



Timing : 90 min

M.M: 100

# **CENTURION DEFENCE ACADEMY**

## **AIRFORCE – (X&Y GROUP)**

Direction : (1-3) Read the following passage and answer the questions given below.

Passage

Many Sociologists have argued that there is a functional relationship between education and economic system. They point to the fact that mass formal education began in industrial society and is an established part of all industrial societies. They note that the expansion of the economies of industrial societies is accompanied by a corresponding expansion of their educational systems. They explain this correspondence in terms of the needs of industry for skilled and trained manpower, needs which are met by the educational system, thus the provision of mass elementary education in Britain in 1870 can be seen as a response to the needs of industry for a literate and numerate work-force at a time when industrial processes were becoming more. Complex and the demand for technical skills was steadily growing.

1. By 'functional relationship' is meant
  - (a) a short-term relationship
  - (b) practical and utilitarian relationship
  - (c) temporary arrangement
  - (d) close and unbreakable relationship
2. The industry needs a literate workforce because
  - (a) its expansion needs sound learning
  - (b) it relies heavily on expertise
  - (c) it promotes a competitive spirit
  - (d) its operations need intricate technical knowledge
3. The observations of the Sociologists are based on a study of
  - (a) the statistical data available in a historical context
  - (b) the correlation between industry and education in a historical context

- (c) economic system of the 19th century
- (d) growth of industry in the 19th century

4. Give one word substitute.  
One who is irreverent towards God.
  - (a) Criminal
  - (b) Atheist
  - (c) Theist
  - (d) Blasphemous
5. Give one word substitute.  
The state of being unmarried.
  - (a) Dilettante
  - (b) Bigamy
  - (c) Celibacy
  - (d) Celibate
6. Identify the correct choice.  
Even in today's modern society, people ..... god to bring rains.
  - (a) Provoke
  - (b) Appeal
  - (c) Evoke
  - (d) Propitiate
7. Select the correct verb.  
When I ..... my bath, I went to have a sleep.
  - (a) had taken
  - (b) took
  - (c) have taken
  - (d) take
8. Identify the correct preposition.  
When I heard of my grandmother's death, I burst ..... tears.
  - (a) at
  - (b) upon
  - (c) into
  - (d) in
9. Choose the correct word.
  - (a) Begining
  - (b) Beggining
  - (c) Beginning
  - (d) Biginning
10. Fill in the blank with correct article.  
..... sick dog died yesterday.
  - (a) An
  - (b) The
  - (c) A
  - (d) v
11. Identify the antonym of the given word.  
'Reprimand'
  - (a) Praise
  - (b) Encourage
  - (c) Recommend
  - (d) Release

- 12.** Identify the antonym of the given word.  
'Unsullied'  
(a) Visible (b) Foul  
(c) Stainless (d) Strong
- 13.** Identify the Indirect Speech.  
Sarita said to me, "I will do it now or never."  
(a) Sarita told me that she would do then or never  
(b) Sarita told me that I would do it then or never  
(c) Sarita told me that she would do it now or never  
(d) Sarita told me that she will do that now or never
- 14.** Change the Voice.  
Somebody told me that there had been an explosion in the Town Hall.  
(a) I was told by somebody about the explosion in the Town Hall  
(b) I was told about the explosion in the Town Hall  
(c) I was informed that there was an explosion in the Town Hall  
(d) I was told by somebody that there had been an explosion in the Town Hall
- 15.** Identify the synonym of the given word.  
'Belittle'  
(a) Diminish (b) Mock  
(c) Disparage (d) Scoff
- 16.** Identify the synonym of the given word.  
'Credulous'  
(a) Trusting (b) Interest  
(c) Joyous (d) Interpret
- 17.** Identify the meaning of the given idioms/phrases.  
To wrangle over an ass's shadow.  
(a) To do something funny  
(b) To quarrel over the possession of an ass  
(c) To waste time on pretty things  
(d) To quarrel over trifles
- 18.** Identify the incorrect part.  
I have done my best (a)/ the whole thing is now (b)/ in the laps of the Gods. (c)/ No error (d)  
(a) A (b) B  
(c) C (d) D
- 19.** Form an adjective from the given word.  
'Senses'  
(a) The senses (b) Senses  
(c) Senser (d) Sensible
- 20.** Give the plural of the given word.  
'Goose'

- (a) Geeses (b) Goose  
(c) Goosee (d) Geese

- 21.** A thermally insulated vessel contains an ideal gas of molecular mass  $M$  and ratio of specific heat  $\gamma$ . It is moving with speed  $v$  and is suddenly brought to rest. Assuming no heat is lost to the surroundings, its temperature increases by  

$$\frac{Mv^2}{2(\gamma - 1)R}$$

$$\frac{(\gamma - 1)Mv^2}{2\gamma R}$$

$$\frac{\gamma Mv^2}{2R}$$

$$\frac{(\gamma - 1)Mv^2}{2R}$$
 (a) A (b) B  
(c) C (d) D
- 22.** A cylinder of height 20m is completely filled with water. The velocity of efflux of water (in m/s) through a small hole on the side wall of the cylinder near its bottom is  
 10  
 20  
 25.5  
 5
- 23.** For the specific heat of 1 mole of an ideal gas at constant pressure ( $C_p$ ) and at constant volume ( $C_v$ ) which is correct?  
 $C_p = \frac{5}{2}R$   
 $C_v = \frac{7}{2}R$   
 $H_2$  has very small values of  $C_p$  and  $C_v$   
 $C_p - C_v = 1.99$  cal/mole-K for  $H_2$   
 $C_p - C_v = H_2$   $\times$  1.99 cal/mole-K
- 24.** Melting point of ice-  
 (a) increases with increasing pressure /  
 (b) decreases with increasing pressure /

