Nepal Engineering Council Registration Examination

Model Question for <u>Aerospace/Aeronautical Engineering (AAAE)</u>

Section A (60*1 = 60)

1. Which is not the common type of fit in hole and shaft?
    a) Clearance fit
    b) Transference fit
    c) Transition fit
    d) Interference fit

2. Steel containing 0.15% - 0.45% carbon is called ………..
    a) Mild steel
    b) Dead mild steel
    c) Medium carbon steel
    d) High carbon steel

3. Wrought iron contains ………………….. of iron
    a) 0.0999%
    b) 0.999%
    c) 9.99%
    d) 99.9%

4. The C.G.S. unit of charge is …………..
    a) Coulomb
    b) Erg
    c) Franklin
    d) Biot

5. The temperature of heat produced by the electric arc is of the order of ………….
    a) $6°C – 7°C$
    b) $60°C – 70°C$
    c) $600°C – 700°C$
    d) $6000°C – 7000°C$

6. The type of organization preferred for a steel industry is ……….
    a) Line and staff
    b) Functional
    c) Line, staff and functional
    d) Line

7. The measurement of a thermodynamic property 'temperature' is based on ……………
    thermodynamic law
    a) Zeroth law
    b) First law
    c) Second law

d) Kelvin-plank law

8. Steady state flow application device is ……….
   a) Filling-in of gas cylinder
   b) Throttling valve
   c) Filling-out of gas cylinder
   d) Compressor

9. Entropy of water at $0°C$ is assumed to be ……………
   a) 1
   b) 0
   c) -1
   d) 10

10. Otto cycle is also known as ………….
    a) Constant pressure cycle
    b) Constant temperature cycle
    c) Constant volume cycle
    d) Constant enthalpy cycle

11. The inlet valve of a four-stroke cycle petrol engine remains open for …………..
    a) $30°$
    b) $130°$
    c) $230°$
    d) 300

12. A refrigerant with the highest critical pressure is …………
    a) R-11
    b) R-12
    c) R-22
    d) Ammonia

13. Water pressure at any point is measured with the unit ………….
    a) Bar
    b) Newton
    c) Cusecs
    d) kg

14. The upper surface of weir over which water flows is known as ………….
    a) Crest
    b) Nappe
    c) Sill
    d) Weir-top

15. Bernoulli's theorem deals with the conservation of …………….
    a) Mass

b) Force

c) Momentum

d) Energy

16. Which of the following pipe bends will introduce maximum head loss ……………..

a) 30° bend

b) U bend

c) 45° bend

d) 90° bend

17. Most commonly used hydro turbine in Nepal is ………….

a) Pelton

b) Francis

c) Kaplan

d) Turgo-impulse

18. One horse power of pump is equal to ……………….

a) 75 watt

b) 102 watt

c) 550 watt

d) 746 watt

19. The total momentum of a system of masses (*i.e.* moving bodies) in any direction remains constant, unless acted upon by an external force in that direction. This statement is called ……………

a) Newton's first law of motion

b) Newton's second law of motion

c) Principle of conservation of energy

d) Principle of conservation of momentum

20. Hook's law holds good up to …………

a) Elastic limit

b) Yield point

c) Plastic limit

d) Breaking point

21. The unit of moment of inertia of an area is …………

a) $kg\ m^2$

b) m^4

c) kg/m^2

d) kg/m^4

22. In a reciprocating steam engine, which of the following forms a kinematic link?

a) Cylinder and piston

b) Piston rod and connecting rod

c) Crankshaft and flywheel

d) Flywheel and engine frame

23. In simple harmonic motion (S.H.M.), the ratio of acceleration and displacement is proportional to ………
    a)ω
    b)ω^2
    c)$1/\omega^2$
    d)$\sqrt{\omega}$

24. The distribution of torsion shear stress is uniform in ……….. section.
    a) Parallel
    b) Rectangular
    c) Trapezoidal
    d) Circular

25. The separation of the boundary layer takes place when the pressure gradient is ……
    a. Negative
    b. Constant
    c. Zero
    d. Positive

