PLUMBING ARITHMETIC

INSTRUCTION: Select the correct answer for each of the following questions. Mark only one answer for each item by encircling the letter of your choice. STRICTLY NO ERASURES ALLOWED.

TIME ELEMENT: 2 hours

MULTIPLE CHOICES:

SITUATION 1: At 2:00 A.M. an airplane takes off at a speed of 340 mph on an aircraft carrier. The aircraft carrier moves due south at the speed of 25 mph in the same direction as the plane. At 4:05 A.M. the communication between the plane and the aircraft carrier was cut off.

1. Compute the distance travelled by the aircraft carrier after 2 hours and 5 minutes travel.
   a. 52 miles
   b. 708 miles
   c. 656 miles
   d. 645 miles
2. Compute the distance travelled by the plane after 2 hours and 5 minutes travel.
   a. 52 miles
   b. 708 miles
   c. 656 miles
   d. 645 miles
3. Compute the communication range between the aircraft carrier and the plane.
   a. 52 miles
   b. 708 miles
   c. 656 miles
   d. 645 miles

SITUATION 2: A job could be done by 25 workers in a target time of 90 days. There were 25 workers in the beginning but 5 workers quit after 30 days. Three more workers resigned after 60 days.

4. How many days did the remaining workers take to finish the job?
   a. 23 days
   b. 203 days
   c. 113 days
   d. 53 days
5. How many days did the workers finish the job?
   a. 23 days
   b. 203 days
   c. 113 days
   d. 53 days
6. How many days the project was delayed?
   a. 23 days
   b. 203 days
   c. 113 days
   d. 53 days

SITUATION 3: Two planes parallel to the base of a pyramid (12-m in altitude) cut the pyramid into three parts. The upper and lower planes are 4 m and 8 m away from the top of the pyramid.

7. Find the ratio of the volume of the middle part to the volume of the whole pyramid.
   a. 0.259
   b. 3.861
   c. 0.704
   d. 0.037
8. Find the ratio of the volume of the largest part to the volume of the whole pyramid.
   a. 0.259
   b. 3.861
   c. 0.704
   d. 0.037
9. Find the ratio of the volume of the smallest part to the volume of the whole pyramid.

a. 0.259 c. 0.704
b. 3.861 d. 0.037

SITUATION 4: An amount of P1, 000.00 becomes P1, 608.44 after 4 years compounded bi-monthly.

10. Find the nominal rate of interest.
    a. 12.00% c. 12.06%
    b. 12.62% d. 12.37%
11. Find the effective rate of interest.
    a. 12.00% c. 12.06%
    b. 12.62% d. 12.37%
12. Find the effective rate of interest if it is compounded quarterly.
    a. 12.00% c. 12.06%
    b. 12.62% d. 12.37%

SITUATION 5: An engineer is entitled to receive P25, 000 at the beginning of each year for 18 years. If the rate of interest is 4% compounded annually.

13. What is the present value of this annuity at the time he us supposed to receive the first payment.
    a. P111, 111 c. P666, 781
    b. P25, 645 d. P325, 142
14. What is the sum of this annuity at the end of the 18^{th} year?
    a. P111, 111 c. P666, 781
    b. P25, 645 d. P325, 142
15. Find the difference between the sums of this annuity which is paid at the beginning of each year (annuity due) and ordinary annuity (annuity paid at the end of each year).
    a. P111, 111 c. P666, 781
    b. P25, 645 d. P325, 142

16. How many degrees Celsius is 100 degrees Fahrenheit?
    a. 37.8 c. 40.3
    b. 35.6 d. 39.1
17. Express 45 degrees in mils?
    c. 80 mils c. 8000 mils
    d. 800 mils d. 80000 mils
18. An angular unit equivalent to 1/400 of the circumference of a circle is called:
    a. mil c. degree
    b. grad d. radian
19. How many cubic feet is equivalent to 100 gallons of water?
    a. 7.45 c. 13.37
    b. 8.00 d. 133.7
20. The acceleration due to gravity in English unit is equivalent to:
    a. 32.2 c. 9.81
    b. 3.22 d. 98.1