- (c) is independent of pressure /  $\square\square\square\square \square\square$   
 $\square\square\square\square\square\square\square\square \square\square$   
 (d) is proportional to pressure /  $\square\square\square\square \square\square$   
 $\square\square\square\square\square\square\square\square \square\square$

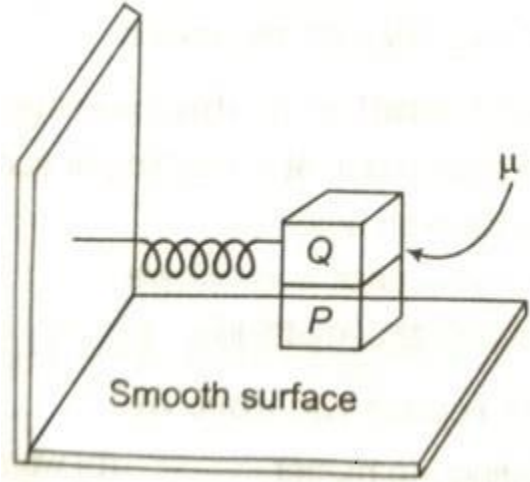
**25.** A constant torque acting on a uniform circular wheel changes its angular momentum from  $A_0$  to  $4A_0$  in  $45^\circ$  the magnitude of this torque is  $\square\square \square\square\square\square \square\square\square\square\square\square\square\square \square\square\square\square \square\square \square\square \square\square\square\square$   
 $\square\square\square\square\square\square \square\square \square\square\square\square\square\square\square\square \square\square \square\square\square\square \square\square\square\square\square\square \square\square\square\square$   
 $A_0 \square\square 4A_0 \square\square\square \square\square\square \square\square\square\square \square\square, 45^\circ \square\square\square \square\square$   
 $\square\square\square\square\square\square \square\square \square\square\square\square\square\square \square\square-$   
 (a)  $\frac{2}{3} A_0$  (b)  $12 A_0$   
 (c)  $A_0$  (d)  $\frac{3}{4} A_0$

**26.** A vessel contains 110 g of water. The heat capacity of the vessel is equal to 10g of water. The initial temperature of water in vessel is  $10^\circ\text{C}$ . If 220 g of hot water at  $70^\circ\text{C}$  is poured in the vessel, the final temperature neglecting radiation loss, will be  $\square\square \square\square\square\square\square \square\square\square 110 \square\square\square\square\square \square\square\square\square \square\square \square\square\square\square\square$   
 $\square\square \square\square\square\square\square \square\square\square\square\square\square 10 \square\square\square\square\square \square\square\square\square \square\square \square\square\square\square\square$   
 $\square\square\square \square\square\square\square \square\square\square \square\square\square\square \square\square \square\square\square\square\square\square\square\square \square\square\square\square\square\square$   
 $10^\circ\text{C} \square\square\square \square\square\square 70^\circ\text{C} \square\square 220 \square\square\square\square\square \square\square\square\square \square\square\square\square$   
 $\square\square\square\square\square \square\square\square \square\square\square\square \square\square\square \square\square, \square\square \square\square\square\square\square\square \square\square$   
 $\square\square\square\square \square\square \square\square\square\square\square\square \square\square\square\square \square\square\square\square \square\square\square\square\square\square$   
 $\square\square\square\square-$   
 (a)  $70^\circ\text{C}$  (b)  $80^\circ\text{C}$   
 (c)  $50^\circ\text{C}$  (d)  $60^\circ\text{C}$

**27.** At room temperature, the rms speed of the molecules of certain diatomic gas is found to be 1930 m/s. The gas is  $\square\square\square\square \square\square \square\square\square\square\square\square \square\square, \square\square\square \square\square\square\square\square\square\square\square\square\square \square\square\square$   
 $\square\square \square\square\square\square\square \square\square \square\square\square\square \square\square\square\square\square \square\square\square \square\square\square 1930$   
 $\square\square/\square\square\square\square\square\square \square\square\square \square\square\square\square \square\square\square \square\square\square \square\square-$   
 (a)  $\text{H}_2$  (b)  $\text{F}_2$   
 (c)  $\text{O}_2$  (d)  $\text{Cl}_2$

