



আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম
International Islamic University Chittagong
Faculty of Science and Engineering (FSE)
Department of Civil Engineering (CE)

END-OF-SEMESTER EXAMINATION
SEMESTER AUTUMN, 2022 SESSION

Programme	: Bachelor of Science in Civil Engineering	Level of Study	: UG 1/2
Time	: 12:30 pm	Date	: November 27, 2022 Sunday
Duration	: 1 hour 30 minutes		
Course Code	: CE2302	Section(s)	: 1
Course Title	: Analytic Mechanics Sessional		

This Question Paper Consists of six (6) Printed Pages (Including Cover Page)

Course Learning Outcome(CLO)	
CLO-1	Understand the vector and scalar representation of forces and moments and Analyze and determine the forces in members of trusses, frames and problems related to friction.
CLO-2	Construct FBD of rigid bodies at static equilibrium and Calculate the motion parameters for a body subjected to a given force system.
CLO-3	Comprehend mechanics associated with friction forces. Determine the deformation of a Helical Spring and understand the relationship between spring constants and load capacity.
CLO-4	Identify and analyze the internal forces in statically determinate beams. Understand the distributed loads and the centroid of areas/ objects.

INSTRUCTION(S) TO CANDIDATES

DO NOT OPEN UNTIL YOU ARE ASKED TO DO SO

- This is a Closed Book, Closed Notes Examination.
- Do not open until You Are Asked to Do So.
- Total mark of this examination is 100 for two sections A & B and is worth 50% of the total course.
- Attempt All Questions.
- Only approved calculator with 'FSE-CE sticker is allowed (Use of non-Programmable or non-Graphical Calculator)
- Mobile Phones and Other Electronic Devices are Prohibited in the Exam Hall.
- **Workout Can Be Done Using Pencil Or Pen.**

Note: Any form of cheating or attempt to cheat is a serious offence, which may lead to dismissal

This set of Engineering Mechanics Multiple Choice Questions & Answers (MCQs)

- _____ is the phenomena that resist the movement of the two surfaces in contact.
a) Friction b) Motion c) Circular movement d) Rotation
- The frictional force always acts _____ to the surface of the application of the friction.
a) Tangential b) Perpendicular c) Parallel d) Normal
- The phenomena of horizontal pull and push, explain what?
a) Theory of friction b) Theory of relativity c) Theory of action d) Theory of forces
- For equilibrium the normal forces acted, in which direction in the free body diagrams.
a) Vertically Upward b) Vertically Downward c) Horizontally Right d) Horizontally Left
- Calculate the product of normal force and the coefficient of friction between the body and the surface; frictional force, normal force

$N = 490.5 + 120 = 710.5$

✓ a) 183N, 160N, 611N b) 116N, 16N, 116N
c) 100N, 10N, 100N d) 180N, 180N, 180N

50×9.81
 $= 490.50$
 $F =$

- Determine the distance between the points of action of the forces, that is the normal force and the self-weight force in the given figure, horizontal force, vertical force, frictional force

$N = 236.28$

a) 9.08mm, 80cos30, 236N, 63.9N,
b) 9.08cm, 60cos30, 600n, 60N
c) 9.08m, 40cos30, 403N, 43N
d) 9.8mm, 8cos30, 830N, 83N

$\sum F_x = 69.28 - F = 0 \quad F = 69.28$
 $-196.2 - 40 + N = 0 \quad N = 236.28$

- The constant in the equation $F = \mu N$ is called?
a) Knew b) Proprietary Constant c) Coefficient of dry friction d) Coefficient of static friction
- The coefficient of friction is generally determined by _____.
a) Written over the Body b) Experiments c) Weighing the body d) Measuring length of the body
- In a roof supporting truss the load is transmitted when _____.
a) First to the truss then the joints through purlins; b) First to the purlins then the joints through trusses
c) First to the truss then the purlins through joints; d) First to the joints then the trusses through purlins

10. When the bridges are extended over long routes or distance then _____
- a) A rocker or a roller is used at the joints b) They are not extended to such a long distance
c) The bridges are painted d) The roads are made narrow

