CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

7145 MECHANICAL DESIGN 1

JUNE XXXX **ADVANCED LEVEL**

Specialty(Specialty Code)	**MAME, HBMA, MWIP, AM-LV, AM-HD**
Centre No.	
Centre Name	
Candidate No.	
Candidate Name	

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

7145 MECHANICAL DESIGN 1: MULTIPLE CHOICE QUESTION

One and a half hours

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 – 7145 MECHANICAL DESIGN 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 crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.
6. **Answer ALL questions**
7. Each question has FOUR suggested answers: **A, B, C** and **D**. Decide on 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. Texts, notes and pre-prepared materials of any kind are also **NOT** allowed in the examination room.
12. **At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet after. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT**.

1. In mechanics, which of the following is a scalar?

A Force
B mass
C Weight
D Torque

---

2. In calculating the frictional force, if the normal force is doubled, then the coefficient of friction is:

A Double
B Not changed
C Halved
D Triple

---

3. In a uniformly varied motion, the displacement, velocity and acceleration of a particle are all:

A vector quantities
B vector quantities except displacement
C vector quantities except velocity
D vector quantities except acceleration

---

4. The kinetic energy due to rotation is equal to:

A $I\omega^2$
B $I\omega^2/2$
C $I\omega/2$
D $I\omega^2/4$

---

5. In the theorem of mutual action, action-reaction forces are :

A Equal in magnitude and point in the same direction
B Equal in magnitude and point in opposite directions
C unequal in magnitude and point in the same direction
D unequal in magnitude and point in opposite directions

---

6. A cyclist moves at a constant speed of 4m/s. How long it will take for the cyclist to moves 36m?

A 3s
B 12s
C 9s
D 6s

---

7. Consider two vectors $\vec{A}$ and $\vec{B}$. If $\vec{A}.\vec{B} = 0$, then the two vectors are:

A Collinear
B Perpendicular
C Parallel
D Concurrent

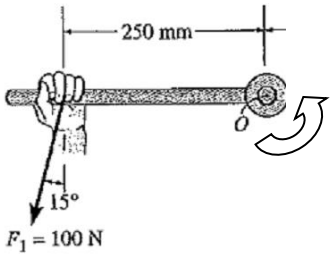
---

8. The equations of the fundamental principle of statics are stated as:

A $\sum \overrightarrow{Fext} = \vec{0}\ ; \sum \overrightarrow{Mext} = \vec{0}$
B $\sum \overrightarrow{Fext} = M\vec{a}\ ; \sum \overrightarrow{Mext} = \vec{0}$
C $\sum \overrightarrow{Fext} = \vec{0}\ ; \sum \overrightarrow{Mext} = J\vec{\ddot{O}}$
D $\sum \overrightarrow{Fext} = M\vec{a}\ ; \sum \overrightarrow{Mext} = J\vec{\ddot{O}}$

---

9. A force F_1 = 100 N is applied on a spanner as shown below.



The moment of the force at point O is given by the formula:

A $100\sin 15^0 \times 250$
B $100\cos 15^0 \times 250$
C $100\tan 15^0 \times 250$
D 100×250

---

10. A vector is defined by:

A Three characteristics
B Two characteristics
C Four characteristics
D Only one characteristic

---

11. If a body moves vertically downwards, its acceleration is

A Equal to +g
B Equal to -g
C Greater than g
D Less than g

---

12. The unit of the moment of inertia is:

A Kg. m
B Kg/m^2
C $Kg .m^2$
D $Kg .m^4$

---

13. The figures below representing some illustrations of a force F acting on a solid (S) are for questions 13 and 14

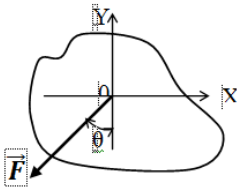


Figure 1

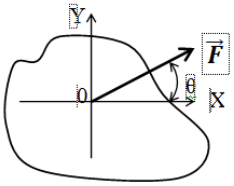


Figure 2

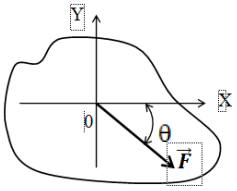


Figure 3

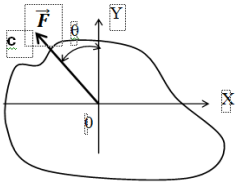


Figure 4

If the components of a force F are:
F_x = -F sinθ and F_y = -F cosθ .
The correct representation of the force F is as in figure:

A 1
B 2
C 3
D 4

---

14. If the components of a force F are:
F_x = +F cosθ and F_y = -F Sinθ .
The correct representation of the force F is as in figure:

A 1
B 2
C 3
D 4

---

15. A cable with a uniformly distributed load will take the shape of a/an

A Straight line
B Parabola
C Elliptical
D Hyperbola

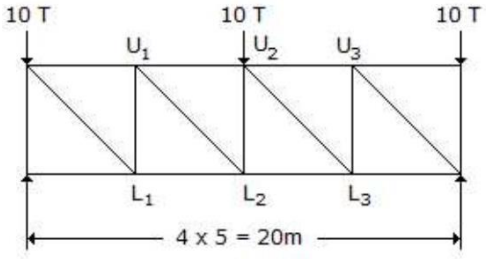
---

16. Consider two solid bodies in contact. The coefficient of friction depends on

A Area of contact
B Shape of surfaces
C Nature of surfaces
D Strength of surfaces

---

17. The figure below represents a truss



The stress in the member U_2L_2 is

A 10 T tension
B 10 T compression
C 15 T compression
D Zero

---

18. Consider the formula $\eta = \frac{P_{out}}{P_{in}}$, where P_{out} is output power and P_{in} is input power η represents:

A The transmission ratio
B The power transmitted
C The efficiency
D The pressure ratio

---

19. A body moves through a distance of 8m under the action of a force of 10 N. The gain in kinetic energy is:

A 80 J
B 120 J
C 40J
D 60 J

---

20. The appropriate graphic method used to solve a case of equilibrium under three coplanar concurrent forces with the point of convergence unknown is called:

A Cullman method
B Force polygon and equilibrium polygon method
C Equilibrium polygon method
D Force polygon method

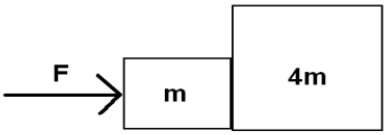
---

21. In strength of materials, a beam is said to be of uniform strength, if

A Bending stress is the same throughout the beam
B Bending moment is the same throughout the beam
C Deflection is the same throughout the beam
D shear stress is the same throughout the beam

---

22. The figure below represents two boxes of masses m and 4m in contact with each order on a frictionless surface. The acceleration of the box of mass 4m is:



A F/m
B F/(4m)
C F/(5m)
D F/(3m)

---

23. If l and δl are the length and change in length respectively, the strain is equal to:

A l/δl
B l x δl
C δl/l
D $\delta l/l^2$

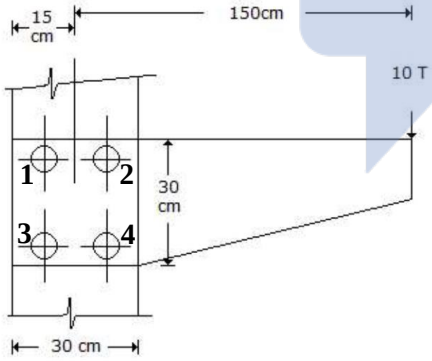
---

24. For a body subjected to two forces to be in the equilibrium, both forces must have:

A The same line of action, opposite direction and same magnitude
B Same line of action, same direction and different magnitude
C Opposite direction, same line of action and different magnitude
D Same magnitude , same line of action and same direction