**28.** A block P of mass  $m$  is placed on a frictionless horizontal surface. Another block Q of same mass is kept on P and connected to the wall with the help of a spring of spring constant  $k$  as shown in the figure.  $\mu_s$  is the coefficient of friction between P and Q. The blocks move together performing simple harmonic motion of amplitude  $A$ . The maximum value of the friction force between P and Q is  $\square\square\square\square\square\square\square\square M \square\square \square\square \square\square\square\square P \square\square \square\square\square\square\square \square\square\square\square$   
 $\square\square\square\square\square\square \square\square\square \square\square \square\square\square \square\square\square \square\square\square \square\square\square$   
 $\square\square\square\square\square\square\square\square \square\square \square\square \square\square \square\square\square\square Q, P \square\square \square\square\square \square\square\square$   
 $\square\square \square\square \square\square\square\square\square \square\square \square\square\square\square\square \square\square\square \square\square \square\square \square\square\square\square\square\square\square$   
 $\square\square \square\square\square \square\square \square\square\square\square \square\square\square\square\square\square\square k \square\square\square\square\square \square\square\square$   
 $\square\square\square\square\square\square \square\square\square \square\square \mu_s, P \square\square Q \square\square \square\square\square \square\square\square\square\square$   
 $\square\square \square\square\square\square\square \square\square\square \square\square\square\square \square\square\square\square \square\square\square\square A \square\square \square\square\square$

$\square\square\square\square \square\square \square\square\square\square\square\square\square \square\square\square \square\square \square\square \square\square\square\square$   
 $\square\square\square\square P \square\square Q \square\square \square\square\square \square\square\square\square\square \square\square \square\square \square\square\square\square\square$   
 $\square\square\square \square\square-$



- (a)  $kA$  (b)  $kA/2$   
 (c) zero (d) zero

**29.** A simple pendulum is executing simple harmonic motion with a time period  $T$ . If the length of the pendulum is increased by 21%, the percentage increase in the time period of the pendulum of increased length is  $\square\square \square\square\square\square\square \square\square\square\square\square\square\square \square\square\square \square\square\square \square\square \square\square\square$   
 $\square\square \square\square\square\square\square\square\square \square\square\square \square\square \square\square\square\square\square\square\square \square\square$   
 $\square\square\square \square\square\square \square\square\square\square\square\square\square \square\square \square\square\square\square\square 21\%$   
 $\square\square\square \square\square\square \square\square, \square\square \square\square\square\square \square\square\square \square\square\square\square\square \square\square$   
 $\square\square\square\square\square\square\square \square\square \square\square\square \square\square\square \square\square\square\square\square\square$   
 $\square\square\square\square\square \square\square\square\square \square\square-$   
 (a) 10% (b) 21%  
 (c) 30% (d) 50%

**30.** A body at rest breaks up into 3 parts. If 2 parts having equal masses fly off perpendicularly each after with a velocity of 12 m/s, then the velocity of the third part which has 3 times mass of each part is  $\square\square\square\square \square\square \square\square \square\square\square 3 \square\square\square\square\square \square\square\square \square\square\square \square\square\square$   
 $\square\square\square \square\square\square \square\square\square\square\square\square\square\square \square\square\square\square 2 \square\square\square 12$   
 $\square\square\square\square/\square\square\square\square\square \square\square \square\square\square \square\square \square\square\square \square\square\square\square\square\square$   
 $\square\square \square\square\square \square\square\square\square\square\square \square\square\square \square\square\square\square \square\square\square\square \square\square\square, \square\square$   
 $\square\square\square\square \square\square\square \square\square \square\square\square \square\square\square\square\square \square\square\square\square\square\square$   
 $\square\square\square \square\square 3 \square\square\square\square \square\square\square\square\square\square\square \square\square, \square\square\square\square \square\square-$   
 (a)  $4\sqrt{2}$  m/s at an angle of  $45^\circ$  from each body  $\square\square\square\square\square\square\square \square\square\square\square \square\square 45^\circ \square\square \square\square\square \square\square 4\sqrt{2}$   
 $\square\square/\square\square$   
 (b)  $24\sqrt{2}$  m/s at an angle of  $135^\circ$  from each body  $\square\square\square\square\square\square\square \square\square\square\square \square\square 135^\circ \square\square \square\square\square \square\square$   
 $24\sqrt{2} \square\square/\square\square$

- (c)  $6\sqrt{2}$  m/s at  $135^\circ$  from each body  
 (d)  $4\sqrt{2}$  m/s at  $135^\circ$  from each body

**31.** One mole of an ideal gas expands at a constant temperature of 300 K from an initial volume of 10 L to a final volume of 20 L. The work done in expanding the gas is ( $R = 8.31$  J / mole-K)

- (a) 750 J / (b) 1728 J  
 (c) 1500 J / (d) 3456 J

**32.** A particle moves in a straight line with retardation proportional to its displacement. Its loss of kinetic energy for any displacement  $x$  is proportional to

- (a)  $x^2$  (b)  $e^x$   
 (c)  $x$  (d)  $\log_e x$

**33.** At what temperature the molecules of nitrogen will have the same rms velocity as the molecules of oxygen at  $127^\circ\text{C}$ ?

