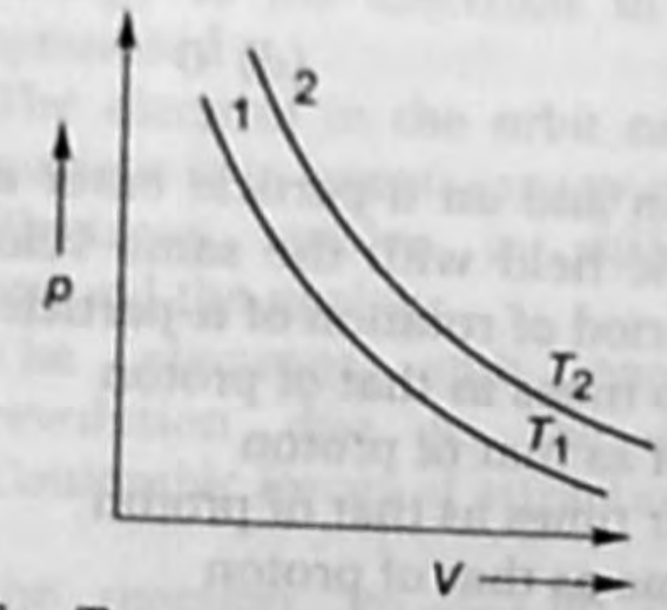
Physics

1. A body floats with one-third of its volume outside water and three-fourth of its volume outside another liquid. The density of another liquid is

(a) $\frac{9}{4}$ g/cm^3 (b) 4.9 g/cm^3

(c) $\frac{8}{3}$ g/cm^3 (d) $\frac{3}{8}$ g/cm^3

2. For a certain mass of gas, the isothermal curves between p and V at T_1 and T_2 temperatures are 1 and 2 as shown in figure. Then,

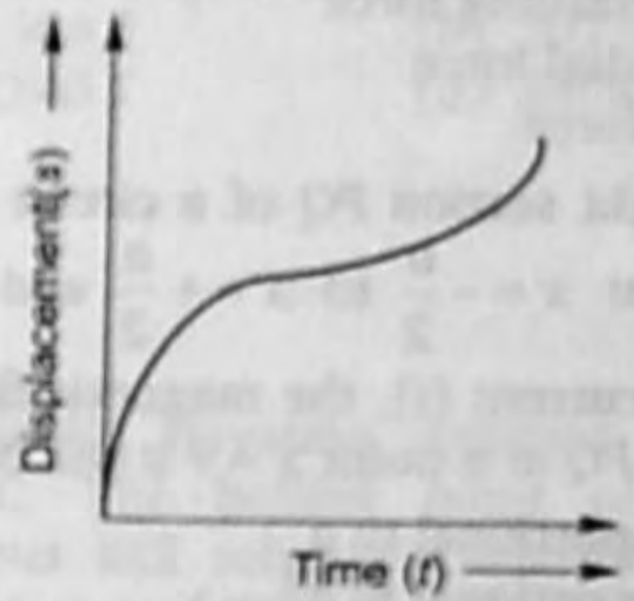


(a) $T_1 = T_2$
(b) $T_1 < T_2$
(c) $T_1 > T_2$
(d) Nothing can be predicted

3. In simple harmonic motion, when the displacement is one-half of the amplitude, what fraction of the total energy and its kinetic energy is

