CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
Technical and Vocational Education Examinations

7460 APPLIED AND FLUID MECHANICS 1

JUNE XXXX   **ADVANCED LEVEL**

Specialty(Specialty Code)	
Centre No.	
Centre Name	
Candidate No.	
Candidate Name	

Mobile phones are **NOT** allowed in the examination room
7460 APPLIED AND FLUID MECHANICS 1: MULTIPLE CHOICE QUESTION PAPER

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 – 7460 APPLIED AND FLUID 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 crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.

6.   A**nswer 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] [C̶] [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**.

_____ *Turn Over*

1. A fluid is:
   A   Any substance that is solid
   B   Any substance that is indeformable
   C   Any substance that remains at equilibrium
   D   Any substance that is affected by shear and tangential stresses

2. A real fluid is:
   A   Fluids that can flow when subjected to shear forces
   B   Fluids that are viscous to some extent
   C   Fluids that are compressible
   D   All of the above

3. The specific weight is:
   A   Weight/unit volume.
   B   Mass/unit volume.
   C   Pressure/unit volume.
   D   Density.

4. The viscosity of a liquid:
   A   Increases with decrease in temperature
   B   Decreases with decrease in temperature
   C   Changes not with temperature
   D   Depends on pressure

5. The viscosity of gases:
   A   Decreases with decrease in temperature
   B   Increases with decrease in temperature
   C   Changes not with change in temperature
   D   None of the above

6. The kinematic viscosity expressed in yokes is converted in m²/s by :
   A 10^{-2}
   B 10^4
   C 10^{-4}
   D   0.00001

7. The printer's ink is:
   A   Newtonian fluid
   B   Non- Newtonian fluid
   C   An Ideal fluid
   D   Thixotropic substance

8. Capillary rise or drop in a small tube is:
   A   Directly proportional to diameter
   B   Directly proportional to surface tension and inversely proportion to the diameter.
   C   Inversely proportional to the square of the diameter
   D   Directly proportional to surface tension and diameter.

9. Calculate the specific weight of a fluid having a density of 800Kg/m³.
   A   0.8 KN/m³
   B   0.08 KN/m³
   C   80 KN/m³
   D   8 KN/m³

10. A petroleum oil has a density of 800 Kg/m³, it specific volume is;
    A   0.000125 m³/Kg
    B   0.00125 m³/Kg
    C   1.25 m³/Kg
    D   125³/Kg

11. The unit for surface tension is:
    A   N/m²
    B   N/m
    C   N
    D   Kg/m³

12. Calculate the dynamic viscosity of oil between two plates having a thickness of 10mm, and a tangential stress of 1000 Pa, if the upper plate is animated with a velocity of 1m/s.
    A   0.10 Pa.s
    B   100 Pa.s
    C   10 Pa.s
    D   1 Pa.s

13. Suction pressure is:
    A   Positive pressure.
    B   Negative pressure.
    C   Absolute pressure.
    D   Atmospheric pressure.

14. Manometers are pressure measuring devices that:
    A   Use the local pressure to measure pressure.
    B   Use the absolute pressure to measure the pressure.
    C   Use a liquid column to measure the pressure.
    D   Use atmospheric pressure to measure the pressure.

15. The location of the center of pressure is such that:
    A   It is at the centroid of the submersed area
    B   Above the centroid of the plane
    C   At the centroid of the pressure prism
    D   Independent of the Orientation of the area

D   0.57 ^{3}/s

16. The point of application of the resultant of the hydrostatic force is given by $z_P = z' + \frac{I_{G}sin^2\theta}{Az'}$; find the point of application of a square gate of 2.5 m^2 whose center z' is located at 5m from the free surface. If $I_G = 0.521m^4$
   A   5.04 m
   B   50.4 m
   C   0.00504m
   D   0.504

17. A body floats in a stable equilibrium:
   A   When center of gravity is below the center of buoyancy
   B   When the center of buoyancy is below the center of gravity
   C   When the center of gravity is at the center of buoyancy
   D   None of the above

18. The two methods used in describing fluid motion are :
   A   Darcy-Weisbach
   B   Hazen- William
   C   Lagrangian- Eulerian
   D   Manning- Strickler

19. Turbulent flow:
   A   When particles flow in cyclic pattern
   B   When particle flow in the opposite direction.
   C   Particle flow in irregular and random pattern.
   D   Particle flow in continuous straight path.
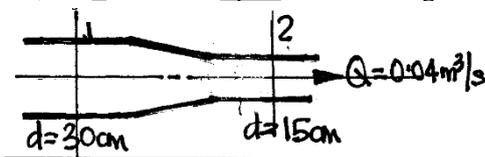
20. Calculate the flow speed v₂, of the figure 1

   Figure 1

   A   0.226m/s
   B   22.60m/s
   C   2.26m/s
   D   0.0226m/s

21. From the figure 1 deduce the flow rate at point 1
   A   57 m^3/s
   B   5.7 m^3/s
   C   0.57 m^3/s

22. In turbulent flow, the Reynolds' number is;
   A $R_e < 1000$
   B $2000 < R_e < 4000$
   C $R_e < 2000$
   D $R_e > 4000$