26. With increase in air-foil thickness, the critical Mach number for an air-foil is likely to …..
    a. Increase
    b. Decrease
    c. Remain unchanged
    d. Be undefined

27. Landing gears fold away during the flight to reduce……
    a. Altitude
    b. Thrust
    c. Drag
    d. Airspeed

28. What is the condition for Kutta and Joukowski theorem?
    a. Pressure and lift
    b. Pressure and drag
    c. Drag and lift
    d. Lift and moment

29. Location of aerodynamic center for low speed airfoil is ………
    a. At half of chord
    b. At quarter chord point
    c. At quarter chord from leading edge
    d. There is no such place

30. What is the shape of the shock wave formed over a cone in a supersonic flow?
    a. Normal shock
    b. Conical shock
    c. Straight shock
    d. Triangular shock

31. Which of the following is a low-cost pavement de-icing mixture?
    a. Carbon mixture
    b. Aluminum mixture
    c. Urea mixture
    d. Quartz mixture

32. The potable water quantity indicator is located …….
    a. Forward of the aft passenger entrance door
    b. Above the fwd passenger entrance door
    c. Above the aft service door
    d. Below the aft service door

33. Which of the following is not the type of fuel tank?
    a. Flap
    b. Integral bladder
    c. Bladder
    d. Discrete

34. Which is the most expensive maintenance check of all?
    a. A-check
    b. B-check
    c. C-check
    d. D-check

35. Who is responsible to review the airworthiness certificate, maintenance records and other required paperwork to verify that the aircraft is worthy?
    a. Pilot
    b. Copilot
    c. Purser
    d. Aircraft Maintenance engineer

36. Which of the following international association is the one that represent an authority for aviation?
    a. CAAN
    b. ICAO
    c. ICAN
    d. DOCA

37. Why does the landing gear retract into the wings and/or fuselage during flight?
    a. To decrease drag
    b. To increase airspeed
    c. To decrease airspeed
    d. To generate more thrust

38. What is lateral torsional buckling?
    a. buckling of beam loaded in plane of its weak axis and buckling about its stronger axis accompanied by twisting
    b. buckling of beam loaded in plane of its strong axis and buckling about its weaker axis accompanied by twisting
    c. buckling of beam loaded in plane of its strong axis and buckling about its weaker axis and not accompanied by twisting
    d. buckling of beam loaded in plane of its weak axis and buckling about its stronger axis and not accompanied by twisting

39. What was added to a pure monocoque structure to support larger, more powerful aircraft?
    a. Skin
    b. Formers
    c. Frames
    d. Longerons

40. The dive speed in v-n diagram represents ……….
    a. maximum dynamic pressure
    b. maximum manifold pressure of supercharger
    c. hydraulic actuator speed limit
    d. rate of climb

41. The safe life of an aircraft is predicted on which of the following?
    a. The number of flying hours elapsed
    b. The number of landings
    c. The number of pressurization cycles elapsed
    d. All of the above

42. Stabilizing tail is also known as …………
    a. Rudder
    b. Empennage
    c. Aileron
    d. Wingtip

43. Which of the following materials is used in making aircraft windows?
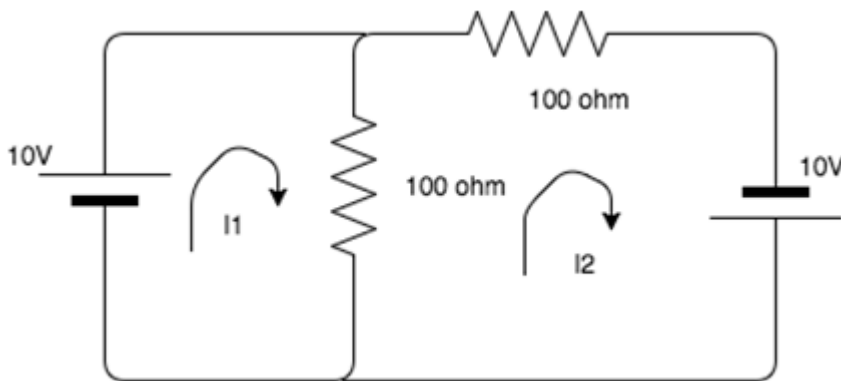   a. Thick glass
    b. Plexiglass

c. Graphite

d. Plane glass

44. Which law is related to slip plane and slip direction?
   a. Schmid's law
   b. Bragg's law
   c. Fick's law
   d. Such a law doesn't exist