(a) zero (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$

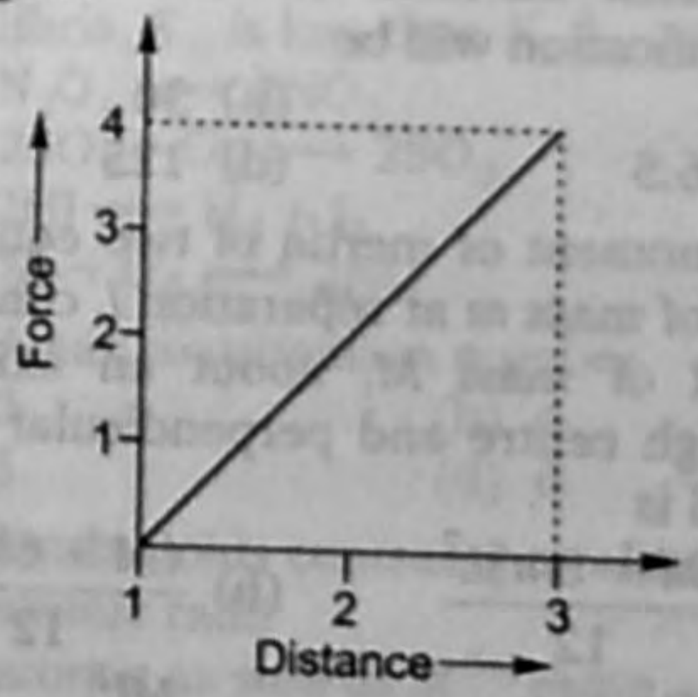
4. Two bodies M and N of equal masses are suspended from two separate massless springs of spring constants k_1 and k_2 respectively. If the two bodies oscillate vertically such that their maximum velocities are equal, the ratio of the amplitudes of vibrations of M to that of N is



(a) $\frac{k_1}{k_2}$ (b) $\sqrt{\frac{k_1}{k_2}}$

(c) $\frac{k_2}{k_1}$ (d) $\sqrt{\frac{k_2}{k_1}}$

5. A 10 kg mass moves 3.0 m against a retarding force shown in figure. If the force is zero at the beginning, how much kinetic energy is changed?



(a) + 6 J (b) − 6 J
(c) 12 J (d) − 12 J

6. A reference frame attached to the earth
(a) is an inertial frame by definition
(b) cannot be an inertial frame because the earth is revolving around the sun
(c) is an inertial frame because Newton's laws are applicable in this frame
(d) cannot be an inertial frame because the earth is rotating about its own axis

7. An iron piece falls from a height of 1 km on the ground. If all the energy is converted into heat, the rise of temperature of the iron piece will be
(specific heat of iron = 0.1 kcal/kg°C)
(a) 0.233°C (b) 2.33°C
(c) 23.8°C (d) 233°C

8. A charged particle moves along the axis of a current carrying solenoid. It experiences
(a) an accelerating force
(b) a retarding force
(c) a radial force
(d) no force

9. A straight section PQ of a circuit lies along x-axis at $x = -\frac{a}{2}$ to $x = +\frac{a}{2}$ and carries a steady current (i), the magnetic field due to section PQ at a point $x = +a$ will be
(a) proportional to a
(b) proportional to a^2
(c) proportional to $\frac{1}{a}$
(d) equal to zero

10. The focal length of the objective of a compound microscope is 2 cm and that of eyepeice of microscope is 5 cm. These two lenses are separated by a distance of 25 cm. When the microscope is focussed for the minimum distance of distinct vision, the magnification will be
(a) 5 (b) 30
(c) 56.5 (d) 125

11. The moment of inertia of two equal masses each of mass m at separation L connected by a rod of mass M, about an axis passing through centre and perpendicular to length of rod is
(a) $\frac{(M+3m)L^2}{12}$ (b) $\frac{(M+6m)L^2}{12}$
(c) $\frac{ML^2}{4}$ (d) $\frac{ML^2}{12}$

12. A wire of length L carries a current i. It is bent in the form of a circle. The magnetic moment of current loop (in A-m^2) is
(a) $\frac{iL^2}{4\pi^2}$ (b) $i\pi L^2$
(c) $\frac{iL^2}{4\pi}$ (d) $4\pi iL^2$

13. In an atom bomb, a temperature of about 10 million degree is developed at the moment of explosion. In what region of the spectrum do the wavelength corresponding to maximum energy density lie, if the light source is in the atom bomb?
(a) Ultraviolet region (b) Visible region
(c) Infrared region (d) X-ray region

