CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
Technical and Vocational Education Examination

ARCHITECTURAL APPLIED MECHANICS1
7215

JUNE XXXX **ADVANCED LEVEL**

Centre No. & Name	
Candidate No.	
Candidate Name	

Mobile phones are **NOT** allowed in the examination room.

7215 - ARCHITECTURAL APPLIED MECHANICS 1: MULTIPLE CHOICE QUESTION PAPER

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins:

3. Check that this question booklet is headed "Advanced Level – 7215 – ARCHITECTURAL APPLIED MECHANICS 1

4. Insert the information required in the spaces above.
5. Insert the information required in the spaces provided on the answer sheet using your HB pencil:

   Candidate Name, Exam Session, Subject Code, Centre Number and Candidate Number.

   Take care that you do not erase or fold the answer sheet or make any marks on it other than those asked for in these instructions.

How to answer the questions in this examination:

6. Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.
7. Each question has FOUR suggested answers: **A, B, C** and **D**. Decide which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

   For example, if **C** is your correct answer, mark **C** as shown below:

   [A] [B] [~~C~~] [D]

8. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.
9. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
10. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
11. **You must not take this booklet and the answer sheet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.**

1. The centre of gravity of a homogenous body is the point at which the whole

A	Volume of the body is assumed to be concentrated
B	Area of the surface of the body is assumed to be concentrated
C	Weight of the body is assumed to be concentrated
D	Volume and area of the body is assumed to be concentrated

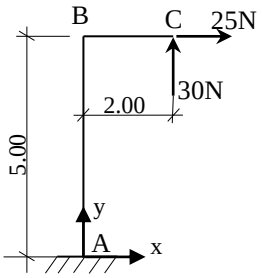
2. The first moment of area of a plane surface about an axis situated in the plane is the product of its:

A	perimeter and the distance between its centre of gravity and the axis.
B	surface area and the distance between its centre of gravity and the axis
C	surface area and the distance between its centre of gravity and a given side of the plane
D	surface area and the square of the distance between its centre of gravity and the axis

3. A point subjected to a number of forces will be in equilibrium, if

A	Sum of resolved parts in any two directions at right angles, are both zero
B	Algebraic sum of the forces is zero
C	Two resolved parts in any two directions at right angles are equal
	Algebraic sum of the moments of the force about the point is zero

4. In the figure below, the sum of moment about the point A is equal to:



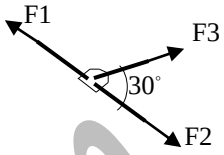
A	100Nm
B	65Nm
C	-100Nm
D	-65Nm

5. It is most correct statement in victors

A	scalar quantities are: time, volume, weight, speed and density
B	vectors quantities are: Displacement, speed, velocity and force
C	Vectors are: momentum, moment, force, acceleration and displacement.
D	Scalar quantities are defined by only the magnitude and direct

6. If $F_1=F_2=500N$ in the diagram below, F_3 is

A	433.01N
B	250N
C	500N
D	0N



7. A free body diagrammed of any rigid structure is said to be statically determinate when the number of unknowns is

A	Equal to the number of static equations
B	Less than the number static equations
C	More than the number static equations.
D	More than one

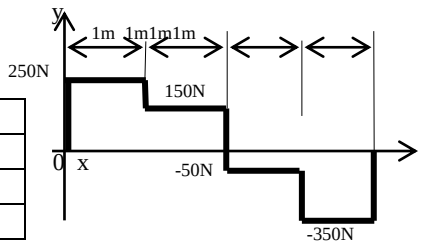
8. The coefficient of friction depends on;

A	The surface area of contact only
B	The nature of the surface only
C	The contact area and the nature of the surface
D	The applied force

9. The coefficient of statics friction of a body sliding on another one is 0.2, calculate the equivalent force if the horizontal force that cause it to just start moving is 30N

