuity and differentiability of a function. Show that Differentiability of a function f(x) at x=a implies continuity but Converse may not be always true. 7

OR

If log y= $\tan^{-1}x$, show that

i) $(1+x^2)y_2+(2x-1)y_1=0$

ii) $(1+x^2)y_{n+2}+(2nx+2x-1)y_{n+1}+n(n+1)y_n=0$

b) State and prove Lagrange's Mean value theorem. Interpret it geometrically. 8

2. a) Find the asymptotes of the curve: 8

$x^3+3x^2y-xy^2-3y^3+x^2-2xy+3y^2+4x+5=0$

b) Find the perimeter of the asteroid: $x^{2/3}+y^{2/3}=a^{2/3}$ 7

3. Integrate (Any **Three**) of the following: 3×5

a) $\int \frac{x^3}{(x-2)(x-3)}dx$

b) $\int \frac{1}{4-5\sin x}dx$

c) $\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx$

d) $\int_0^{\frac{\pi}{2}} \sin^3x\cos^4x dx$

4. a) Find the volume of the solid in region bounded by the curve $y=x^2+1$ and the line $y=-x+3$ revolved bout the x-axis. 8

b) State and prove Euler's theorem on homogeneous function of two independent variables of degree n. 7

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

5. a) Find the extreme values of the function $f(x,y,z)=x^2+y^2+z^2$ subject to the constraints x+y+z=3a. 7

b) Show that the substitution $y=y_1+u$ where y_1 is a solution of Riccati's equation, reduces the Riccati's equation to a Bernoulli's equation. 8

6. a) Find the general solution of the differential equation 7

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

OR

Solve Second order differential equation of the series RLC circuit

$L\frac{d^2Vc}{dt^2}+R\frac{dVc}{dt}+\frac{1}{C}Vc=\frac{Vin}{C}$, where

R=10Ω, L=1 H, $C=16\times10^{-4}F$, $V_{in}=0$, $V_C(0)=6V$, $V_c'(0)=6A$

b) Find the general solution of the differential equation by using method of variation of Parameters: $y''+9y=\text{cosec}3x$. 8

7. Attempt all the questions: 4×2.5

a) Find y_n if $y=x^n$, where n is positive integer

b) Find the radius of curvature of the curve $y^2=4x$ at (0,0).

c) Show that the function $f(x,y)=x^3+y^3-3xy$ has a saddle point at (0,0).

d) Solve: $\frac{dy}{dx}+\frac{1-\cos2y}{1-\cos2x}=0$

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Digital Logic

Semester: Fall

Year : 2022
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 positive and negative logic system. Explain digital number system. Differentiate between digital systems over the analog system. 7

   b) Perform the following Conversions. 8

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

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

   iii. $(584)_{10} = (?)_{Excess\text{-}3}$

   iv. $(7436)_{10} = (?)_{2421}$

2. a) Simplify the following function F in (1) sum of products and (2) product of sums using K-map 7

   $F(A, B, C, D) = \Sigma (0,1,2,,6,11,13,14)$

   OR

   Verify De-morgan's theorem for three variables using truth table.

   b) Why NAND gates and NOR gates are called universal gates? Verify with examples. 8

3. a) Explain (r-1)'s complement with example. "84-2-1 code is a self-complementing code". Justify your answer with illustration. 9

   b) List out application of shift register. Draw circuit diagram for 6-bit parallel in serial out shift register. 6

4. a) Design Full adder circuit and draw the logic diagram. 8

   b) Define Multiplexer and Implement the following Boolean function $F(w, x, y, z) = \sum_m (1,3,6,7,11,15)$ using 8 to 1 Multiplexer 7

5. a) Find out the logical expression of two bit magnitude comparator and draw the circuit diagram. 8

OR

A combinational circuit is defined by the function $F_1(X,Y) = XY + XZ'$ and $F_2(X,Y) = XZ' + YZ$

Implement the circuit with a PLA having three inputs, three product terms and two outputs.

b) Design a 3 bit synchronous binary up counter using T flip-flop. 7

6. a) What are the significance of a flip-flop? Explain R-S flip-flop along with its logic diagram, truth table, characteristic table and excitation table. 9

   b) With suitable example explain about the state reduction and binary assignment. 6

7. Write short notes on: **(Any two)** 2×5

   a) Arithmetic and logical unit

   b) Status register

   c) Random Access Memory

POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2022
Programme: BE | Full Marks: 100
Course: 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 is software? Explain various types of software in brief. 7
   b) Write an algorithm and draw a flowchart to check whether a number given by the user is divisible by 2 and 3. 8

2. a) Why the C language is called a middle–level language? What are the benefits of C being a middle-level language? Explain in Detail. 7
   b) What are the different branching statements in C? Create a menu-driven program having the following options: 8
      i. Sum of three numbers.
      ii. Sum of squares of those three numbers.
      iii. Mean of those three numbers.