- (a)  $77^\circ\text{C}$  (b)  $350^\circ\text{C}$   
 (c)  $273^\circ\text{C}$  (d)  $457^\circ\text{C}$

**34.** A student performs an experiment to determine the Young's modulus of a wire, exactly 2 m long, by Searle's method. In a particular reading, the student measures the extension in the length of the wire to be 0.8 mm with an uncertainty of  $\pm 0.5$  mm at a load of exactly 1.0 kg. The student also measures the diameter of the wire to be 0.4 mm with an uncertainty of  $\pm 0.01$  mm. Take  $g = 9.8$  m/s<sup>2</sup> (exact). The Young's modulus obtained from the reading is

- (a)  $(2.0 \pm 0.3) \times 10^{11}$  N/m<sup>2</sup>  
 (b)  $(2.0 \pm 0.2) \times 10^{11}$  N/m<sup>2</sup>  
 (c)  $(2.0 \pm 0.1) \times 10^{11}$  N/m<sup>2</sup>  
 (d)  $(2.0 \pm 0.05) \times 10^{11}$  N/m<sup>2</sup>

- (a)  $K/l = \text{constant}$   
 (b)  $K^2/l = \text{constant}$   
 (c)  $K/l^2 = \text{constant}$   
 (d)  $Kl = \text{constant}$

**35.** According to the experiment of Ingenhousz, the relation between the thermal conductivity of a metal rod is  $K$  and the length of the rod whenever the wax melts is

- (a)  $4.2$  yr / (b)  $2.8$  yr  
 (c)  $5.6$  yr / (d)  $8.4$  yr

**36.** The radius of orbit of a planet is two times that of the Earth. The time period of planet is

- (a) The internal energy changes in all processes  
 (b) Internal energy and entropy are state functions  
 (c) The change in entropy can never be zero  
 (d) The work done in an adiabatic process is always zero

**37.** Which of the following statements is correct for any thermodynamic system?

- (a) A spherical solid ball of volume  $V$  is made of a material of density  $\rho_1$ . It is falling through a liquid of density  $\rho_2$  ( $\rho_2 < \rho_1$ ). Assume that the liquid applies a viscous force on the ball that is proportional to the square of its speed  $v$ , i.e.,  $F_{\text{viscous}} = -kv^2$  ( $k > 0$ ). The terminal speed of the ball is

- (a)  $V$   
 (b)  $\rho_1$

$\rho_2 (\rho_2 < \rho_1)$  ...  
 $-kv^2 (k > 0)$  ...

A)  $\frac{Vg\rho_1}{k}$  B)  $\sqrt{\frac{Vg\rho_1}{k}}$  C)  $\frac{Vg(\rho_1 - \rho_2)}{k}$  D)  $\sqrt{\frac{Vg(\rho_1 - \rho_2)}{k}}$

- (a) A (b) B  
 (c) C (d) D

**39.** Consider a uniform square plate of side 'a' and mass 'm'. The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corners is

... 'a' ... 'm' ...

- (a)  $\frac{1}{12} ma^2$  (b)  $\frac{7}{12} ma^2$   
 (c)  $\frac{2}{3} ma^2$  (d)  $\frac{5}{6} ma^2$

**40.** Two bodies of masses m and 4 m are placed at a distance r. The gravitational potential at a point on the line joining them, where the gravitational field is zero, is

... m ... 4 m ... r ...

- (a) zero / ... (b)  $-4 \frac{Gm}{r}$   
 (c)  $-6 \frac{Gm}{r}$  (d)  $-9 \frac{Gm}{r}$

**41.** A thin horizontal circular disc is rotating about a vertical axis passing through its centre. An insect is at rest at a point near the rim of the disc. The insect now moves along a diameter of the disc to reach other end. During the journey of the insect, the angular speed of the disc

... remains unchanged ... continuously decreases ... continuously increases ... first increases and then decreases ...

- (a) remains unchanged ...  
 (b) continuously decreases ...  
 (c) continuously increases ...  
 (d) first increases and then decreases ...

**42.** A body of mass 4 kg moving with velocity 12 m/s collides with another body of mass 6 kg at rest. If two bodies stick together after collision, then the loss of kinetic energy of system is

... 4 ... 12 ... 6 ...

- (a) zero / ... (b) 288 J / ...  
 (c) 172.8 J / ... (d) 144 J / ...

**43.** Which of the following is the correct device for the detection of thermal radiation?

... Constant volume thermometer / ...  
 ... Liquid-in-glass thermometer / ...  
 ... Six's maximum and minimum thermometer / ...  
 ... Thermopile / ...

- (a) Constant volume thermometer / ...  
 (b) Liquid-in-glass thermometer / ...  
 (c) Six's maximum and minimum thermometer / ...  
 (d) Thermopile / ...

**44.** An object weight 72 N on Earth. Its weight at a height of R/2 from Earth is

... 72 ... R/2 ...

- (a) 32 N (b) 56 N  
 (c) 72 N (d) Zero / ...

**45.** At which temperature the speed of sound in hydrogen will be same as that of speed of sound in oxygen at 100°C

... 100°C ...

- (a) -148° C (b) -212.5° C  
 (c) -317.5° C (d) -249.7° C

**46.** The solution of equation  $\cos^2 \theta + \sin \theta + 1 = 0$  lies in the interval

...  $\cos^2 \theta + \sin \theta + 1 = 0$  ...

A)  $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$  B)  $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$  C)  $\left(-\frac{3\pi}{4}, \frac{5\pi}{4}\right)$  D)  $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$

- (a) A (b) B  
 (c) C (d) D

**47.** The number of real roots of the equation  $e^{\sin x} - e^{-\sin x} - 4 = 0$  are

...  $e^{\sin x} - e^{-\sin x} - 4 = 0$  ...