A	30N
B	50N
C	6N
D	60N

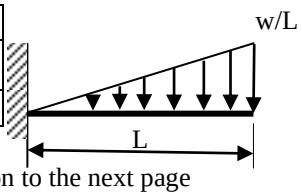
10. The figure below is the shear force diagram of a loaded beam. The bending moment at the point 2m from the left will be:



A	300Nm
B	250Nm
C	100Nm
D	400Nm

11. A cantilever carries a uniformly distributed load (W) over its entire length. The bending moment at the support will be:

A	$WL^2/3$
B	WL/3
C	2WL/3



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D	$2WL^2/3$

12. If the compressive stress at the top of a beam of height or depth 20 cm is 1800bars and the corresponding tensile stress at its bottom 600bars, the neutral axis from the top will be at.

A	15cm
B	10cm
C	5cm
D	7.5cm

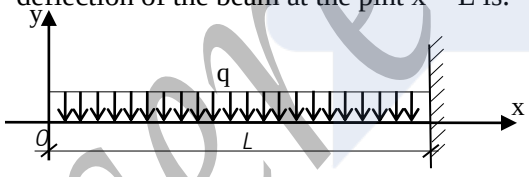
13. A material is said to be fragile or brittle when;

A	No alteration in shape is accepted within the elastic limit
B	It is most likely to deform beyond the yield point
C	The material is most likely to rupture beyond elastic limits
D	The material does not possess any elastic quality

14. For a simply supported beam carrying a point load F applied at the middle of the beam, the maximum bending moment is at L/2 and is given by M(max) equal to:

A	$FL/4$
B	$FL^2/4$
C	$FL/2$
D	$FL^2/2$

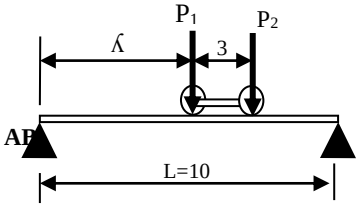
15. A cantilever carries a uniformly distributed load (q) over its entire length as shown below. The net deflection of the beam at the pint x = L is:



A	$\frac{5ql^4}{24EI}upward$
B	$\frac{5ql^4}{24EI}downward$
C	Zero
D	$\frac{5ql^4}{48EI}$

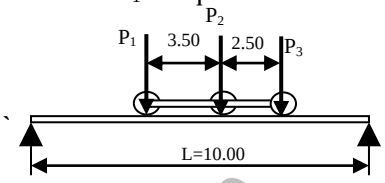
16. The diagram below shows a convoy of two wheels rolling over a beam on two supports, the maximum reaction at B is obtained when:

A	ʎ=0
B	ʎ = 5
C	ʎ = 7
D	ʎ = 10



17. The beam below supports a 3 axle trolley. If P_1=10kN, P2=7kN, and P_3=13kN, the distance between the resultant andP_1 is equal to

A	3
B	3.5
C	3.42
D	2.58



18. A member of a roof truce is subjected to a tensile effort of 2KN. If the practical resistance of the material used is 2000Pa Determine the minimal section S of the wood to be used.

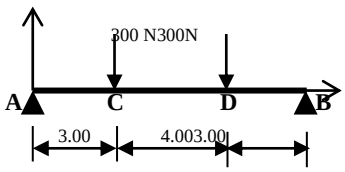
A	$S=1000cm^2$
B	$S=10000cm^2$
C	$S=100m^2$
D	$S=1000mm^2$

19. Across section of a loaded beam is subjected to a bending stress of $10N/m^2$ and a direct tensile stress of $5N/m^2$. The resultant tensile stress on the section is

A	$10N/m^2$
B	$5N/m^2$
C	$15N/m^2$
D	$20N/m^2$

20. Considering the mechanical sketch below, the equation of the bending moment between A and C is:

A	M(x) = 900x
B	M(x) = 300x-300
C	M(x) = 30x+300
D	-300x



21. Two major causes of buckling of concrete elements subjected to simple compression are the:

A	Radius of gyration and the length
B	Section and the length
C	Section and the applied force
D	Radius of gyration and the applied force