3. a) How does a for-loop work? Explain in brief. Also write a program to print the following series up to four terms: 1, 4, 9, 16, ... 7
   b) Why do you need arrays? Write a program to read a matrix of order m*n and print its transpose matrix. 8

4. a) What are the advantages of using a function? Write a program to find the area of a circle using a function that takes radius of a circle as an argument and returns the area to the calling function. 8
   b) What are pointer variables? Write a program to find the sum of elements of an integer array using pointer (not the index of the array). 7

OR

Explain about the different types of dynamic memory allocation techniques used in C.

5. a) Define a recursive function. Write a program to find the sum of numbers from 1 to 50 using recursive function. 8

OR

Write a program to check whether the number is prime or not using user defined function.

b) What are character arrays in C? Write a program to print the following pattern. 7

ENGINEER
ENGINEE
ENGINE
ENGIN
ENGI
ENG
EN
E

6. a) Create a nested structure for the following data. 8

Emp_id	Emp_name	Department	Address	Date of birth
				mm | dd | yyyy

Write a program to initialize details for 10 employees and display the details of employees from "POKHARA".

b) What are the different file opening modes? Write a program to read name and marks of n number of students and store them in a file. 7

7. Write short notes on: **(Any two)** 2×5
   a) Formatted input/ output functions
   b) Storage classes
   c) Union

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2022
Programme: BE Full Marks: 100
Course: Problem Solving Technique 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) A certain number k is a multiple of 9. Add the digits together. If the result has more than one digit, add those together. Continue adding digits together until you have a one digit answer. It will be a 9. Explain why this is so? 8

OR

A watermelon weighs 500 pounds. It turns out that 99% of the weight of the watermelon is due to water in the watermelon. After the watermelon has sat in a drying room for a while, it turns out that it is only 98% water by weight. How much does it weigh now?

b) A ten foot pole is dropped into a milling saw and randomly cut into three shorter poles. What is the probability that these three pieces will form a triangle? 7

2. a) A right-angled triangle has sides of length l, m 10. Note that 10 is not the hypotenuse, and the both l and m are integers. Given this information, find l, m. 8

b) A game is played by two players. They begin with a pile of thirty chips, all the same. For his or her move, a player may remove 1 to 6 chips. The player who removes the last chip wins. What strategy can the first player use so that he will always win? 7

3. a) Solve the crypto arithmetic problem: 7

NUDE+NOT+RUDE+NOR=CRUDE

b) Six people, named A, B, C, D, E, F are in the dining car of a train. They are one each from New York City, Chicago, Tulsa, St. Louis, Milwaukee and Atlanta. The following facts are known. 8

i. A and the man from New York City are physicians.

ii. E and the woman from Chicago are teachers.

iii. The person from Tulsa and C are engineers.

iv. B and F are veterans of Gulf war, but the person from Tulsa has never served in the military.

v. The person from Milwaukee is older than A.

vi. The person from ~~Milwaukee is~~ Atlanta older than ~~A~~ C

vii. At St. Louis, B and the man from New York get off.

viii. At San Francisco, C and the man from Milwaukee gets off. Match the names of the people with their professions and their cities.

4. a) Consider a unit cube with four of its eight vertices joined to form a regular tetrahedron with vertices A,B,C and D. What is the ratio of the surface area of the cube to the surface area of the tetrahedron? 7

b) A 10 years old child puts Rs. 100000 in the bank. She intended with withdraw the money on her 21st birthday. Which one scheme is better for her? 8

i. An account with 5% interest compounded daily

ii. An account with 5.1% interest compounded weekly.

5. a) Suppose that you have 9 pearls. They all look the same, but 8 of have equal weight and one is different. The odd pearl is either heavier or lighter; you do not know which. The only equipment that you have at hand is a balance scale. How can you use the scale to find the odd pearl in just three weighing? 7

b) It begins snowing some time before noon. The snow fall steadily, when measured by the rate of change of depth. At exactly noon, a snow plow begins working at a steady rate (in terms of cubic feet of snow removed per hour). The plow clears two blocks during the first hour of work, and one block during the second hour. At what time did it begin snowing? 8

OR

Examine the equations:

$$1 = 1$$
$$2+3+4 = 1+8$$
$$5+6+7+8+9 = 8+27$$
$$10+11+12+\ldots+16 = 27+64$$

Determine the pattern and prove the identity.