- (a) 1  
 (b) 2  
 (c) infinite /  $\infty$   
 (d) None of these /  $\text{None}$

48.  $x = 1 + a + a^2 + \dots \infty, (|a| < 1)$ ,  
 $y = 1 + b + b^2 + \dots \infty, (|b| < 1)$ ,  
 Then, the value of  $1 + ab + a^2b^2 + \dots \infty$  is  
 $\frac{xy}{x+y-1}$  A)  $\frac{xy}{x+y-1}$  B)  $\frac{xy}{x+y+1}$  C)  $\frac{xy}{x-y-1}$  D)  $\frac{xy}{x-y+1}$

- (a) A (b) B  
 (c) C (d) D

49. Let a, b, c be such that  $b(a+c) \neq 0$ . If  
 $\begin{vmatrix} a & a+1 & a-1 \\ -b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^n c \end{vmatrix} = 0$ ,

$$\begin{vmatrix} a & a+1 & a-1 \\ -b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^n c \end{vmatrix} = 0,$$

then the value of n is

- (a) zero / 0  
 (b) any even integer /  $\text{any even integer}$   
 (c) any odd integer /  $\text{any odd integer}$   
 (d) any integer /  $\text{any integer}$

50.  $\cos^4 \theta - \sin^4 \theta$  is equal to  
 $\cos^4 \theta - \sin^4 \theta$   
 (a)  $1 - 2 \sin^2 (\theta/2)$  (b)  $2 \cos^2 \theta - 1$   
 (c)  $1 + 2 \sin^2 (\theta/2)$  (d)  $1 + 2 \cos^2 \theta$

51. If roots of equation  $x^2 + kx + 12 = 0$  are such that  $\alpha - \beta = 1$ , then the value of k is  
 $x^2 + kx + 12 = 0$   
 $\alpha - \beta = 1, k$   
 A)  $\pm 6$  B)  $\pm 7$  C)  $\pm 2$  D)  $\pm 9$   
 (a) A (b) B  
 (c) C (d) D

52. The slope of the normal at the point  $(at^2, 2at)$  of the parabola  $y^2 = 4ax$  is  
 $y^2 = 4ax$  at  $(at^2, 2at)$   
 (a)  $1/t$  (b)  $t$   
 (c)  $-t$  (d)  $-1/t$

53. If in  $\Delta ABC, 2b^2 = a^2 + c^2$ , then  $\frac{\sin 3B}{\sin B}$  is equal to  
 $\Delta ABC, 2b^2 = a^2 + c^2, \frac{\sin 3B}{\sin B}$

B  $\frac{c^2 - a^2}{2ca}$  A)  $\frac{c^2 - a^2}{2ca}$  B)  $\frac{c^2 - a^2}{ca}$  C)  $\left(\frac{c^2 - a^2}{ca}\right)^2$  D)  $\left(\frac{c^2 - a^2}{2ca}\right)^2$   
 (a) A (b) B  
 (c) C (d) D

54. If A, B, C be three sets such that  $A \cup B = A \cup C$  and  $A \cap B = A \cap C$ , then  
 $A, B, C, A \cup B = A \cup C, A \cap B = A \cap C$   
 (a)  $A = B$  (b)  $B = C$   
 (c)  $A = C$  (d)  $A = B = C$

55. The intercept on the line  $y = x$  by the circle  $x^2 + y^2 - 2x = 0$  is AB, equation of the circle on AB as a diameter is  
 $x^2 + y^2 - 2x = 0, y = x$   
 AB  
 (a)  $x^2 + y^2 + x - y = 0$   
 (b)  $x^2 + y^2 - x + y = 0$   
 (c)  $x^2 + y^2 + x + y = 0$   
 (d)  $x^2 + y^2 - x - y = 0$

56. A parabola has the origin as its focus and the line  $x = 2$  as the directrix. Then, the vertex of the parabola is at  
 $x = 2$   
 (a) (1, 0) (b) (0, 1)  
 (c) (2, 0) (d) (0, 2)

57. If  $\left|z - \frac{4}{z}\right| = 2$ , then the maximum value of  $|z|$  is equal to  
 $\left|z - \frac{4}{z}\right| = 2, |z|$   
 (a)  $\sqrt{3} + 1$  (b) 2  
 (c)  $\sqrt{5} + 1$  (d)  $2 + \sqrt{2}$

58. The pole of the straight line  $9x + y - 28 = 0$  with respect to circle  $2x^2 + 2y^2 - 3x + 5y - 7 = 0$ , is  
 $9x + y - 28 = 0, 2x^2 + 2y^2 - 3x + 5y - 7 = 0$   
 (a) (3, 1) (b) (1, 3)  
 (c) (3, -1) (d) (-3, 1)

59. Let  $\alpha_1, \alpha_2, \alpha_3, \dots$  be terms of an AP.  
 $\frac{\alpha_1 + \alpha_2 + \dots + \alpha_p}{\alpha_1 + \alpha_2 + \dots + \alpha_q} = \frac{p^2}{q^2}, p \neq q$   
 then  $\frac{\alpha_6}{\alpha_{21}}$  equals  
 $\alpha_1, \alpha_2, \alpha_3, \dots$



$$\frac{a_1 + a_2 + \dots + a_p}{a_1 + a_2 + \dots + a_q} = \frac{p^2}{q^2}, p \neq q$$