21. 10 to the 12th power is the value of the prefix:
    a. giga
    b. pico
    c. tera
    d. tetra
22. When rounded-off to four significant figures, 102.35690 becomes:
    a. 102.4
    b. 102.0
    c. 102.3
    d. 102.5
23. Which of the following is correct:
    a. 0.001 has three significant figures
    b. 107.0 has three significant figures
    c. 100.0 has four significant figures
    d. 0.0012 has five significant figures
24. Which of the following is correct?
    a. 1 horsepower = 746 kW
    b. 1 horsepower =0. 746 W
    c. 1 horsepower = 0.746 kW
    d. 1 horsepower = 748 W
25. A line on a map was drawn at a scale of 5:100,000. If a line in the map is 290 mm long, the actual length of the line is:
    a. 2.8 km
    b. 5.8 km
    c. 3.6 km
    d. 4.8 km
26. The probability that you will win the lottery is more likely to happen than the probability you will be stricken by lightning. True or False.
    a. True
    b. False
    c. Trulse
    d. All of the above
27. A mother is three times as old as her son. Four years ago, she was four times as old as her son was at that time. How old is her son?
    a. 18 years old
    b. 10 years old
    c. 24 years old
    d. 12 years old
28. Mary is 24 years old. Mary is twice as old as Ana was when Mary was as old as Ana is now. How old is Ana?
    a. 16
    b. 18
    c. 20
    d. 21
29. A 100-kilogram brine solution originally 4% by weight. Salt in water is boiled to reduce water content until the concentration is 5% by weight salt. How much water is evaporated?
    a. 5
    b. 10
    c. 20
    d. 15
30. A pump can pump out a tank in 11 hours. Another pump can pump out the same tank in 20 hours. How long will it take both pumps together to pump out the tank?
    a. 5 hours
    b. 4 hours
    c. 6 hours
    d. 7 hours

31. One pipe can fill a tank in 5 hours and another pipe can fill the same tank in 4 hours. A drainpipe can empty the full content of the tank in 20 hours. With all the three pipes open, how long will it take to fill the tank?
    a. 2.9 hours
    b. 2.5 hours
    c. 3.1 hours
    d. 3.7 hours
32. How many minutes after 10:00 o'clock will the hands of the clock be opposite each other for the first time?
    a. 21.18
    b. 18.21
    c. 21.81
    d. 28.11
33. In a two-digit number, the unit's digit is 3 greater than the ten's digit. Find the number if it is 4 times as large as the sum of its digits.
    a. 69
    b. 65
    c. 36
    d. 59
34. The product of three consecutive integers is 9240. Find the third integers.
    a. 21
    b. 20
    c. 22
    d. 23
35. Ten less than four times a certain number is 14. Determine the number.
    a. 4
    b. 5
    c. -1
    d. 7
36. The measure of 2.25 revolutions counterclockwise is:
    a. -810 degrees
    b. -800 degrees
    c. 800 degrees
    d. 810 degrees
37. If coversine θ is 0.134, find the value of θ?
    a. 60°
    b. 30°
    c. 90°
    d. 45°
38. Find the value of x in the equation csc x + cot x = 3.
    a. π/2
    b. π/4
    c. π/6
    d. π/5
39. Solve for x from the given trigonometric equation: $\arctan(1 - x) + \arctan(1 + x) = \arctan 1/8$
    a. 4
    b. 7
    c. 6
    d. 5
40. The angle or inclination of ascends of a road having 8.25% grade is _____ degrees.
    a. 7.43
    b. 4.72
    c. 4.27
    d. 7.34
41. The hypotenuse of a right triangle is 34 cm. Find the length of the shortest leg if it is 14 cm shorter than the other leg.
    a. 15 cm
    b. 16 cm
    c. 17 cm
    d. 18 cm
42. Given angle A = 32°, angle B = 70°, and side c = 27 units. Solve for side *a* of the triangle.
    a. 24.94 units
    b. 13.65 units
    c. 14.63 units
    d. 11.05 units
43. If the bearing of A from B is S 40° W, then the bearing of B from A is:

a. N 40° E
c. N 50° E
b. N 40° W
d. N 50° W

44. If the sides of the parallelogram and an included angle are 6, 10 and 100° respectively, find the length of the shorter diagonal.
a. 10.53
c. 10.73
b. 10.43
d. 10.63

45. The sum of the interior angles of a polygon of n sides is 1080°. Find the value of n.
a. 4
c. 6
b. 7
d. 8

46. If a regular polygon has 27 diagonals, then it is a:
a. heptagon
c. decagon
b. nonagon
d. octagon

47. The angle of a sector is 30 degrees and the radius is 15 cm. What is the area of the sector?
a. 85.9 sq. cm.
c. 59.8 sq. cm.
b. 58.9 sq. cm.
d. 89.5 sq. cm.