22. One characteristic of statically determinate frame work is that the links between the members are

A	Always embedded
B	Always articulated
C	Neither embedded nor articulated
D	Either embedded of articulated

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23. A frame truss with m bars and J joints or knots is statically determinate if:

A	J = 2m – 3
B	J = 3 – 2m
C	J =2m + 3
D	m=2j-3

24. A frame truss with m bars and J joints or knots is statically unstable if:

A	m > 3j – 2
B	m < 2j – 3
C	m < 3j – 2
D	m=3j+2

25. The buoyancy depends on the:

A	pressure with which the liquid is displaced
B	viscosity of the liquid
C	weight of the liquid displaced
D	compressibility of the liquid

26. The resistance of concrete to tensile stress with a resistance to compressive stress at 28 days of 20Mpa is

A	18Mpa
B	20Mpa
C	1.8Mpa
D	2.0Mpa

27. The main role of transversal reinforcements in a beam in simple or plane bending is to

A	Counter the effect normal forces
B	Counter the effect of shear forces
C	Counter the effect bending moment
D	Counter the effect of the longitudinal deformation

28. A T-section beam is considered as rectangular during the calculation of longitudinal reinforcement at the ultimate limit state if:

A	The table moment is less than the external moment
B	A part of the web is in compression
C	The web is both in tension and compression
D	Only the table or part of it is in compression

29. The buckling length of concrete elements subjected to simple compression is characterized by the:

A	Radius of gyration and the section
B	Radius of gyration and the length
C	Section and the applied force
D	Type of link or supports at its ends

30. According to B.A.E.L principles, the reduced moment $\mu = 0.125$ indicates that**:**

A	Concrete section enough while steel section is over dimensioned
B	Concrete section is over dimensioned while the steel section just enough.
C	Both concrete and steel sections are enough
D	Both the concrete and steel are over dimensioned

31. If the permanent and service loads on a beam are 40daN/m and 20daN/m respectively, the total load at ULS is

A	84dan/m
B	60dan/m
C	87dan/m
D	20dan/m

32. At ultimate limit state the deformation of concrete ε_b (according to BAEL) is limited to

A	$2^0/_{00}$ in simple compression
B	$2^0/_{00}$ in simple tension
C	$2^0/_0$ in simple compression
D	$2^0/_{00}$ in simple bending

33. The relationship between the resistance of concrete to compressive stress and tensile stress after 28days is given by

A	$F_{t28}= 0.06F_{c28}$
B	$F_{t28}=F_{c28}+0.6$
C	$F_{t28}= 0.6+0.06F_{c28}$
D	$F_{t28}=0.6F_{c28}-0.6$

34. When a liquid is flowing through a pipe, the velocity of the liquid is

A	minimum at the centre and maximum near the walls
B	zero at the centre and maximum near the walls
C	maximum at the centre and minimum near the walls
D	maximum at the centre and zero near the walls

35. A car accelerated constantly from rest at 2.17 m/s^2.What is the velocity after a distance of 100m?

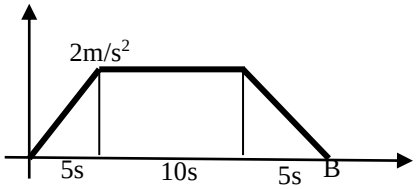
A	46.08 m/s
B	20.83m/s
C	22.83m/s
D	28.08 m/s

36. A body falling freely from the 3th floor of a building rebounds from the ground floor and went up 8m. If it loses 20% of its energy in this impact, the height of the 3th floor from the ground floor should be

A	10m
B	8m
C	12m
D	6m

37. In the velocity-time graph of the motion of a train from point A to point B shown below, the total distance covered by the train is:

A	20m
B	30m
C	60m
D	50m



38. The forces which meet at one point, but their lines of action do not lie in a plane, are called

A	Coplanar non-concurrent forces
B	non-coplanar concurrent forces
C	non-coplanar non-concurrent forces
D	intersecting forces

