

Total No. of Questions : 08

Roll No. : 0701.....

**B.Tech SECOND SEMESTER EXAMINATION JUNE-2025**

(Branch : Civil Engineering)

**MA-2403 MATHEMATICS - II**

Time : Three Hours

Maximum Marks : 70

Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Evaluate  $\int_{x=0}^a \int_{y=0}^{a-x} \int_{z=0}^{a-x-y} (x + y + z) dx dy dz$ . 07

(b) Change the order of integration in integral  $\int_0^1 \int_{x^2}^{2-x} xy dx dy$  and hence evaluate the same. 07

2(a) Evaluate the surface integral  $\iint_S (x dy dz + y dz dx + z dx dy)$ , where  $S$  is the portion of the plane  $x + 2y + 3z = 6$  which lies in the first octant. 07

(b) Using Green's Theorem evaluate  $\int_C (x^2 y dx + x^2 dy)$  where  $C$  is the boundary described counter clockwise of the triangle with vertices  $(0,0), (1,0), (1,1)$ . 07

3(a) Solve for  $p$  the differential equation  $x^2 p^3 + y(1 + x^2 y) p^2 + y^3 p = 0$ . 07

(b) Solve  $(1 + e^{x/y}) dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$ . 07

4(a) Solve  $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = \sin 3x$ . 07

(b) Solve  $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$ . 07

5(a) Solve by method of variation of parameters  $\frac{d^2 y}{dx^2} + y = \operatorname{cosec} x$ . 07

(b) Solve in series  $(1 + x^2) y'' + xy' - y = 0$ . 07

6(a) Prove that  $J_{1/2}(x) = \sqrt{\left(\frac{2}{\pi x}\right)} \sin x$ . 07

(b) Given :  $\sin 45^\circ = 0.7071$ ,  $\sin 50^\circ = 0.7660$ ,  $\sin 55^\circ = 0.8192$ ,  $\sin 60^\circ = 0.8660$ . Find  $\sin 52^\circ$  by using Newton's forward difference interpolation formula. 07

P.T.O.

7(a) Evaluate  $\int_0^1 \frac{dx}{1+x^2}$  by Simpson's 1/3<sup>rd</sup> rule, up to 3 decimal places. **07**

(b) Find the real root of the equation  $x \log_{10} x - 1.2 = 0$  by the Regula-Falsi method, correct to **07** four places of decimal.

8(a) Solve  $10x + y + z = 12$  **07**  
 $2x + 10y + z = 13$   
 $2x + 2y + 10z = 14$

by Gauss-Seidel iteration method.

(b) Given that  $\frac{dy}{dx} = \log_{10}(x+y)$ , with the initial condition that  $y=1$  when  $x=0$ , using **07** Modified Euler's method find value of  $y$  when  $x=0.2$ .

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**B.Tech SECOND SEMESTER EXAMINATION JUNE-2025**

(Branch : Civil Engineering)

**CE-1402 APPLIED MECHANICS**

Time : Three Hours

Maximum Marks : 70

Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

- 1(a) Explain the following : 06  
 (i) Free Body Diagram (FBD)    (ii) Polygon law of forces    (iii) Bow's Notation
- (b) A particle is acted upon by the following forces : 08  
 (i) A pull of 8 N due North East  
 (ii) A pull of 10 N due North  
 (iii) A pull of 12 N due East  
 (iv) A pull of 4 N in a direction inclined  $60^\circ$  South of West  
 (v) A pull of 6 N in a direction inclined  $30^\circ$  East of South.

Find graphically the magnitude and direction of the resultant force.

- 2 Two spheres A and B weighing 100 N and 75 N respectively and with the corresponding radii 75 mm and 50 mm are placed in a container as shown in **fig.1**. Determine the support reactions. 14

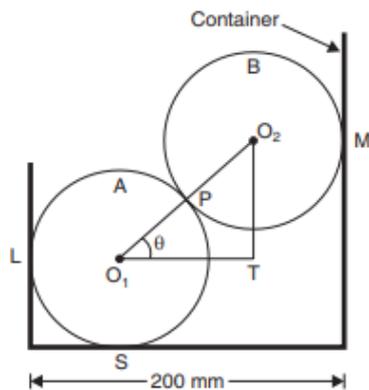


Fig.1

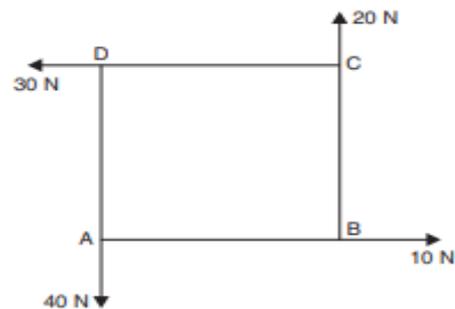


Fig.2

- 3(a) Explain First, Second and Third Laws of Motion. 06
- (b) Four forces equal to 10 N, 20 N, 30 N and 40 N are respectively acting along the four sides (1 m each) of a square ABCD, taken in order as shown in **fig.2**. Find the magnitude, direction and position of the resultant force. 08