48. Determine the area of a regular hexagon inscribed in a circle having an area of 170 sq. cm.
a. 169.3
c. 148.2
b. 128.1
d. 140.6

49. What is the formula for the area of ellipse?
a. $\pi(a^2 + b^2)$
c. πab
b. $\pi(a^2 + b^2)/2$
d. $\pi(a + b)$

50. If the edge of a cube is increased by 30%, by how much is the surface area increased?
a. 13
c. 10
b. 69
d. 7

51. A conical vessel has a height of 24 cm and a base diameter of 12 cm. It holds water to a depth of 18 cm above its vertex. Find the volume of its content in cc.
a. 387.4
c. 383.5
b. 381.7
d. 385.2

52. The slant height of a right circular cone is 5m long. The base diameter is 6m. What is the lateral area in sq. m?
a. 37.7
c. 43
b. 47
d. 40.2

53. What is the surface are of a sphere whose volume is 36 cu. m.?
a. 52.7 sq. m.
c. 48.7 sq. m.
b. 59.3 sq. m.
d. 46.6 sq. m.

54. How many terms of progression 3, 5, 7, 9, ... must be taken in order that their sum will be 2600?
a. 51
c. 50
b. -52
d. 52

55. There are 4 geometric between 3 and 729. Find the sum of the G.P. ***3 x x x x 729***
a. 91
c. 999
b. 1092
d. 1001

56. Find the 12^{th} term of the series 6, 3, 2.
    a. 1/3 c. 1/6
    b. 1 d. 1/2
57. Find P(5,3):
    a. 5 c. 15
    b. 60 d. 41
58. Find C(8,5):
    a. 56 c. 80
    b. 40 d. 26
59. Find C(8,8):
    a. 64 c. 1
    b. 40 d. 80
60. How many ways can you arrange 10 books on a bookshelf that has space for only 5 books?
    a. 262 c. 30240
    b. 252 d. 30220
61. A certain state lottery consists of selecting a set of 6 numbers randomly from a set of 49 numbers. To win the lottery, you must select the correct set of six numbers. How many possible lottery tickets are there?
    a. 10,000 c. 13,983,816
    b. 5,000,000 d. 1.0068×10^{10}
62. What is the probability of rolling a sum of 3 when rolling a pair of dice?
    a. 1/2 c. 1/6
    b. 1/18 d. 1/9
63. What is the probability of rolling a sum of 9 when rolling a pair of dice?
    a. 1/2 c. 1/6
    b. 1/18 d. 1/9
64. Water in the rural areas is often extracted from the underground water source whose free surface is 60 meters below ground level. The water is to be raised 5 meters above the ground by a pump. The diameter of the pipe is 10 cm at the inlet and 15 cm at the exit. Neglecting any heat interaction with the surroundings and frictional heat heating effects, what is the necessary power input to the pump in kW for steady flow of water at the rate of 15 L/s. assume pump efficiency of 74%.
    a. 60 c. 9.565
    b. 65 d. 12.925
65. Find the coordinates of the points P (2, 4) with respect to the translated axis with origin at (1, 3).
    a. (-1, -1) c. (-1, 1)
    b. (1, 1) d. (1, -1)
66. Find the area of triangle whose vertices are A (-3, -1), B (5, 3) and C (2, -8).
    a. 36 c. 38
    b. 31 d. 37
67. Find the distance from the point (5, -3) to the line $7x - 4y - 28 = 0$.
    a. 2.61 c. 2.43