---

25. The figure below represents two riveted parts.

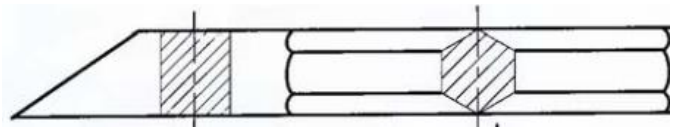


The rivets with maximum stress are:

A 1 and 2
B 1 and 3
C 2 and 3
D 2 and 4

---

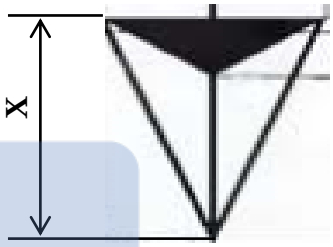
26. The part below has some two sections on it. Which type of section are represented as such?



A Revolved section
B Offset section
C Removed section
D Partial section

---

27. On a drawing paper with border lines at 10mm from edge of paper, what is the value of the dimension X shown in the figure below?



A 10 mm
B 20mm
C 11mm
D 5mm

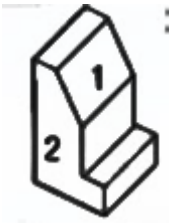
---

28. Which angle cannot be constructed with either a 45 or 30/60 degrees triangle or a combination of the two?

A 90°
B 70°
C 30°
D 15°

---

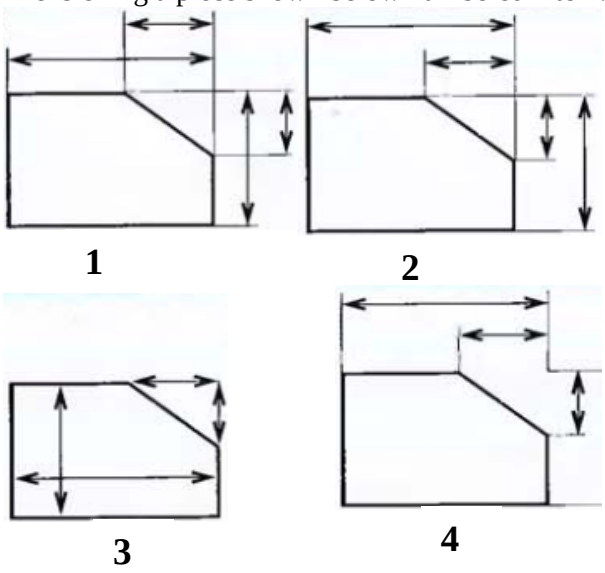
29. An isometric projection of a part is shown below. How many views are in true size?



A 2
B 1
C 0
D 3

---

30. Indicate from the drawings the correct way of dimensioning a piece shown below numbered 1 to 4.



A 4
B 3
C 2
D 1

---

31. In linear dimensioning, one group listed below, in order of execution is used to realize a dimension. Give the correct order.

A dimension line, dimension value and extension line
B dimension line, extension line and dimension value
C extension line, dimension value and dimension line
D Extension line, dimension line and dimension value

---

32. Given the fit below, which one is an interference or tight fit?

A H7/k6
B H7/p6
C H7/h6
D H7/g6

The information below is for questions 33 and 34.
Given the tolerance fit, **Ø50H7f6** with

$$Ø50H7 = Ø50\,^{+0.025}_{0}$$ and

$$Ø50H7 = Ø50\,^{-0.025}_{-0.041}$$

33. The maximum allowance is equal to

A 0.066
B 0.025
C 0.041
D 0.016

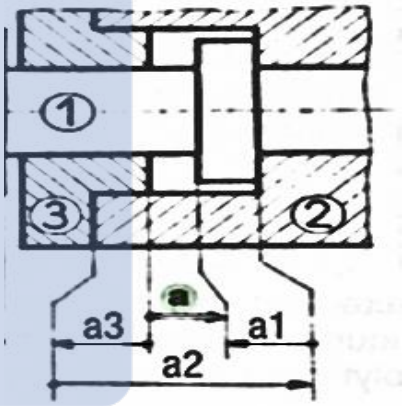
---

34. The interval of tolerance on the hole is equal to

A 0.066
B 0.025
C 0.041
D 0.016

---

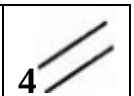
35. From the assembly drawing below, the algebraic equation for the calculation of the clearance **'a'** is written as