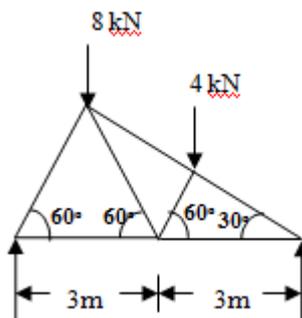
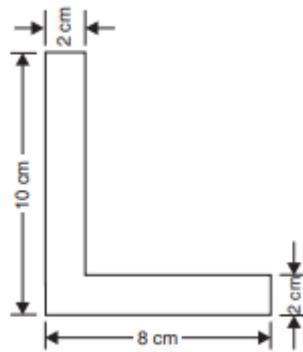


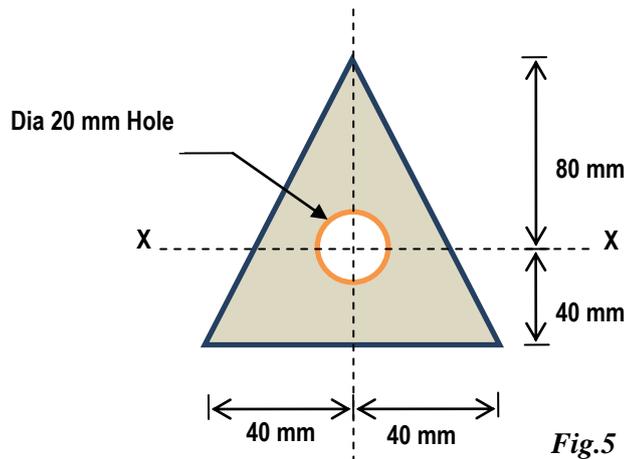
Fig.3

- 5(a) Derive the expression of moment of inertia (M.I.) of circular section of about centroidal axes. **06**
- (b) Calculate the position of centroid and locate on given *fig.4*. **08**



*Fig.4*

- 6(a) Explain parallel axis theorem and write its importance. **06**
- (b) Find the moment of inertia of the section about horizontal centroidal axis as shown in *fig.5*. **08**



*Fig.5*

- 7(a) Define the following terms : (i) Limiting friction (ii) Angle of friction. **06**
- (b) A body of weight 450 N is pulled up an inclined plane, by a force of 300 N. The inclination of the plane is  $30^\circ$  to the horizontal and the force is applied parallel to the plane. Find the coefficient of friction. **08**
- 8(a) Define the following terms regarding lifting machine : **06**
- (i) Mechanical advantage (ii) Optimum efficiency of machine
- (b) An effort of 50 N is applied to a machine to lift a load of 800 N. If the velocity ratio of the machine is 20, determine the following : **08**
- (i) Efficiency of the machine,  
(ii) Frictional force in terms of effort,  
(iii) Frictional force in terms of load.

Total No. of Questions : **08**

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**B.Tech SECOND SEMESTER EXAMINATION JUNE-2025**

(Branch : *Civil Engineering*)

**CE-1403 FUNDAMENTALS OF CIVIL ENGINEERING**

**Time : Three Hours**

**Maximum Marks : 70**

**Min. Pass Marks : 22**

**Note : Attempt any five questions. Each question carries equal marks.**

- 1(a) Explain various types of test that can be conducted on bricks. **07**
- (b) What is the workability of concrete? Explain those factors that affecting the workability of concrete. **07**
- 2(a) What are the elements of building? **07**
- (b) What are the various types of doors and windows used in the building construction? **07**
- 3(a) List out the various instruments used in chain survey also explain principal of survey. **07**
- (b) Write short notes on : (i) Errors in chain surveying (ii) Local Attraction. **07**
- 4(a) The following are the consecutive reading were taken with a leveling instrument at intervals of 20 m, 3.375, 2.73, 1.615, 2.45, 3.835, 5.07, 4.835, 2.985, 4.435, 2.630, 4.255 and 5.63 m. The instrument was shifted after the fourth and eight reading. The last reading was taken on a BM of RL 125.25 m. Find the RLs of all the point using rise and fall method and satisfy the answer with arithmetic check. **07**
- (b) Write down the importance of the term “Leveling”. **07**
- 5(a) What do you understand by true and magnetic bearing? **07**
- (b) The distance between two stations when measured by 20 m chain was found to be 1500 m. The same distance when measured by 30 m chain was found 1476 m. If 20 m chain is 5 cm too short, determine the error is 30m chain. **07**
- 6 List out the various stages for the construction of a building and list out the various building material used in Construction work give detail with brief. **14**
- 7(a) Discuss the importance of plastering and pointing in civil engineering construction works. **07**
- (b) Discuss the concrete preparation procedure in brief. **07**
- 8(a) Write down the importance of compaction and curing in concreting. **07**
- (b) What is the function of foundation and write its types. **07**