11. Find the force in the member RP, RQ, QP of the frame shown below.

	a) 707.1N, 500N, 505N b) 500N, 707.1N, 500N c) 505N, 784N, 707.1N d) 784N, 505N, 700
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12. Find the force in the member RQ, QS, PQ, RS of the frame shown below.

	a) 566N, 400N, 773N, 1090N, 566N b) 400N, 1090N, 773N, 773N, 400N c) 773N, 400N, 1090N, 566N, 1090N d) 1090N, 566N, 546N, 400N, 773N
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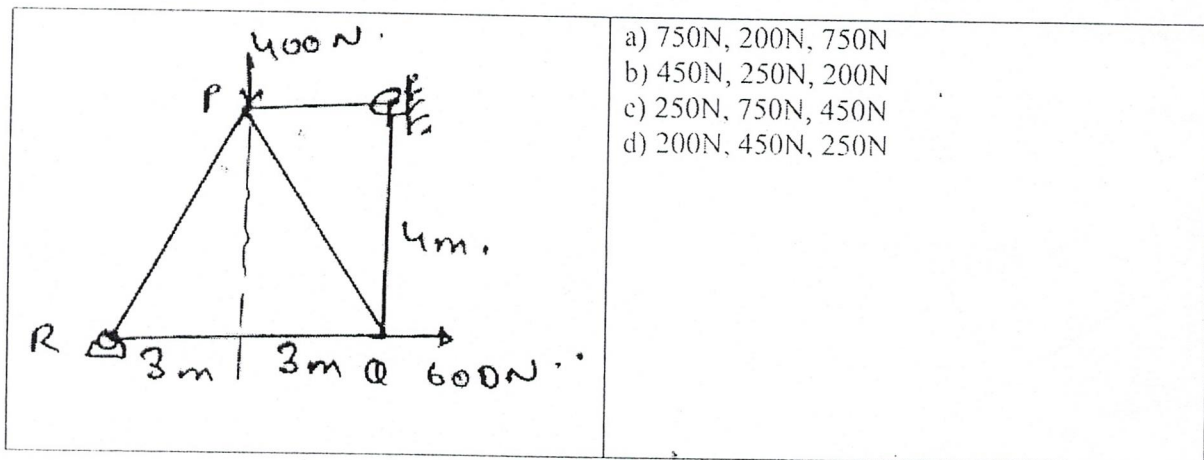
13. A truss is facing a two force member and both of them are in the opposite directions. And the truss is in equilibrium. And both of them are getting away from each other. The forces are called?

- a) Compressive forces; b) Tensile Forces;
c) Parallel and collinear forces with same direction of heading
d) The rotational forces

14. If the whole truss is in equilibrium then all the joints, which are connected to that truss, is in equilibrium. This is known as:

- a) Method of joints; b) Section method; c) Scalar field method; d) Vector equilibrium method

15. Find the force in the member vertical at the right, joined by the hinge, force member RQ and PQ



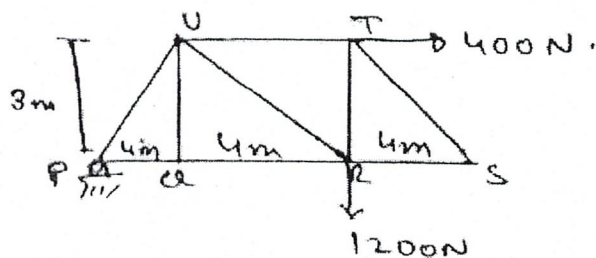
16. What is after taking the assumption of the direction of the force, the direction comes opposite?

- a) The assumption made was wrong and the question can't be solved further
- b) The assumptions are not to be taken
- c) The direction is in the opposite sense, and hence the direction is known to us
- d) The direction will be already given to us, no need of assuming

17. Zero force members has _____ loadings. The zero forces are used to improve _____ of the structure.

- a) Infinite, Ductility; b) No, Stability; c) Minimum, Malleability d) Maximum, Toughness

18. Find the horizontal support reactions at P, Member force QR



- a) 300N, 500N b) 0N, 300N c) 500N, 400N d) 400N, 800N

19. The free body diagram of which part of the section of the truss is made to make use of the method of sections?

- a) Joints b) Truss c) The whole structure d) Any section can be used