14. The absolute temperature of a gas is increased 3 times. The root mean square velocity of the molecules will become
(a) 3 times (b) 9 times
(c) $\frac{1}{3}$ times (d) $\sqrt{3}$ times

15. The position x of a particle varies with time t as $x = at^2 - bt^3$. The acceleration of the particle will be zero at time t equal to
(a) $\frac{2a}{3b}$ (b) $\frac{1}{b}$
(c) $\frac{a}{3b}$ (d) 0

16. A proton and an α-particle enter a uniform magnetic field with the same velocity. The time period of rotation of α-particle will be
(a) two times as that of proton
(b) half as that of proton
(c) four times as that of proton
(d) same as that of proton

17. The half-life of radium is 1620 yr and its atomic weight is 226 g/mol. The number of atoms that will decay from its 1 g sample per second is
(a) 3.61×10^{10} (b) 3.6×10^{12}
(c) 3.1×10^{15} (d) 31.1×10^{15}

18. The density of a substance at 0°C is 10 g/cc and at 100°C, its density is 9.7 g/cc. The coefficient of linear expansion of the substance is
(a) 10^{-4} (b) 10^{-2}
(c) 10^{-3} (d) 10^{2}

19. The kinetic energy of a body becomes four times its initial value. The new linear momentum will be
(a) eight times that of initial value
(b) four times that of initial value
(c) twice of the initial value
(d) remain as the initial value

20. The dimensions of torque are
(a) $[ML^3T^{-3}]$
(b) $[ML^{-1}T^{-1}]$
(c) $[ML^2T^{-2}]$
(d) $[MT^{-2}]$

21. At 0 K temperature, a p-type semiconductor
(a) has equal number of holes and free electrons
(b) has few holes but no free electrons
(c) has few holes and few free electrons
(d) does not have any charge carrier

22. The coefficient of mutual inductance when magnetic flux changes by 2×10^{-2} Wb and current changes by 0.01 A, will be
(a) 8 H (b) 4 H
(c) 3 H (d) 2 H

23. When a wire is stretched and its radius becomes $r/2$ then its resistance will be
(a) zero (b) $2R$
(c) $8R$ (d) $16R$

24. If equation of a sound wave is $y = 0.0015\sin(62.8x + 314t)$ then its wavelength will be
(a) 2 unit (b) 0.3 unit
(c) 0.1 unit (d) 0.2 unit

25. The latent heat of vaporization of water is 2240 J. If the work done in the process of vaporization of 1 g is 168 J, then increase in internal energy will be
(a) 1904 J (b) 2072 J
(c) 2240 J (d) 2408 J

Chemistry

1. The statement that does not belong to Bohr's model of atom, is
(a) Energy of the electrons in the orbit is quantised
(b) The electron in the orbit nearest to the nucleus is in lowest energy state
(c) Electrons revolve in different orbits around the nucleus
(d) The electrons emit energy during revolution due to the presence of Coulombic forces of attraction

2. In the reaction, $Po \xrightarrow{-\alpha} Pb \xrightarrow{-\beta} Bi$, if Bi belongs to group 15, to which Po belongs?
(a) 13 (b) 14
(c) 15 (d) 16

3. The average kinetic energy of an ideal gas per molecule in SI units at 25°C will be
(a) 6.17×10^{-21} kJ (b) 6.17×10^{-21} J
(c) 6.17×10^{-20} J (d) 7.16×10^{-20} J

4. For the reaction of one mole of zinc dust with one mole of sulphuric acid in a bomb calorimeter, ΔE and W correspond to
(a) $\Delta E < 0, W = 0$ (b) $\Delta E = 0, W < 0$
(c) $\Delta E > 0, W = 0$ (d) $\Delta E = 0, W > 0$

