FACULTY OF ENGINEERING

B.E. II Semester (Civil) (Bridge Course) (Backlog) Examination, October 2021

Subject: Engineering Mechanics

Time: 2 Hours　　　　　　　　　　　　　　　　　　　　　**Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer any seven questions.　　　　　　　　**(7x3 = 21 Marks)**

1　Define equilibrium of a body and give conditions of equilibrium when subjected to forces.
2　Explain superposition law and law of transmissibility.
3　What is the significance of Moment of Inertia?
4　Explain pappus theorem I.
5　Discuss the difference between curvilinear and rectilinear motion.
6　State the Parallel axis theorem.
7　State work-energy theorem for a system of particles.
8　Define product of inertia.
9　Determine the work done in pulling a block of wood weighing 100 kN for a length of 10m
up on a smooth inclined plane which makes 300 with the horizontal.
10　The resultant of two forces is 20 kN when they act at 500. The same forces when they act
at 900 produce a resultant of 15 kN. Determine the magnitude of the two forces.

PART – B

Note: Answer any three questions.　　　　　　　　**(3x18 = 54 Marks)**

11　A uniform ladder of weight 800N and of length 7 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 600. When a man of weight 600N stands on the ladder at a distance 4m from the top of the ladder, the ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor.

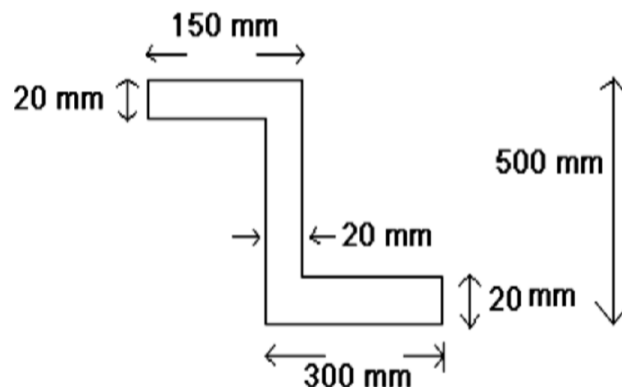12 (a) Find the centroid of the Z section shown in Figure 1.

Figure 1

(b) Differentiate between centroid and centre of gravity.

13 Find the moment of inertia of shaded area shown in Figure 2, below about centroidal axes.
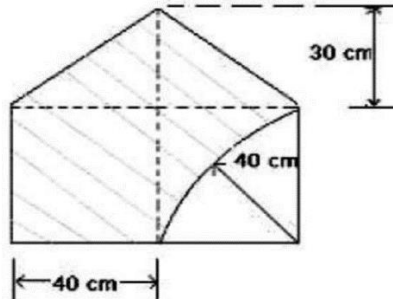

Figure 2

14 A homogeneous solid cylinder of weight 100 N whose axis is horizontal rotates about its axis, in frictionless bearings under the action of the weight of a 10 N block which is carried by a rope wrapped around the cylinder. What will be the angular velocity of cylinder two seconds after the motion starts? Assume the diameter of cylinder as 100cm.

15 Find the least horizontal force 'P' to start motion of any part of the system of three blocks resting upon one another as shown in Figure 3. The weights of the blocks are A = 3000N, B = 1000N, C = 2000N. Between A and B, μ= 0.3, between B and C, μ = 0.2 and between C and the ground μ = 0.1.
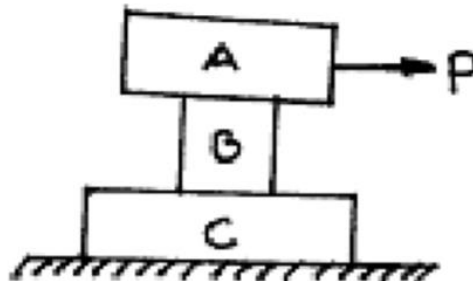

Figure 3

16 (a) A projectile is aimed at a target on the horizontal plane and falls 12m short when the angle of projection is 150 while it overshoots by 24m when the angle is 450. Find the angle of projection to hit the target.
(b) Derive the formula for mass moment of inertia with the help of a suitable sketch.

17 (a) An automobile moving with a uniform velocity of 40Kmph is accelerated by increasing the traction force by 20%. If the resistance to motion is constant, find the distance travelled before it acquires 50Kmph.Use work-energy method.
(b) Write short notes on Simple harmonic motion.