39. The first moment of area of a plane surface about an axis situated in the plane is the product of its

A	perimeter and the distance between its centre of gravity and the axis.
B	surface area and the square of the distance between its centre of gravity and the axis
C	its surface area and the distance between its centre of gravity and a given side of the plane
D	surface area and the distance between its centre of gravity and the axis

40. Flow through a long pipe at constant rate is called

A	Steady uniform flow
B	Steady non-uniform flow
C	Unsteady uniform flow
D	Steady non-uniform flow

41. Head loses on liquids flowing through pipes is caused by the

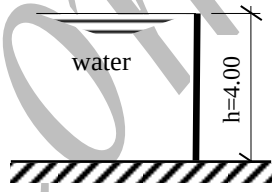
A	length of the pipe lines
B	Roughness of the internal pipes surfaces
C	Diameter of the pipes
D	Relative density of the liquids

42. The intensity of pressure at any point, in a liquid at rest would vary in function of the

A	Elevation of the free surface
B	Depth of the point from the free surface
C	Depth of liquid from the free surface
D	Depth of the point to the base of the containing vessel

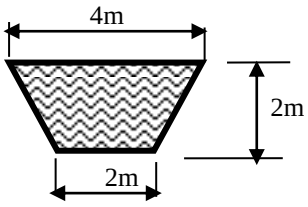
43. The figure below is a 4.00m high dam with a length of 7.00m perpendicular to the plane of this page, filled to the brim with water, The hydrostatic force on the wall will be

A	$56\rho g$
B	$112\rho g$
C	$28\rho g$
D	$4\rho g$



44. Water flows in an upend channel with cross section as shown below. If the velocity v = 4.528m/s, the discharge Q will be

A	170.112m³/s
B	255.168 m³/s
C	91.56 m³/s
D	85.056 m³/s



45. A pipe of 20mm diameter is used in a washing point. if the discharge in the pipe is 10m3/s and it takes 15s of continuous flow to wash a car, the quantity of water used will be.

A	150m³
B	200m³
C	300m³
D	250 m³

46. In the BERNOULLI energy conservation equation of fluids below, the total energy at any given point is given by

$$Z_1 + \frac{p_1}{\rho g} + \frac{V_1^2}{2g} = Z_2 + \frac{p_2}{\rho g} + \frac{V_2^2}{2g}$$

A	$\frac{P}{\rho g} + \frac{v2}{2g}$
B	$Z - \frac{p}{\rho g}$
C	$Z + \frac{p}{\rho g} - \frac{v2}{2g}$
D	$Z + \frac{p}{\rho g} + \frac{v2}{2g}$

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47. The ratio of the effective length of a column and the minimum radius of gyration of its cross sectional area, is known as its:

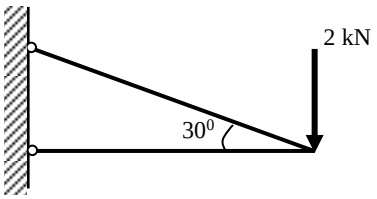
A	slenderness ratio
B	buckling factor
C	crippling factor
D	compression factor

48. "When a body is immersed wholly or partially in a liquid, it is lifted up by a force equal to the weight of liquid displaced by the body". This statement is called

A	Pascal's Law
B	Archimedes' principle
C	Principle of floatation
D	Bernoulli's principle

49. The magnitude of force in member *BC* of the two frame structure shown in below is

A	23 *kN*
B	32 *kN*
C	4 *kN*
D	3 kN



50. A point subjected to a number of forces will be in equilibrium, if

A	The sum of resolved parts in any two directions at right angles, are both zero
B	Algebraic sum of the forces is zero
C	Two resolved parts in any two directions at right angles are equal
D	Algebraic sum of the moments of the forces about the point is zero

STOP

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