5. The molal elevation constant of water is 0.52°C. The boiling point of 1.0 molal aqueous KCl solution (assuming complete dissociation of KCl), therefore, should be
(a) 98.96°C (b) 100.52°C
(c) 101.04°C (d) 107.01°C

6. If the density of water is 1 gcm^{-3} then, the volume occupied by one molecule of water is approximately
(a) 18 cm^3 (b) 22400 cm^3
(c) $6.02\times10^{-23}cm^3$ (d) $3.0\times10^{-23}cm^3$

7. In which one of the following gaseous equilibria, K_p is less than K_c ?
(a) $N_2O_4 \rightleftharpoons 2NO_2$
(b) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(c) $2HI \rightleftharpoons H_2 + I_2$
(d) $N_2 + O_2 \rightleftharpoons 2NO$

8. EDTA has coordination number
(a) 3 (b) 4
(c) 5 (d) 6

9. The lanthanoids contraction relates to
(a) atomic radii
(b) atomic as well as M^{3+} radii
(c) valence electrons
(d) oxidation states

10. Solder is an alloy of
(a) Pb + Sn (b) Pb + Sn + Zn
(c) Pb + Zn (d) Sn + Zn

11. Which of the following compounds reacts with, an aqueous solution of $Ag(NH_2)_2OH$?
(a) Ethane (b) Ethene
(c) 1-butyne (d) 2-butyne

12. 2-methoxy butane is obtained by reacting diazomethane with
(a) 2-butanol (b) 1-butanol
(c) 2-butanone (d) butanal

13. The formation of aldehyde from alkyl cyanide is related with the name
(a) Stephen (b) Rosenmund
(c) Wurtz (d) HVZ reaction

14. Which of the following can be used for the preparation of propane ?

(a) $CH_3CH{=}CH_2 \xrightarrow[2.\ AgNO_3/NaOH]{1.\ B_2H_6}$

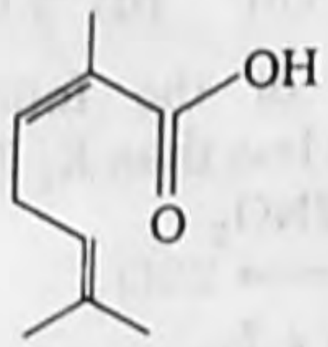
(b) $CH_3CH_2CH_2Cl \xrightarrow[2.\ H_2O_2]{1.\ Mg/ether}$

(c) $CH_3CH_2CH_2I \xrightarrow{HI/\Delta\,150^\circ C}$

(d) $CH_3CH_2CH_2COONa \xrightarrow[\Delta]{NaOH\ (CaO)}$

15. The reactivities of
CH_3Cl, $CH_3CH_2CH_2Cl$ and C_6H_5Cl are in the order
(a) $CH_3Cl > CH_3CH_2CH_2Cl > C_6H_5Cl$
(b) $CH_3CH_2CH_2Cl > CH_3Cl > C_6H_5Cl$
(c) $C_6H_5Cl > CH_3CH_2CH_2Cl > CH_3Cl$
(d) $CH_3Cl > C_6H_5Cl > CH_3CH_2CH_2Cl$

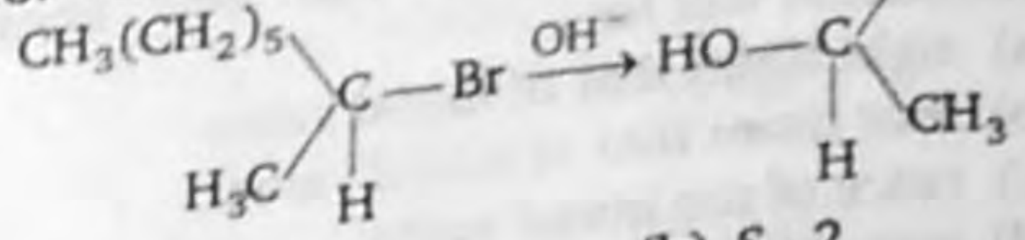
16. The IUPAC name of the compound



is
(a) 2-ethenyl-3-methyl cyclohexa-1, 3-diene
(b) 2,5-dimethyl hepta-2,6-dienoic acid
(c) 2,6-dimethyl hepta-2,5-dienoic acid
(d) 2,3-dimethyl epoxyethane