45. Which of the following is a high temperature alloy resistant to?
   a. Tensile compression
   b. Tensile elongation
   c. Fatigue
   d. Creep

46. In a sensitive altimeter, the sea-level reference pressure can be adjusted with a ……… knob.
   a. Setting
   b. Calibrating
   c. Adjusting
   d. Pressure

47. GPS user solution depends on which of the following?
   a. Satellite vehicle
   b. Absolute Positioning
   c. Space vehicle
   d. Relative positioning

48. Which of the following cannot be measured in primary radar?
   a. Position of the aircraft
   b. Height of the aircraft
   c. Speed of the aircraft
   d. Direction of the aircraft

49. How many types of gas turbine engines are manufactured?
   a. 1
   b. 2
   c. 4
   d. 10

50. Which of the following is part of a turbine engine?
   a. Compressor
   b. Flap
   c. Aileron
   d. Elevator

51. Flaps are used to ……… the lift.
    a. Increase
    b. Maintain
    c. Nullify
    d. Decrease

52. The tail section is also referred to as……
    a. Cockpit
    b. Rudder
    c. Empennage
    d. Undercarriage

53. The requirements of an Aircraft will fall in ………. phase.
    a. Surface requirement
    b. Preliminary design
    c. Detail design
    d. Conceptual design

54. What is the speed at which the takeoff is aborted when there is an engine failure?
    a. Stall speed
    b. Decision speed
    c. Takeoff speed
    d. Rotational speed

55. Standard dimensions (mm x mm) of A3 drawing sheet is
    a) 11.69×16.54
    b) 29.7×42
    c) 297×420
    d) 420×280

56. Which of the following methods of charging depreciation of an asset has increased amount of depreciation as the age of asset increases
    a) Sum-of-year digit
    b) Sinking fund
    c) Diminishing balance
    d) Straight line

57. The process of optimizing the project's limited resources without extending the project duration is known as
    a) Project crashing
    b) Resource levelling
    c) Resource smoothing
    d) Networking

58. The process of composing/raising the required fund from different sources such as equity, preferred stock, bond and debenture is known as
   a) Capital structure planning
   b) Project financing
   c) Capital budgeting decision
   d) Deducing earning per share

59. In which of the following society, people used to seek their existence on growing plants for their cattle and domestic animals
   a) Pastoral society
   b) Tribal society
   c) Horticultural society
   d) Agricultural society

60. According to Nepal Engineering Council Act, 2055 (Revised, 2079), all engineering academic institutions shall be …………………….. in the Council.
   a) Affiliated
   b) United
   c) Recognized
   d) Associated

Section-B (20*2 = 40)

61. Find the value of the currents I1 and I2.

   a) 0.3, 0.1
   b) -0.1, -0.3
   c) -0.3, -0.1
   d) 0.1, 0.2

62. What is the Eutectic reaction at 1146°C?
   a) L (0.53% C) + δ(0.09% C) → γ(0.17% C)
   b) L (4.3% C) → γ(2.1 % C) + Fe_3C (6.67% C)
   c) γ (0.8 % C) → α (0.025% C) + Fe_3C (6.67% C)
   d) L (0.53% C) + δ(0.09% C) → γ (0.8 % C)

63. The specific volume of a wet steam at 1600°C, 80% quality, $v_f = 0.011$ m/kg and $v_g = 0.3071$ m³/kg is
   a. 1.00
   b. 1.09
   c. 1.25
   d. 0.25