- $a_{6/21}$      -  
 (a)  $41/11$  (b)  $7/2$   
 (c)  $2/7$  (d)  $11/41$

- 60.** Period of  $\sin^2 x$  is  
 $\sin^2 x$       -  
 (a)  $\pi$  (b)  $2\pi$   
 (c)  $\pi/2$  (d) None of these /

- 61.** If  $z = x + iy$  and  $\omega = 1 - iz/z - i$ , then  $|\omega| = 1$  show that in complex plane  
 $z = x + iy$   $\omega = 1 - iz/z - i$ ,  $|\omega| = 1$   
     -  
 (a)  $z$  will be at imaginary axis  $z$       -  
           -  
 (b)  $z$  will be at real axis  $z$             -  
 (c)  $z$  will be a unity circle  $z$             -  
 (d) None of the above            -

- 62.** Which is true in the following?  
           -  
 (a)  $a \cos A + b \cos B + c \cos C = R \sin A \sin B \sin C$   
 (b)  $a \cos A + b \cos B + c \cos C = 2 R \sin A \sin B \sin C$   
 (c)  $a \cos A + b \cos B + c \cos C = 4 R \sin A \sin B \sin C$   
 (d)  $a \cos A + b \cos B + c \cos C = 8 R \sin A \sin B \sin C$

- 63.** If  $x + 1/x = 2 \cos \theta$ , then  $x^2 + 1/x^2$  is equal to  
 $x + 1/x = 2 \cos \theta$     $x^2 + 1/x^2$       -  
 (a)  $1/2 \cos \theta$  (b)  $2 \cos 2 \theta$   
 (c)  $2 \cos 3 \theta$  (d)  $\cos \theta$

- 64.** The locus of the mid-point of the distance between the axes of the variable line  $x \cos \alpha + y \sin \alpha = p$ , where  $p$  is constant, is  
 $x \cos \alpha + y \sin \alpha = p$             -  
           -  
 p            -  
 A)  $x^2 + y^2 = 4p^2$  B)  $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$  C)  $x^2 + y^2 = \frac{4}{p^2}$  D)  $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$   
 (a) A (b) B  
 (c) C (d) D

- 65.** If the roots of  $x^2 - bx + c = 0$  are two consecutive integers, then  $b^2 - 4c$  is

- $x^2 - bx + c = 0$            -  
           -  
 (a) 1 (b) 2  
 (c) 3 (d) 4

- 66.** The value of  $\sqrt{e}$  will be  
 $\sqrt{e}$       -  
 (a) 1.648 (b) 1.547  
 (c) 1.447 (d) 1.348

- 67.** The equation of straight line passing through point of intersection of the straight lines  $3x - y + 2 = 0$  and  $5x - 2y + 7 = 0$  and having infinite slope is  
           -  
           -  
 $3x - y + 2 = 0$             -  
 $5x - 2y + 7 = 0$             -  
 (a)  $x = 2$  (b)  $x + y = 3$   
 (c)  $x = 3$  (d)  $x = 4$

- 68.** The coefficient of middle term in the expansion of  $(1 + x)^{10}$  is  
 $(1 + x)^{10}$             -  
           -  
 (a)  $10!/5!6!$  (b)  $10!/(5!)^2$   
 (c)  $10!/5!7!$  (d) None of these /

- 69.** If  ${}^nC_r$  denotes the number of combinations of  $n$  things taken  $r$  at a time, then the expression  ${}^nC_r + 1 + {}^nC_{r-1} + 2{}^nC_r$  equals to  
   ${}^nC_r$            -  
           -  
   ${}^nC_{r+1} + {}^nC_{r-1} + 2{}^nC_r$             -  
 (a)  ${}^{n+2}C_r$  (b)  ${}^{n+2}C_{r+1}$   
 (c)  ${}^{n+1}C_r$  (d)  ${}^{n+1}C_{r+1}$

- 70.** If the coefficient of  $r$ th term and  $(r + 4)$ th term are equal in the expansion of  $(1 + x)^{20}$ , then the value of  $r$  will be  
   $r$ th                        -  
   $(r + 4)$                         -  
   $(1 + x)^{20}$                          -  
 (a) 7 (b) 8  
 (c) 9 (d) 10

- 71.** How many Articles are there in the Indian Constitution?  
                        -  
 (a) 395 (b) 396  
 (c) 398 (d) 399

- 72.** Which of the following states is a member of the 'Seven Sisters'?  
                        -  
                        -  
                        -

- (a) West Bengal /
- (b) Tripura /
- (c) Bihar /
- (d) Orissa /

**73.**Who is known as Father of Medicine?

- (a) Aristotle /
- (b) Theophrastus /
- (c) Hippocrates /
- (d) Edward Jenner /

**74.**Computer ..... is whatever is typed, submitted or transmitted to a computer system.

- (a) Input /
- (b) Output /
- (c) Data /
- (d) Circuitry /

**75.**The headquarter of the International Court of justice is at

- (a) Geneva /
- (b) The Hague /
- (c) Rome /
- (d) Vienna /

**76.**Name the Country,that had become the 72nd country to sign the Framework Agreement of the International Solar Alliance (ISA)with India?