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FACULTY OF ENGINEERING
B.E. I - Semester (AICTE) Examination, October 2021

Subject: Programming and Problem Solving

Time: 2 Hours   **Max. Marks: 70**

Note: i)   First Question is compulsory. Answer any three questions from the remaining six questions.
  ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
  iii) Missing data, if any, may suitably be assumed.

1   Answer any four questions.   (4x4 = 16 Marks)

  a   Define operating system.
  b   What are the operations performed on strings?
  c   What are the advantages of functions?
  d   Write a code snippet for an array of structures.
  e   What are the advantages of linked lists?
  f   What are the rules to be followed for declaring identifiers?
  g   Write an algorithm to find the reverse of a number.

2   (a) Explain the concept of syntax and logical errors in C programming.
    (b) Explain algorithm and flowchart with and example.

3   (a) Briefly explain control structures in C programming with example.
    (b) Write a C program to find addition of two matrices.

4   (a) Explain parameter passing techniques with an examples.
    (b) With a C program to find roots of quadratic equation.

5   (a) Explain the concept of recursion with an example program.
    (b) What is structure and give example for it?

6   (a) What is the use of pointers in structures give an example?
    (b) Write short notes on File handling

7   (a) Discuss how binary search works with an example.
    (b) Compare Bubble Sort and Selection Sort. Justify when to prefer each method.

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FACULTY OF ENGINEERING
B.E. I - Semester (AICTE) (Backlog) Examination, October 2021

Subject: Programming for Problem Solving

Time: 2 Hours   **Max. Marks: 70**
(Missing data, if any, may be suitably assumed)

PART – A
Note: Answer any five questions.   **(5x2 = 10 Marks)**

1   Difference between Compiler and Interpreter.
2   Write an algorithm to find sum of two numbers.
3   Define an Array. Write its applications.
4   Compare and Contrast "while" and "do while" loop.
5   Difference between actual Parameters and formal parameters.
6   Write a function for swapping two values.
7   Define Structures. How it is different from array?
8   Define recursion. Write an example.
9   Define Pointer. Declare a pointer variable.
10 Write the Syntax of fopen() and fclose() and its usage.

PART – B
Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 (a) Explain about computer components in detail.
   (b) Difference between high-level and low level programming languages.

12 (a) What are the different types of operators in C. Give example.
   (b) Write a program to add two matrices.

13 (a) Explain different parameter passing technique.
   (b) Write a program to sort n elements using Bubble Sort.

14 (a) Write a program to find factorial using recursion.
   (b) How do you access members of a structure? Explain.

15 (a) What is the use of pointer in self referential structure? Explain in detail.
   (b) Write a program to copy contents of one file to other file.

16 (a) Write a program to find roots of quadratic equation.
   (b) Explain idea of call by reference with example.

17 (a) Write a program to read a string and convert alphabets from lower to upper case.
   (b) Distinguish between break and continue.

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FACULTY OF ENGINEERING

B.E. I Year (Backlog) Examination, October 2021

Subject: Programming in C & C++

Time: 2 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer any seven questions.   **(7x3 = 21 Marks)**

1 Convert the following:

   i) $1010010.101_{(2)}$ to _____ $_{(10)}$

   ii) $2AB.C25_{(16)}$ to _____ (2)

2 Draw a flowchart to find maximum among three numbers.
3 Define (i) Void pointers (ii) Null pointer
4 How to declare 1-D array in 'C'. Give Syntax and example.
5 What is a self referential structure in 'C'. Give its declaration and an example.
6 Define a File and give the uses of File.
7 Give differences between overloading and overriding.
8 How new and delete operators are used in C++.
   Give example of each.
9 What is template class. Give an example.
10 How static member of a class can be initialized and accessed? Give example.

PART – B

Note: Answer any three questions.   **(3x18 = 54 Marks)**

11 a) Write an algorithm to find roots of a quadratic equation.
   b) What is a flow chart. What symbols are used in flowchart?

12 a) Write a program in 'C' for Linear search.
   b) Write a program in 'C' to print command line arguments.

13 a) Write a program to copy one file to another in 'C'.
   b) Write a program in 'C' to read 'n' students information and display.
      The student structure should contain – studid, studname, DOB.

14 a) What is function overloading in C++.
   b) Write a program for function overloading in C++.