A **a** = a1 + a3 – a2
B **a** = a1 – a3 + a2
C **a** = a2 + a1 + a3
D **a** = a2 – a3 – a1

---

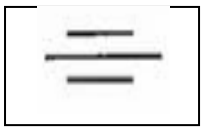
36. From the table below, which symbol is a geometrical tolerance of shape?

1	2	3	4
			

A 1
B 2
C 3
D 4

---

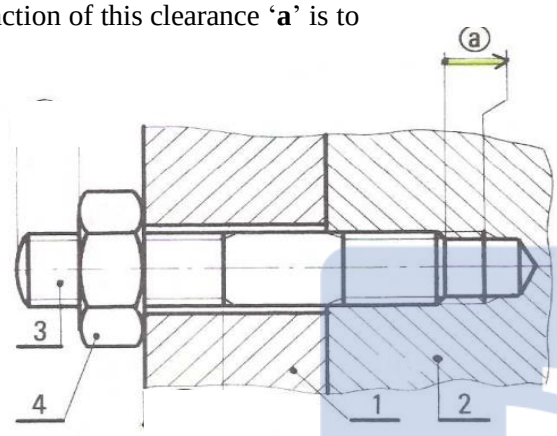
37. The symbol below shows a geometrical tolerance. What does it stand for?



A Angularity
B Perpendicularity
C Parallelism
D Symmetry

---

38. The drawing below shown a clearances. The function of this clearance '**a**' is to



A assures that part **2** is threaded
B assures that parts **1** and **2** are linked
C assures that part 3 is well tightened
D Indicates then end of the threaded hole

---

39. In the designation of surface texture of parts, the symbol shown on the figure below signifies a surface

A to be machined
B not to be machined
C To be heat treated
D that is molded

---

40. The list of the elements are used to link a shaft and housing only in translational motion except:

A Keys
B Bolts
C Retaining ring
D Pins

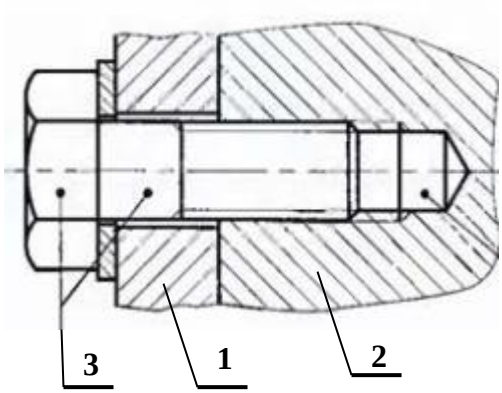
---

41. Joining two mechanical parts together by welding assures a

A Permanent, dismountable and elastic link
B Permanent, not dismountable and rigid link
C Permanent, not dismountable, elastic link
D Permanent, dismountable and rigid link

---

42. The assembly of two mechanical parts **1** and **2** is realized with help of a screw.



How is the hole on piece **1**?