- (a) France /
- (b) Canada /
- (c) Argentina /
- (d) Russia /

**77.**The Great Barrier reef is

- (a) conglomeration of Corals in Australian waters
- (b) mountains range in Utah, USA
- (c) salt hills of Afghanistan
- (d) sub-oceanic mountain in South China Sea

**78.**NABARD was established in the

- (a) Fourth Five Year Plan /
- (b) Fifth Five Year Plan /
- (c) Sixth Five Year Plan /
- (d) Eight Five Year Plan /

**79.**In India, population density is defined as the number of persons

- (a) per square mile /
- (b) per square kilometer /
- (c) per lakh square mile /
- (d) per lakh square kilometer /

**80.**Which is not a Central Service?

- (a) Indian Police Service (IPS)
- (b) Indian Foreign Service (IFS)
- (c) Indian Audit and Accounts Service (IAAS)
- (d) Indian Revenue Service (IRS)

**81.**The first Indian State which was created on a linguistic basis following along drawn agitation is

- (a) Andhra Pradesh /
- (b) Assam /
- (c) Tamil Nadu /
- (d) Karnataka /

**82.**C, BASIC, COBOL, and Java are examples of ..... language.

- (a) low level /
- (b) computer /
- (c) system programing /
- (d) High-level /



**83.** In order to regularize the system of levying stamp duty, President Ram Nath Kovind gave his assent to the amendments of which of the following Act recently?

\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_, \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_?

- (a) Indian Stamp Act, 1899 / \_\_\_\_\_  
 \_\_\_\_\_, 1899
- (b) Indian Stamp Act, 1999 / \_\_\_\_\_  
 \_\_\_\_\_, 1999
- (c) Indian Stamp Act, 1999 / \_\_\_\_\_  
 \_\_\_\_\_, 1999
- (d) Indian Stamp Act, 1979 / \_\_\_\_\_  
 \_\_\_\_\_, 1979

**84.** The first computer was programmed using

\_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_

- (a) assembly language / \_\_\_\_\_
- (b) machine language / \_\_\_\_\_
- (c) spaghetti code / \_\_\_\_\_
- (d) source code / \_\_\_\_\_

**85.** Which of the following is not the unit of time?

\_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_?

- (a) Parallaxic second / \_\_\_\_\_
- (b) Microsecond / \_\_\_\_\_
- (c) Leap year / \_\_\_\_\_
- (d) Solar day / \_\_\_\_\_

**86.** What is the largest number of 4 digits which divided by 6, 9, 12, 15 or 18 leaves and 1 as remainder in each case?

4 \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ 6, 9, 12, 15 \_\_\_\_\_ 18  
 \_\_\_\_\_ \_\_\_\_\_ 1 \_\_\_\_\_?

- (a) 9901 (b) 9899
- (c) 1081 (d) 9673

**87.** The diameter of a circle is increased by 3 cm, then the ratio of new radius to the new circumference will be

\_\_\_\_\_ 3 \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_

- (a)  $2\pi : 1$  (b)  $\pi : 2$
- (c)  $2 : \pi$  (d)  $1 : 2\pi$

**88.** 25% of what amount of money is equal to  $12\frac{1}{2}\%$  of Rs. 180?

\_\_\_\_\_ \_\_\_\_\_ 25% \_\_\_\_\_ 180 \_\_\_\_\_  
 $12\frac{1}{2}\%$  \_\_\_\_\_

- (a) 120 Rs. / \_\_\_\_\_ (b) 75 Rs. / \_\_\_\_\_
- (c) 80 Rs. / \_\_\_\_\_ (d) 90 Rs. / \_\_\_\_\_

**89.** The average age of a class is 15.8 year. The average age of the boys in the class is 16.4 year and that of the girls is 15.4 year. What is the ratio of boys to girls in the class?

\_\_\_\_\_ \_\_\_\_\_ 15.8 \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ 16.4 \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ 15.4 \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_?

- (a) 1 : 2.
- (b) 2 : 3
- (c) 3 : 4
- (d) Cannot be determined / \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**90.** A man covers half of his journey at 6 km/h and the remaining half at 3 km/h. His average speed is

\_\_\_\_\_ \_\_\_\_\_ 6  
 \_\_\_\_\_/\_\_\_\_\_ \_\_\_\_\_ 3 \_\_\_\_\_/\_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

- (a) 9 km/h / \_\_\_\_\_/\_\_\_\_\_
- (b) 4.5 km/h / \_\_\_\_\_/\_\_\_\_\_
- (c) 4 km/h / \_\_\_\_\_/\_\_\_\_\_
- (d) 3 km/h / \_\_\_\_\_/\_\_\_\_\_

**91.** Evaluate  $(3 \cos^2 30^\circ + \sec^2 30^\circ + 2 \cos 0^\circ + 3 \sin 90^\circ - \tan^2 60^\circ)$ .

$(3 \cos^2 30^\circ + \sec^2 30^\circ + 2 \cos 0^\circ + 3 \sin 90^\circ - \tan^2 60^\circ)$  \_\_\_\_\_

- (a)  $5\frac{7}{12}$  (b)  $7\frac{5}{12}$
- (c)  $5\frac{12}{7}$  (d)  $12\frac{5}{7}$

**92.** Direction : Select the related word from the given alternatives.

\_\_\_\_\_ : \_\_\_\_\_ \_\_\_\_\_  
 \_\_\_\_\_ \_\_\_\_\_

Country : President :: State : ?