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**B.Tech FIRST/SECOND SEMESTER EXAMINATION JUNE-2025**

*(Common for All Branches)*

**CS-1401 C/C++ PROGRAMMING FOR PROBLEM SOLVING**

**Time : Three Hours**

**Maximum Marks : 70**

**Min. Pass Marks : 22**

**Note : Attempt any five questions. Each question carries equal marks.**

- 1(a) Write an algorithm, flowchart and C program to find the sum of numbers from 1 to 10. **07**
- (b) Explain string manipulation library functions with their syntax's. Write a program to check whether a string is palindrome or not. **07**
- 2(a) Write a program in C using functions to swap two numbers using global variables concept and call by reference concept. **07**
- (b) What do you mean by nesting of classes? **07**
- 3(a) What is an array? How a single dimension and two dimension arrays are declared and initialized? **07**
- (b) Differentiate between syntax errors and logical errors in the context of program compilation. **07**
- 4(a) Write a C++ program that reads from the user an arithmetic operator and two operands, perform the corresponding arithmetic operation on the operands using switch statement. **07**
- (b) Give the scope and life time of the following : **07**
- (i) External variable      (ii) Static variable  
(iii) Automatic variable      (iv) Register variable
- 5(a) What is function? Explain different classification of user defined functions based on parameter passing and return type with examples **07**
- (b) Explain OOP (Object Oriented Programming) paradigm and the features of OOP. **07**
- 6(a) What do you mean by abstraction? Construct Data abstraction program in C++. **07**
- (b) Briefly explain Dynamic Binding through virtual function with an example. **07**
- 7(a) With example, explain friend function and friend class. **07**
- (b) Classify different forms of inheritance and clearly explain them. **07**
- 8(a) Differentiate between operator overloading and operator overriding. **07**
- (b) What do you mean by Polymorphism? Explain with the help of example how polymorphism is achieved at : (i) Compile time      (ii) Run time. **07**

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**B.Tech FIRST/SECOND SEMESTER EXAMINATION JUNE-2025***(Common for All branches)***ME-1401 / ME-1302 BASIC MECHANICAL ENGINEERING****Time : Three Hours****Maximum Marks : 70****Min. Pass Marks : 22****Note : Attempt any five questions. Each question carries equal marks.**

- 1(a) Define the thermodynamic system. Differentiate between open system, closed system and an isolated system. **07**
- (b) A system undergoes a cycle comprising four processes. The heat transfers in each process are: **07**  
 $Q_{ab} = 725 \text{ kJ}$ ;  $Q_{bc} = -80 \text{ kJ}$ ;  $Q_{cd} = 35 \text{ kJ}$  and  $Q_{da} = -640 \text{ kJ}$   
The respective work transfers are :  
 $W_{ab} = -95 \text{ kJ}$ ;  $W_{bc} = -45 \text{ kJ}$  and  $W_{cd} = 130 \text{ kJ}$   
Determine the work interaction during the process d-a.
- 2(a) Explain the Kelvin-Planck and Clausius statement of the second law of thermodynamics. **07**
- (b) A reversible heat engine delivers 1.2 kW power and rejects heat energy to a reservoir at 300 K at the rate of 0.8 kW. Make calculations for the engine efficiency and temperature of the thermal reservoir. **07**
- 3(a) What are the major differences between mountings and accessories? Give the examples of each. **07**
- (b) What is boiler draught? Compare forced and induced draught. **07**
- 4(a) Explain construction and working of Locomotive boiler. **07**
- (b) Define : (i) Quality of steam (ii) Boiler efficiency (iii) Equivalent evaporation. **07**
- 5(a) Explain the working of 4-stroke diesel engine with neat sketch. **07**
- (b) Explain Otto cycle with the help of p-v diagram. Derive an expression for air standard efficiency of Otto cycle. **07**
- 6(a) Classify engineering materials and define the following mechanical properties of materials: **07**  
(i) Ductility (ii) Toughness (iii) Hardness and (iv) Malleability.
- (b) Draw and explain the stress-strain diagram for a ductile material under tensile loading. **07**
- 7(a) Explain briefly : (i) Pattern allowances (ii) Properties of moulding sand. **07**
- (b) Explain the function of a pattern in casting process. Explain with the help of sketches different types of pattern. **07**
- 8(a) Classify the various welding processes. **07**
- (b) Explain the principle of operation of gas welding. **07**