17. Which of the following is not isomeric with diethyl ether?
(a) Methyl *n*-propyl ether
(b) Butan-1-ol
(c) 2-methyl propan-2-ol
(d) Butan-2-one

18. The following reaction is described as



(a) S_E2 (b) S_N2
(c) S_N1 (d) S_N0

19. Which of the following species is paramagnetic in nature ?
(a) Carbonium ion (b) Free radical
(c) Carbene (d) Nitrene

20. Which of the following type of forces are present in nylon-66 ?
(a) van der Waals' forces of attraction
(b) Hydrogen bonding
(c) Three dimensional network of bonds
(d) Metallic bonding

21. Benzenediazonium chloride on reaction with phenol in weakly basic medium gives
(a) diphenyl ether
(b) *p*-hydroxyazobenzene
(c) chlorobenzene
(d) benzene

22. Which of the following statements are correct ?
(a) Aniline is a stronger base than ethyl amine
(b) Aniline is a stronger base than *p*-methoxyaniline
(c) Aniline must be acetylated before nitration with an acid derivative
(d) Aniline is soluble in an ammonium hydroxide solution

23. The species which has the same number of electrons in the outermost as well as penultimate shell is
(a) F^- (b) Ca^{2+} (c) O^{2-} (d) Mg^{2+}

24. In which one of the following cases, breaking of covalent bond takes place ?
(a) Boiling of H_2O (b) Melting of KCN
(c) Boiling of CF_4 (d) Melting of SiO_2

25. The coefficients of I^-, IO_3^- and H^+ in the redox reaction,

$$I^- + IO_3^- + H^+ \longrightarrow I_2 + H_2O$$

in the balanced form respectively are
(a) 5, 1, 6 (b) 1, 5, 6
(c) 6, 1, 5 (d) 5, 6, 1

Biology

1. Which one does not matched?
   (a) Thyroid – Goitre
   (b) Enzyme – Substrate
   (c) Antigen – Antibody
   (d) Pancreas – Glisson's capsule
2. Ducts of Bellini are found in
   (a) liver (b) intestine
   (c) kidney (d) pancreas
3. Where is protein digestion accomplished ?
   (a) Rectum (b) Duodenum
   (c) Stomach (d) Ileum
4. The covering of the lung is called
   (a) peritoneum
   (b) perichondrium
   (c) pericardium
   (d) pleura
5. Haemoglobin is found dissolved in the plasma of
   (a) bird (b) man
   (c) frog (d) earthworm
6. The conversion of a protein waste, the ammonia into urea occurs in
   (a) liver (b) kidney
   (c) gall bladder (d) intestine
7. Mouth part type in mosquito is
   (a) sucking and piercing type
   (b) biting and chewing type
   (c) sponging type
   (d) None of the above
8. Sarcomere is the distance between
   (a) A and I-bands
   (b) two I-bands
   (c) two Z-lines
   (d) Z and A bands
9. In case of blockage of functioning of islets of Langerhans, which hormone will be in short supply and what will be its effect ?
   (a) Thyroxine – Retardation of growth
   (b) Cortison – Tetany
   (c) Insulin – Blood glucose level rises
   (d) Adrenalin – Heart beat increases
10. Tissue culture technique can produce indefinite number of new plants from a small parental tissue. The economic importance of the technique is in raising
    (a) genetically uniform population of an elite species
    (b) homozygous diploid plants
    (c) development of new species
    (d) variants through picking up somaclonal variations
11. Germ pore present on the surface of pollen grain represents
    (a) specialised thickening of intine
    (b) specialised thickening of exine
    (c) area, where exine is thin or absent
    (d) area, where tectum is absent
12. 6-furfuryl amino purine, 2,4-dichloro phenoxy acetic acid and indole-3-acetic acid are
    (a) kinetin, synthetic auxin and natural auxin
    (b) natural auxin, gibberellin and kinetin
    (c) synthetic auxin, kinetin and natural auxin
    (d) gibberellin, natural auxin and kinetin
13. Twin develops from
    (a) different ova
    (b) different sperms
    (c) different zygote
    (d) same zygote
14. In a forest or pond ecosystem, pyramid of energy is
    (a) always inverted
    (b) always upright
    (c) spindle-shaped
    (d) Both upright and inverted depending upon ecosystem
15. Gas being produced by paddy fields and involved in global warming is
    (a) CO_2 (b) chlorine
    (c) methane (d) H_2S
16. Which antiviral substance is produced in response to viral infection for restricting its multiplication ?
    (a) Virion
    (b) Antigen
    (c) Interferon
    (d) Antibody