6. a) There are three married couples that need to cross a river. A small boat is available that will hold just two people at a time. The males involved are quite jealous. No woman can be left with a man unless her husband is also present. There are no other constraints. How can these six people cross the river? What is the fewest numbers of trips possible? 7

b) Imagine the election involving three candidates A,B,C. There are 33 Votes. Every voters vote and every voter gives a near ranking to the three candidates. The result is shown below. 8

Ranking	Number of Votes
ABC	10
ACB	4
BAC	2
BCA	7
CAB	3
CBA	7

We have three methods namely Plularity method (who get most votes *is* Winner) .Borda method (Candidates with best average is winner) and Hare Method (fewest vote candidates is eliminated and votes are shared to second rank candidate method).Show that which method favors which of the candidates.

7. Write short notes on: **(Any two)** 2×5

a) Explain impossible problems.

b) Determine how many zeros end the number 780! – 310!.

c) Is $10^{\frac{1}{10}} > 2^{\frac{1}{3}}$?

POKHARA UNIVERSITY

Level: Bachelor | Semester: Fall | Year : 2022
Programme: BE | Full Marks: 100
Course: Discrete Structure | 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) Mention the types of set operations that you are familiar with. In a class of 40 students, 20 have chosen Discrete Mathematics but not Calculus. If every student has chosen either Discrete Mathematics or Calculus or both, find the number of students who chose both Discrete Mathematics and Calculus and the number of students to choose Calculus but not Discrete Mathematics. 8

   b) How do you differentiate Euclid's Division Algorithm and Extended Euclidean Algorithm? Find the gcd (83, 19) by Euclid's Division Algorithm. 7

OR

Give the type of Boolean Functions. Prove that "if n is a composite integer, then n has a prime divisor less than or equal to square root of n.

2. a) Define closure of a relation. Let A= {1, 2, 3, 4} and let R = {(1, 2), (2, 3), (3, 4), (2, 1)}. Find the transitive closure of R using Warshall's algorithm. 8

   b) Explain the closure of relation. Let R be the relation of set {0,1,2,3} containing order pair (0,1),(1,1),(1,2),(2,0),(2,2) and (3,0). Find the symmetric closure of R. 7

OR

Define POSET.Show that the relation R= {(a, b)}| a divides b} defined on a set S = {1, 2, 3, 4, 6} is a Partial order relation.

3. a) Find the explicit formula for the Fibonacci Series, $f_n = f_{n-1} + f_{n-2}$ with $f_0 = 0$ and $f_1 = 1$. 7

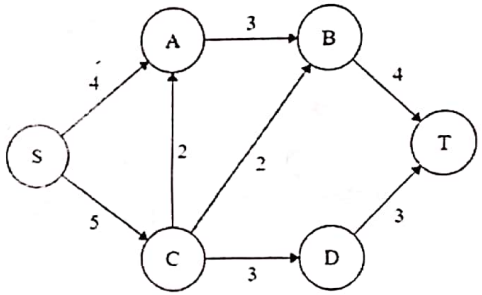
   b) Solve the recurrence relation: $a_n - 6a_{n-1} + 8a_{n-2} = 3$; $a_0 = 10$, $a_1 = 25$. 8

4. a) Define the terms Tautology, Contradiction and Logical Equivalences. Show that Implication and Contrapositive are Logically Equivalent. State the converse, contrapositive and Inverse of the statement: "A positive integer is prime only if it has no divisors other than 1 and itself. 7

   b) Prove the validity of the following statements, "It is not sunny this afternoon and it is colder than yesterday". "We will go swimming only if it is sunny". "If we don't go swimming, then we will go for the canoe trip". "If we go for the canoe trip, then we will be home by sunset" , Which leads to the conclusion "We will be home by sunset". 8

5. a) Use Mathematical induction to show that: $8^n - 3^n$ is divisible by 5. 7

   b) Find the maximum flow in the given network: 8



6. a) What do you understand by the walk, path, trail and circuits in the graph theory? Explain briefly with figures. 8

   b) What are difference between the DFA and NFA? Construct the DFA that accepts any strings over {a, b} that doesn't contain the string 'aabb' in it. 7

7. Write short notes on: (Any two) 2×5
   a) Regular Expressions
   b) Graph representation techniques
   c) TOH puzzle