64. In an engine working on an ideal Otto cycle, the temperature at the beginning and at the end of the compression are 27°C and 327°C. What will be the compression ratio? (Assume constant specific heat and its ratio $\gamma = 1.4$)
   a. $2^{2.5}$
   b. $(1/2)^{2.5}$
   c. $(2)^{1/1.4}$
   d. $(1/2)^{1/1.4}$

65. A hydro-turbine with Net head 90m and discharge 10 Cumecs will have the generation output as
   a) 7 MW
   b) 8 MW
   c) 9 MW
   d) 10 MW

66. To lift a water up to 30m head with 10 lit/sec, a centrifugal pump with …. kW motor is needed.
   a) 2 kW
   b) 4kW
   c) 7 kW
   d) 10 kW

67. The resultant of two forces each equal to P and acting at right angles is ………….
   a)$P/\sqrt{2}$
   b)$P/2$
   c)$2\sqrt{2}\,P$
   d)$\sqrt{2}P$

68. Two simply supported beams are of equal length. One carries a central load of *W* and other carries the uniformly distributed load such that total load is *W*. The ratio of maximum deflection in two cases is ………..
   a) 8/5
   b) 8/6
   c) 8/7
   d) 5/4

69. Ram was on the bank of the river and was observing the flow of river. After sometime he got an idea and started imagining certain points in the fluid and when he drew tangent to those points, he got direction of the flow. These lines are called as ………

a. Streamline
b. Streakline
c. Pathline
d. Velocity vector

70. If aspect ratio of wing is 8 and $S=0.1m^2$, then, what will be the span of wing?
    a. 0.89m
    b. 0.89cm
    c. 0.89
    d. 0.89inch

71. Determine the corrections or otherwise of the following Assertion [A] and Reason [R]:
    Assertion [A]: Total fuel CG is located near to the aircraft CG. Reason[R]: Fuel can be
    located at centre, at tip or at tail.
    a. Both [A] and [R] are true and [R] is the correct reason for [A]
    b. Both [A] and [R] are true but [R] is not the correct reason for [A]
    c. [A] is true but [R] is false
    d. [A] is false but [R] is true

72. How is windshield de-icing accomplished?
    a. Isopropyl alcohol sprayed from a heated and pressurized bottle in the nose below the
       center windscreen
    b. Hot exhaust gases ducted to the center and side windshields from the third stage bleed
       air from both engines
    c. By an energized heater element embedded in the windshield center panel glass and
       laminated to the inboard side of the panel's outer layers
    d. By a small heater element centered in the lower portion of each windshield panels that is
       held in place by a spring-clip

73. If an aircraft is cruising with lift of 150N, what would be the weight of aircraft?
    a. 0.150KN
    b. 150KN
    c. 123N
    d. 15KN

74. In Mohr's circle method, compressive direct stress is represented on ……………..
    a. Positive x-axis
    b. Positive y-axis
    c. Negative x-axis
    d. Negative y-axis

75. For pane (1 1 0) of BCC having a lattice parameter 'a', planar atomic density is given by?
    a. $3.690/a^2$
    b. $2.312/a^2$

c. $1.414/a^2$

d. $0.580/a^2$

76. Which one of the following is not true with respect to the FBW system?

a. FBW is not necessary for every aircraft

b. FBW makes an aircraft stealthy

c. FBW provides better control and carefree flying

d. FBW makes aircraft with low stability fly smoothly

77. If damping ratio is 0.05 then, find the lift to drag ratio, if 2-degree phugoid approximation is considered.

a. 14.14

b. 20

c. 25

d. 0.05

78. An aircraft is flying with fuselage having length of 1.5m and fineness ratio of 15. At which maximum diameter fuselage should be designed?

a. 0.1m

b. 0.25m

c. 5m

d. 20.5m

79. Effective monthly interest rate will be …………., if nominal interest rate of 10% accounted for continuous compounding

a) 1%

b) 0.84%

c) 1.2%

d) 2%

80. By considering following activities of a project, the project duration will be

Activity	A	B	C	D	E
Immediate predecessors	-	-	-	C	A, B, D
Duration (days)	4	5	3	7	5

a) 9 days

b) 10 days

c) 15 days

d) 24 days