17. A man shows outbursts of emotions, quarrelsome behaviour and conflicts with others is suffering from
(a) schizophrenia
(b) borderline personality disorder
(c) addictive disorder
(d) mood disorders

18. Which one is used for preparation of bread ?
(a) *Aspergillus*
(b) *Lactobacillus*
(c) *Streptobacillus*
(d) *Saccharomyces cerevisiae*

19. Restriction nucleases are
(a) present in mammalian cells for degeneration of DNA of dead cells
(b) synthesised by bacteria for their defence
(c) used for *in vitro* DNA synthesis
(d) used in genetic engineering for uniting two DNA molecules

20. A bacteriophage possesses an enzyme
(a) urease (b) protease
(c) dehydrogenase (d) lysozyme

21. A bacterium with flagella all around is
(a) peritrichous (b) lophotrichous
(c) cephalotrichous (d) amphitrichous

22. Sandfly is a causative agent of
(a) typhoid
(b) dysentery
(c) kala-azar
(d) sleeping sickness

23. Yeast produces an enzyme complex that is responsible for fermentation. The enzyme complex is
(a) zymase (b) aldolase
(c) invertase (d) dehydrogenase

24. Pyrenoids are the centres for formation of
(a) starch (b) enzymes
(c) fat (d) proteins

25. Animals devoid of respiratory, excretory and circulatory organs are
(a) sponges (b) threadworms
(c) tapeworm (d) liver fluke

General Ability

1. The train service—"Thar Express" between India and Pakistan, originates in India from
(a) Jaisalmer (b) Jodhpur
(c) Bikaner (d) Barmer

2. Which one of the following cricketers has been awarded the Rajiv Gandhi Khel Ratna Award for the year 2007 ?
(a) Sachin Tendulkar (b) Saurav Ganguly
(c) MS Dhoni (d) Virender Sehwag

3. Garba is a dance form of
(a) Gujarat (b) Rajasthan
(c) Orissa (d) Asom

4. Which one of the following countries has become the world leader in the carbon credit business in 2007 ?
(a) India (b) Brazil
(c) Mexico (d) China

5. Who is named as the Flying Sikh of India ?
(a) Mohinder Singh
(b) Ajit Pal Singh
(c) Joginder Singh
(d) Milkha Singh

6. What is the tenure of the Prime Minister of India ?
(a) Conterminous with the tenure of the Lok Sabha
(b) Conterminous with the tenure of the President
(c) As long as he enjoys the support of a majority in the Lok Sabha
(d) Five years

7. What was the reason for Gandhiji's support to decentralisation of power ?
(a) Decentralisation ensures more participation of the people into democracy
(b) India had decentralisation of power in the past
(c) Decentralisation was essential for the economic development of the country
(d) Decentralisation can prevent communalism