23. A fuel oil of relative density 0.850 has to be transported through a pipeline of 300mm, with a speed of 0.60m/s. The absolute viscosity of the oil is 0.10 Pa s. Find the Reynolds' number.
   A   1530
   B   153
   C   15300
   D   1.53

24. From question 23 deduce the flow regime:
   A   Turbulent
   B   laminar
   C   Boundary
   D   Unsteady

25. The factor K$_L$ in the minor loss equation is:
   A   The coefficient of friction
   B   The coefficient of energy loss
   C   The coefficient of simultaneity
   D   The coefficient of safety

26. The Moody's diagram is used in:
   A   Determining the slope of pipes
   B   Determining the diameters of pipes
   C   Determining the friction factor of pipes
   D   Determining the local head loss

27. The hydraulic gradient line is:
   A   Always above the energy gradient li.
   B   Always above the center line.
   C   Always sloping in the direction of flow.
   D   Lower than energy line by the velocity head.

28. Minor losses are those:
   A   Caused by local disturbances in the flow.
   B   Have a small magnitude.
   C   Which depends on the velocity of flow
   D   Caused by resistance at the surface.

29. The transport line in an irrigation scheme is made up of a pipe having a cross-sectional area of 0. 36 m^2; the flow rate pipe conveys a flow rate of 3600l/s. Find the speed in the pipe.
   A   1m/s
   B   0.10 m/s

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C   10m/s

D   0.001m/s

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30. Find the internal diameter of the pipe in question 29 above.
    A   677 mm
    B   67.7 mm
    C   0.677mm
    D   677mm

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31. A pipe system is said to be equivalent to another when one of the set of quantities are the same.
    A   L, Q
    B H_L, Q
    C   F, d
    D   v, d

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32. Prismatic channels:
    A   Have constant slopes and uniform cross sections.
    B   Are lined channels.
    C   Have varying cross-sections.
    D   Irregular geometric figures.

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33. The channel best in transporting small discharges:
    A   Trapezoidal section
    B   Circular section
    C   Triangular section
    D   Rectangular section

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34. For pipes arranged in series:
    A   The flow is different in the different pipes
    B   The velocity of flow is the same in all pipes
    C   The head loss must be the same in all pipes
    D   None of the above

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35. Select that which does not represents a tensile force:
    A   That stretches an object
    B   That Shortens an object
    C   That elongates an object
    D   That drags an object

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36. A force of 1000 N was applied on a solid metallic rod having a cross-sectional area of 0.010 m². The stress in the rod is:
    A   100 KPa
    B   1000 KPa
    C   10 KPa
    D   1 KPa

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37. In Hooke's law the study is on:
    A   The plasticity of a material
    B   The toughness of a material
    C   The malleability of a material
    D   None of the above

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38. If the resultant of two forces have the same magnitude as either of the forces, then the angle between the two forces is:
    A   30
    B   45°
    C   60°
    D   120°

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39. When two forces, of equal magnitude P act at 90° to each other, the resultant will be:
    A   P
    B PV_2
    C P/V_2
    D   2P

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40. The Young Modulus measures:
    A   The elasticity of an object
    B   The deformability of an object
    C   The plasticity of an object
    D   The toughness of an object

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41. When a bracket is loaded as a cantilever, if the load at the extremity is increased, the failure will occur:
    A   In the middle
    B   At the tip, beneath the load
    C   At the embedment support
    D   Anywhere along the bracket

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42. Find the strain in a brass rod of length 250mm, which is subjected to a tensile load of 50KN, when the extension of the rod is equal to 0.3mm.
    A   0.025
    B   0.0012
    C   0.0046
    D   0.0014

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43. A pump is:
    A   A mechanical device that translates horizontal motion.
    B   A mechanical device that impacts circular motion to liquids.
    C   A mechanical device which converts mechanical energy into hydraulic energy.
    D   A mechanical device which improves flow conditions.

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44. Pumps are classified as:
    A   Positive displacement pumps
    B   Rotodynamic pumps
    C   Multi-stage pumps
    D   All of the above

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45. The slip in a reciprocating pump is:
    A   The efficiency of the pump

B   The theoretical discharge
C   The factual discharge
D   The difference between the theoretical and actual discharge

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46.   Find the discharge of a piston pump that has the following characteristics; loss 0%, movement length of piston; 0.5m, and the cyclic rotation of the piston 100 rotation/min and cross-section of the piston: 0.40m^2.
   A   20 l/min
   B   2 l/min
   C   200 l/min
   D   0.20 l/min

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47.   The total energy head developed by a pump is:
   A   The suction head
   B   The delivery head
   C   The total manometric head
   D   The total static head

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48.   Calculate the head to be developed by a centrifugal pump, if the static head is 30m and the developed length of pipeline is 100m. The friction factor is 0.1.
   A   4 m
   B   400 m
   C   0.40 m
   D   40 m

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49.   The hydraulic power is:
   A   The power used in displacing the liquid
   B   The useful power developed by the pump
   C   The mechanical power of the motor
   D   The power supplied by the impellers

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50.   Calculate the hydraulic power of a pump which discharges 2000 l/s to transport water through an elevation difference of 50m.
   A   100 KW
   B   10 KW
   C   1 KW
   D   1000 KW

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NOW GO BACK AND CHECK YOUR WORK

_____ *Turn Over*