A Unthreaded
B Threaded
C Tapered
D Tapered threaded

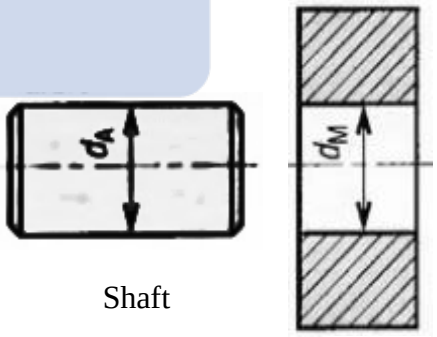
---

43. In mounting two rigid ball bearings on a rotating shaft, the rings should be mounted such that the

A Outer rings should be tight
B One inner should be tight and one outer tight
C Inner rings should be tight
D None of the rings should be tight

---

44. The shaft and hub shown below have to be fitted together with $\mathbf{d_A}$ slightly greater than $\mathbf{d_M}$.



Shaft

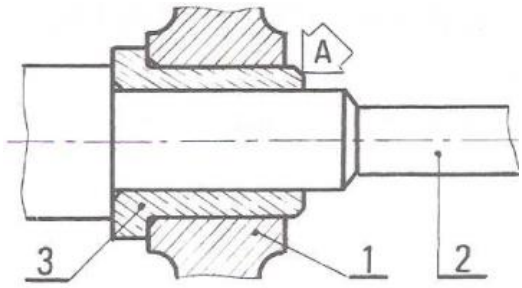
Hub

Give the nature of the fit.

A Clearance fit
B Interference fit
C Allowance fit
D Transition fit

---

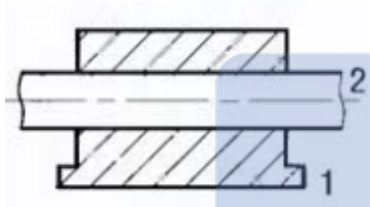
45. The part **3** mounted in between the shaft and the housing as indicated by **A** on the assembly drawing is called



A Parking
B Retaining ring
C Bushing
D Bearing ring

---

46. The assembly drawing below shows a pivot sliding link between two mechanical parts **1** and **2**.

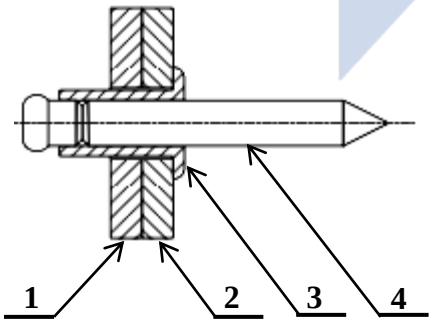


Give the number of degrees of freedom existing in this type of link.

A 3
B 2
C 0
D 1

---

47. The assembly drawing below shows two parts **1** and **2** to be riveted with a rivet **3**.

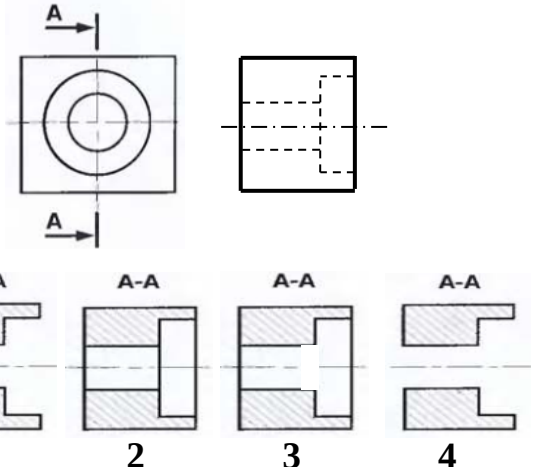


To realize the assembly, on which part(s) should the riveting force be exerted?

A 2 and 3
B 1 and 2
C 3 and 4
D 1 and 3

---

48. Choose from the drawings numbered 1 to 4 below, the drawing that shows the removed section A - A of the part shown



A 1
B 2
C 3
D 4

---

49. In a mechanism, grease is used as a lubricant when:

A High Speed is desired
B High Temperatures are desired
C Low maintenance frequency is desired
D High maintenance frequency is desired

---

50. The diagram below shows a spring in two views

Give the type of spring concerned.

A Torsion spring
B Compression spring
C Extension spring
D Flexion spring

NOW GO BACK AND CHECK YOUR WORK