8. Which of the following according to Mahatma Gandhi, is the strongest force in the world ?
(a) Non-violence of the brave
(b) Non-violence of the weak
(c) Non-violence of the coward
(d) Non-violence of the downtrodden

9. Why was the name of Kuber Singh, a 17-year-old student of GD Goenka World School, in the news on 20th January, 2009 ?
(a) He was declared as the winner of the Sanjay Chopra Award
(b) He broke the record for fastest memorising of a 9 digit number
(c) He witnessed the Swearing-in-Ceremony of President Barack Obama of USA, as an official invitee
(d) He solved the crossword puzzle of the famous USA magazine

10. Who among the following were members of the Swaraj Party ?
1. Motilal Nehru
2. Sardar Patel
3. Gopal Krishna Gokhale
(a) 1 and 2
(b) 1 only
(c) 2 and 3
(d) 1, 2 and 3

11. 'Consent of the people' means Consent of
(a) a few people
(b) all people
(c) majority of the people
(d) leader of the people

12. For how many categories has AR Rehman, the Golden Award Winner for original sound track in the film "Slum Dog Millionaire" been nominated at the Oscars ?
(a) 1 (b) 2
(c) 3 (d) 9

13. Which of the following is *not* a Panchayati Raj Institution?
(a) Gram Sabha
(b) Gram Panchayat
(c) Gram Cooperative Society
(d) Nyaya Panchayat

14. If the radius of blood vessels of a person decreases his/her blood pressure will
(a) increase
(b) decrease
(c) remain unaffected
(d) increase for males and decrease for females

15. Cell or tissue death within a living body is called as
(a) Neutrophilia (b) Nephrosis
(c) Necrosis (d) Neoplasia

16. Insufficient blood supply in human body is referred as
(a) Ischemia (b) Hyperemia
(c) Hemostasis (d) Haemorrhage

17. Match the following :

Union Territory	Jurisdiction (High Court)
A. Pondicherry	1. Kerala
B. Andaman and Nicobar Islands	2. Bombay
C. Lakshadweep	3. Madras
D. Daman and Diu	4. Calcutta

	A	B	C	D
(a)	3	4	1	2
(b)	1	3	4	2
(c)	1	2	3	4
(d)	1	4	3	2

18. Which of the following is an extra-constitutional and non-statutory body ?
(a) Finance Commission
(b) Planning Commission
(c) Union Public Service Commission
(d) Election Commission

19. Which of the following is true regarding 'No Confidence Motion' in the Parliament ?
1. There is no mention of it in the Constitution.
2. A period of six months must lapse between the introduction of one 'No Confidence Motion' and another.
3. At least 100 persons must support such a motion before it is introduced in the House.
4. It can be introduced in the Lok Sabha only.
(a) 2 and 4
(b) 1, 2, 3 and 4
(c) 1, 2 and 3
(d) 1 and 4

20. Deep fried food materials are carcinogenic because they are rich in
(a) fats (b) hydrocarbons
(c) cooking oil (d) nicotine

21. With which province of Canada has India signed a historic MoU to boost cooperation and investment in the field of geology and mineral resources ?
(a) British Columbia (b) Ontario
(c) Quebec (d) Alberta

22. Which of these statements is/are correct ?
1. Both HELINA and Namica are future antitank missiles of India.
2. Both HELINA and Namica are versions of Nag Missile.

(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

23. With which Western country has India signed a Counter Terrorism Initiative that includes steps to check financing of terror activities, joint probe in cases of bomb blasts besides cooperation in cyber and border security ?

(a) France (b) UK
(c) US (d) Germany

24. Which of these countries has its independence day on the same day as India has (August 15) ?

(a) Vietnam (b) Sri Lanka
(c) Ecuador (d) Korea

25. Which bolwer recently took his first and One Day Internationals' 26th hat-trick?

(a) Muttiah Murlidharan
(b) Zaheer Khan
(c) Farveez Maharoof
(d) None of the above