\_\_\_\_\_ : \_\_\_\_\_ :: \_\_\_\_\_ : ?

- (a) Chief Minister / \_\_\_\_\_

(b) Prime Minister / \_\_\_\_\_

(c) Speaker / \_\_\_\_\_

(d) Governor / \_\_\_\_\_

**93.**Direction : Select the related number from the given alternatives.

\_\_\_\_\_ : \_\_\_\_\_ :: \_\_\_\_\_ : \_\_\_\_\_

\_\_\_\_\_ : \_\_\_\_\_ :: \_\_\_\_\_ : \_\_\_\_\_

? : 63 :: 08 : 26

- (a) 12
- (b) 9
- (c) 18
- (d) 15

**94.**Find the wrong number from the given series.

\_\_\_\_\_

1236, 2346, 3456, 4566, 5686

- (a) 1236
- (b) 4566
- (c) 3456
- (d) 5686

**95.**Pointing to a lady on the platform, Manju said, "She is the sister of the father of my mother's son." Who is the lady to Manju?

\_\_\_\_\_

- (a) Mother / \_\_\_\_\_
- (b) Sister / \_\_\_\_\_
- (c) Aunt / \_\_\_\_\_
- (d) Niece / \_\_\_\_\_

**96.**In a row of girls, Rita and Monika occupy the ninth place from the right end and tenth place from the left end, respectively. If they interchange their places, then Rita and Monika occupy seventeenth place from the right and eighteenth place from the left respectively. How many girls are there in the row?

\_\_\_\_\_

- (a) 25
- (b) 26
- (c) 27
- (d) Data inadequate / \_\_\_\_\_

**97.**If PRADESH is written as 1234567, how will PARAS be written?

\_\_\_\_\_ PRADESH \_\_\_\_\_ 1234567 \_\_\_\_\_

PARAS \_\_\_\_\_

- (a) 13235
- (b) 13536
- (c) 13236
- (d) 14436

**98.**If \$ means +, # means -, @ means x and \* means ÷, then what is the value of 16 \$ 4 @ 5 # 72 \* 8?

\_\_\_\_\_ \$ \_\_\_\_\_ + , # \_\_\_\_\_ - , @ \_\_\_\_\_ x  
\_\_\_\_\_ \* \_\_\_\_\_ ÷ \_\_\_\_\_, \_\_\_\_\_ 16 \$ 4 @ 5 # 72 \* 8 \_\_\_\_\_

- (a) 25
- (b) 27
- (c) 29
- (d) 36

**99.**Bharati is 8 ranks ahead of Divya who ranks twenty-sixth in a class of 42 students. What is Bharati's ranks from the last?

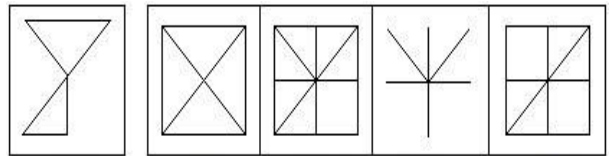
\_\_\_\_\_ \_\_\_\_\_ 8 \_\_\_\_\_ \_\_\_\_\_ 42  
\_\_\_\_\_ \_\_\_\_\_ \_\_\_\_\_

- (a) 9th / 9\_\_\_\_\_
- (b) 24th / 24\_\_\_\_\_
- (c) 25th / 25\_\_\_\_\_
- (d) 34th / 34\_\_\_\_\_

**100.**Select the answer figure in which question figure is hidden / embedded.

\_\_\_\_\_

\_\_\_\_\_ / \_\_\_\_\_



- (x) \_\_\_\_\_
- (A) \_\_\_\_\_
- (B) \_\_\_\_\_
- (C) \_\_\_\_\_
- (D) \_\_\_\_\_
- (a) A
- (b) B
- (c) C
- (d) D

## **AIRFORCE – (X&Y GROUP)**

### **ANSWER KEY**

1	B	26	C	51	B	76	C
2	D	27	A	52	C	77	A
3	D	28	B	53	D	78	C
4	D	29	A	54	B	79	B
5	C	30	D	55	D	80	D
6	C	31	B	56	A	81	A
7	A	32	A	57	C	82	D
8	C	33	A	58	C	83	A
9	C	34	B	59	D	84	B
10	B	35	C	60	A	85	A
11	B	36	B	61	B	86	A
12	B	37	B	62	C	87	D
13	A	38	D	63	C	88	D
14	D	39	C	64	B	89	B
15	C	40	D	65	A	90	C
16	A	41	D	66	A	91	A
17	D	42	C	67	C	92	D
18	C	43	D	68	B	93	C
19	D	44	A	69	B	94	D
20	D	45	D	70	C	95	C
21	D	46	D	71	A	96	B
22	B	47	D	72	B	97	C

23	D	48	A	73	C	98	B
24	B	49	A	74	A	99	C
25	D	50	B	75	B	100	B