15 a) What is Inheritance in C++.
   b) Explain different types of Inheritance with examples.

16 a) What is an Exception.
   b) How Exceptions are handled in C++. Give example.

17   Write short notes on :
   a) Recursion
   b) Dynamic Binding
   c) Friend Function

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FACULTY OF ENGINEERING
B.E. I - Semester (CBCS) (Backlog) Examination, October 2021

Subject: Engineering Mathematics - I

Time: 2 Hours   **Max. Marks: 70**
(Missing data, if any, may be suitably assumed)

PART – A
Note: Answer any five questions.   **(5x2 = 10 Marks)**

1   Define rank and find the rank of $A = \begin{bmatrix} 1 & 3 & -4 \\ -1 & -3 & 4 \\ 2 & 6 & -8 \end{bmatrix}$.

2   Show that sum of eigen values of a matrix A is equal to trace of A and product of eigen values is equal to $|A|$.

3   Discuss the convergence of the series $\sum\limits_{n=2}^{\infty} \dfrac{1}{n \log n}$.

4   State Leibnit'z Test for the alternate series.

5   Explain geometrical interpretation of Lagrange's mean value theorem.

6   Find the assymplotes of the curve $x^2 y^2 - x^2 y - xy^2 + x + y + 1 = 0$ parallel to coordinate axes.

7   Determine the $\underset{(x,y)\to(0,0)}{Lt} \dfrac{xy}{\sqrt{x^2 + y^2}}$.

8   If $u = f(2x - 3y, 3y - 4z, 4z - 2x)$ find the value of $\dfrac{1}{2}\dfrac{\partial u}{\partial x} + \dfrac{1}{3}\dfrac{\partial u}{\partial y} + \dfrac{1}{4}\dfrac{\partial u}{\partial z}$.

9   Find the directional derivative of $f(x, y, z) = xy^2 + 4xyz + z^2$ at the point (1,2,3) is the direction of 3i+4j-5k.

10 Prove that $\nabla r^n = nr^{n-2} \vec{r}$, where $\vec{r} = xi + yj + zk$.

PART – B
Note: Answer any four questions.   **(4x15 = 60 Marks)**

11 (a) Find the values of d and μ for which the system of equations
$x + 2y + z = 6, x + 4y + 3z = 10, x + 4y + dz = \mu$ has (i) a unique solution (ii) infinite number of solutions (iii) no solution.

(b) Diagonalize the matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

12 (a) Discuss the convergence of the series $\displaystyle\sum_{n=1}^{\infty}\sqrt{\dfrac{n!}{\left(n^n\right)^2}}$.

(b) Test the convergence of the series $\displaystyle\sum_{n=1}^{\infty}\sqrt{\dfrac{3^n-1}{2^n+1}}$.

13 (a) The functions $f(x)$ and $g(x)$ are continuous on [a,b] and differentiable in (a,b) such that f (a) =4, f (b) =10, g (a) =1, g (b) =3, then show that f' (c) =3 g' (c) for a<c<b.

(b) Find the evolute of the curve y²=4a^x.

14 (a) If $u=x+y+z,\ uv=y+z,\ uvw=z$ show that $\dfrac{\partial(x,y,z)}{\partial(u,v,w)}=u^2v$.

(b) Find the maximum and minimum values of the function

$f(x,y)=2(x^2-y^2)-x^4+y^4$.

15 (a) Verify Green's theorem for $\displaystyle\int_{c}\left[(x+y)dx+x^2dy\right]$, c is the triangle with vertices at

(0,0), (2,0), (2,4) taken is the order.

(b) Find the value of a if the vector $(ax^2y+yz)i+(xy^2-xz^2)j+(2xyz-2x^2y^2)k$ has zero divergence.

16 (a) Using Gauss-Jordan method, find the inverse of the matrix $A=\begin{bmatrix}1&1&1\\1&2&3\\1&3&4\end{bmatrix}$.

(b) Trace the curve $a^2y^2=x^2(a^2-x^2)$.

17 (a) Show that $\nabla^2 f(r)=f''(r)+\dfrac{2}{r}f'(r)$.

(b) If $z=f(x,y)$ and $x=e^u\cos v,\ y=e^u\sin v$, prove that $x\dfrac{\partial z}{\partial v}+y\dfrac{\partial z}{\partial u}=e^{2u}\dfrac{\partial z}{\partial y}$.

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