b. 2.36 d. 2.32

68. Find the angle that the line 2y – 9x – 18 = 0 makes with the x-axis.
    a. 74.77° c. 47.77°
    b. 45.21° d. 77.47°
69. One knot is equivalent to _____.
    a. 1 mile c. 1 degree
    b. 6080 feet d. 5280 feet
70. One minute in the Earth surface is equivalent to _____.
    a. 1 mile c. 1 degree
    b. 6080 feet d. 5280 feet
71. $3^{\log_3(-5)}$ = _____.
    a. 1 c. -1
    b. 0 d. undefined
72. If $\log_x(3) = 1/4$, then x =_____.
    a. 81 c. 82
    b. 80 d. 83
73. Simplify: $x^2 x^3$
    a. x^5 c. 1
    b. 0 d. x
74. Simplify: a^{-3} / a^7
    a. $1 / a^{-5}$ c. $1 / a^{10}$
    b. $1 / a^5$ d. 1 / a
75. Simplify: $(x^2 y^3)^3$
    a. x^6y^9 c. x
    b. 0 d. xy
76. Water freezes at _____ in SI unit.
    a. 0°C c. 32°F
    b. 100°C d. 212°F
77. Water boils at _____ in SI unit.
    a. 0°C c. 32°F
    b. 100°C d. 212°F
78. Water freezes at _____ in English unit.
    a. 0°C c. 32°F
    b. 100°C d. 212°F
79. Water boils at _____ in English unit.
    a. 0°C c. 32°F
    b. 100°C d. 212°F
80. 80 psi is equivalent to how many meters of water?
    a. 56.24 c. 54.26
    b. 80.01 d. 81.01
81. The person who proved the millennial “Last Fermat’s Theorem” is from what school?
    a. Cambridge University

b. Harvard University
c. Princeton University
d. Massachusetts Institute of Technology

82. Among the biggest Universities in the U.S., which among the schools below has produced the largest pool of Billionaires?
    a. Cambridge University
    b. Harvard University
    c. Princeton University
    d. Massachusetts Institute of Technology
83. When you combine Matter and Antimatter what will happen?
    a. It will increase its charges
    b. It will produce new type of matter
    c. It will undergo decomposition
    d. It will explode
84. _____ also known as slope.
    a. Slope
    b. Derivative
    c. Integral
    d. Angle of repose
85. What is the eccentricity of ellipse?
    a. Less than one
    b. Equal to one
    c. Greater than one
    d. Equal to zero
86. Derivative of a constant is equal to _____.
    a. Zero
    b. One
    c. Two
    d. Infinite
87. Derivative of **x** is equal to _____.
    a. Zero
    b. One
    c. Two
    d. Infinite
88. One over curvature is equal to _____.
    a. Zero
    b. One
    c. Circle
    d. Radius of Curvature
89. Maxima and Minima are examples of applications of _____.
    a. Differential Calculus
    b. Integral Calculus
    c. Differential Equation
    d. Linear Algebra
90. Other name for linear algerbra:
    a. Algebra
    b. Complex
    c. Matrix
    d. Calculus
91. A type of rectangle with maximum area that can be cut from a circle:
    a. Rectangle
    b. Square
    c. Parallelogram
    d. Rhombus
92. Type of integration, once evaluate, has a definite value:
    a. Equation
    b. Complex No.
    c. Indefinite Integral
    d. Definite Integral
93. The following are the applications of integration techniques, except for _____.
    a. Slope
    b. Plane areas
    c. Length of arc
    d. Solid of revolution
94. 1 lambert is equal to _____.
    a. 3,183.099 cd/m^2
    c. 997.561 cd/m^2

b. 1889.045 cd/m^2 d. 981.048 cd/m^2

95. He is the mathematician who invented Cartesian plane. Who is he?
    a. Rene Descartes c. Michiu Kaku
    b. Isaac Newton d. John Smith
96. Speed is a _____ quantity.
    a. scalar c. real
    b. vector d. imaginary
97. A Greek philosopher known for shouting “Eureka” after nakedly went out his house.
    a. Archimedes c. Herculano
    b. Plato d. Zeus
98. What is the unit of current?
    a. Volts c. Ohms
    b. Amperes d. Watts
99. Type of tax (levied to every individual employee or corporation) which is based on the percentage of his or her wages or income from businesses.
    a. Royalty tax c. Real estate tax
    b. E-VAT d. Income tax
100. Residential houses are considered, from the bank’s point of view, as assets. This misconception is opposed to the belief of a financially-literate person – that is, considered as liability. In what way can you considered it as asset?
    a. When it generates passive income by making it as income-generating facilities
    b. Converting a typical residential house to an apartment, boarding house, etc. which generates income
    c. Converting residential structures into commercial establishment ready for lease
    d. All of the above