SECTION-A

Answer all the questions each one carries one mark. **20*1=20 M**

1) Which of the following is most elastic
   a) rubber b) glass c) steel d)copper

2) The Young's modulus of wire of length L and radius r is Y. If the length is reduced to L/2 and radius r/2, then its young's modulus will be
   a) Y/2 b) Y c) 2Y d) 4Y

3) A wire is stretched by a certain amount under a load. If the load and radius both are increased to 4 times, then find the stretch caused in the wire
   a) $\Delta L/2$ b) $\Delta L/4$ c) $\Delta L/6$ d)$\Delta L/8$

4) A steel cable with a radius of 1.5 cm supports a chairlift at a ski area. If the maximum stress is not to exceed 10^8 N/m^2, then what is the maximum load the cable can support
   a) $5*10^4$ N b) $3*10^4$ N c)$7*10^4$ N d)$9*10^4$ N

5) Two wires of same radius and material have their lengths in the ratio 1:2. If they are stretched by same force, the strain produced in the two wires will be in the ratio
   a) 1:1 b)1:2 c)2:1 d)1:4

6) Two wires of the same length and radius are joined end to end and loaded. If the Young's modulus of the material of the two wires are Y_1 and Y_2, the combination that behaves as a single wire of young's modulus will be
   a) $Y_1 + Y_2$ b) $Y_1 * Y_2$ c)$Y_1 - Y_2$ d) $2Y_1Y_2 / (Y_1 + Y_2)$

7) A sphere contracts in volume by 0.01% when taken to the bottom of leg 1 km deep. If the density of water is 1 gm/cc, the bulk modulus of water is
   a) $9.8*10^5$ N/m^2 b) $9.8*10^8$ N/m^2 c)$9.8*10^{10}$ N/m^2 d) $9.8*10^6$ N/m^2

8) How much should be pressure on a liter of water be changed to compress it by 0.10% (Bulk modulus of water is $2.2*10^9$ N/m^2)
   a) $220*10^5$ N/m^2 b)$22*10^5$ N/m^2 c) $2.2*10^5$ N/m^2 d) None

9) Pascal's law states that pressure in a fluid at rest is the same at all points, if
   a) they are at the same height
   b) they are having same weight
   c) they are carrying same mass
   d) both a and b

10) In hydraulic lift the compressed air exert a force F_1 on a small piston having a radius of 5 cm . This pressure is transmitted to a second piston of radius 15 cm. If the mass of the car to be lifted is 1350 Kg calculate F_1 (Take g=9.8 m/s^2)
   a) 1470 N b) 1500 N c) 1420 N d) 1380 N

11) Bernoulli's theorem is a consequence of
   a) conservation of mass c) conservation of energy
   b) conservation of linear momentum d) conservation of angular momentum

12) Viscosity of liquids
   a) increases with increase of temperature c) is independant of temperature
   b) decreases with increase in temperature d) None

13) If $R_e > 3000$, then the flow is
   a) turbulent b) stream line c) both a and b d) None

14) If temperature increases, the surface tension of a liquid
a) increases b) decreases c) remains same d) first increases then decreases

15) If work done by an exernal agent to form a bubble of radius R is W. Then how much energy is required to increase its radius to 3R
a) W b) 3W c) 8 W d) 9W

16) The work done in blowing a soap bubble of radius 3.5 cm is ($S= 3*10^{-2}$ N/m)
a) $0.66*10^{-4}$ Nm b) $3.5*10^{-4}$ Nm c) $1.32*10^{-4}$ Nm d) $2.6*10^{-4}$ Nm

17) A liquid does not wet the solid surface if angle of contact is
a) 0^0 b) 45^0 c) 90^0 d) $>90^0$

18) Find the depression of the miniscus in the capillary tube of diameter 0.4 mm dipped in a beaker containing mercury (mercury density $=13.6*10^3$ Kg/m^3 , S=0.49 N/m and angle of contact = 135^0)
a) - 0.024 m b) – 0.0024 m c) -0.2 m d) -0.001 m

19) A 20 cm long capillary tube is dipped in water. The water rises upto 8 cm. If the entire arrangement is put in a freely falling elevator then the length of water column in the capillary tube will be
a) 4 cm b) 8 cm c) 10 cm d) 20 cm

20) Excess pressure inside a soap bubble
a) 2S/r b) 4S/r c) 8S/r d) None

SECTION-B

Answer any two of the following each one carries five marks. **2*5=10 M**

1.
a) Draw and expalin about the stress-strain curve in detail. (3 M)
b) A wire of length L and radius r is rigidly fixed at one end. On stretching the other end of the wire with a force F, the increase in its length is l. If another wire of same material but of length 2L and radius 2r is stretched with a force of 2F, then find the increase in its legth. (2 M)

2.
a) State and prove Bernoulli's principle. (3M)
b) A horizontal pipe of non-uniform cross-section allows water to flow through it with a velocity of 1 m/s when pressure is 50 kPa at a point. If the velocity of flow has to be 2 m/s at some other point, what will the pressure at that point? (2 M)

3.
a) Derive the formula for velocity of fluid flow at the wide open end of Venturi meter with neat diagram. (3M)
b) Derive the formula for gauge pressure for open tube manometer with neat diagram.(2 M)

4.
a) Derive the formula for pressure difference of a liquid drop, cavity and bubble during the expansion of radius by Δr. (3 M)
b) Write the formula for efflux speed of water in Toricelli's law. From that formula show that speed of efflux of water is equals to freely falling body. (2 M)