SAMPLE PAPER - 119

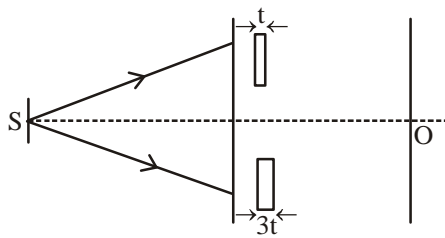**Time : 1 : 15 Hr.**

Question : 60

PHYSICS

01. Plane having inclinaton 30°. The coefficient of friction between the block and the inclined plane is 0.75. The contact force on the block is-
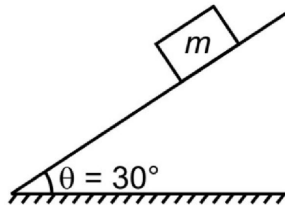

(1) $\frac{3}{4}mg$ (2) 2mg   (3) $\frac{5}{4}mg$ (4) mg

02. Find the time after which the particle's initial velocity will be perpendicular to instantaneous velocity when it is projected with 30 m/s from horizontal ground by making an angle 37° with vertical.
(1) 6 second   (2) 3.75 second
(3) 3 second   (4) None of these

03. Particles of masses 2M, m and M are respectively at points A, B and C with AB = ½ (BC). m is much-much smaller than M and at time t = 0, they are all at rest. At subsequent times before any collision takes place:

A   B   C
2M   m   M

(1) m will remain at rest.
(2) m will move towards M.
(3) m will move towards 2M.
(4) m will have oscillatory motion.

04. At height h = 3R from the earth surface value of acceleration due to gravity is g_1 and at depth 'd' acceleration due to gravity is g_2. If $g_2 = 4g_1$. Find depth d (Given : radius of earth = 6400 km)
(1) 3600 km   (2) 4800 km
(3) 1200 km   (4) 3200 km

05. Three identical spherical shells, each of mass m and radius r are placed as shown in figure. Consider an axis XX' which is touching to two shells and passing through diameter to third shell. Moment of inertia of the system consisting of these three spherical shells about XX axis is
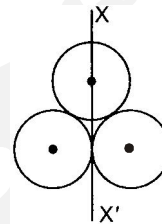
(1) $4mr^2$ (2) $\frac{11}{5}mr^2$ (3) $3mr^2$ (4) $\frac{16}{5}mr^2$

06. You measure two quantities as A=(1.0 ± 0.2) m and B = (2.0 ± 0.2) m. You should report correct value for $\sqrt{AB}$ as
(1) (1.4 ± 0.4) m   (2) (1.41 ± 0.15) m
(3) (1.4 ± 0.3) m   (4) (1.4 ± 0.2) m

07. In YDSE set-up, two thin transparent slabs of thickness t and 3t are introduced in front of slits (as shown in figure). As a result, the 1st order minimum is formed at central point O, then value of λ is

(1) n t   (2) 4 (n – 1) t
(3) 3 (n –1) t   (4) 4 n t

08. The inward and outward electric flux for a closed surface in units of N-m²/C are respectively 8×10^3 and 4×10^3. Then the total charge inside the surface is [where ε_0 = permittivity constant]
(1) 4×10^3 C   (2) -4×10^3 C
(3) $\frac{(-4 \times 10^3)}{\varepsilon_0}$ C   (4) $-4 \times 10^3 \varepsilon_0$ C

09. The figure gives the electric potential V as a function of distance through five regions on x-axis. Which of the following is true for the electric field E in these regions?
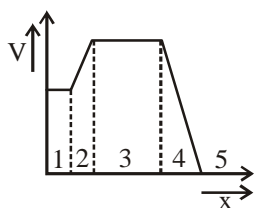
   (1) $E_2 = E_4$, $E_5 = 0$
   (2) $E_1 = E_3 = E_5 = 0$
   (3) $E_2 = E_4 = E_5$
   (4) $E_1 < E_2 < E_3 < E_4 < E_5$

10. Electric charges of $+10\mu C$, $+5\ \mu C$, $-3\mu C$ and $+8\mu C$ are placed at the corners of a square of side $\sqrt{2}$ m. the potential at the centre of the square is
   (1) 1.8 V   (2) 1.8×10^6 V
   (3) 1.8×10^5 V   (4) 1.8×10^4 V

11. At time of t s, a particle of mass 3 kg has position vector $\vec{r} = (3t)\hat{i} - (4\cos t)\hat{j}$. The impulse of the force during the time interval $0 \le t \le \dfrac{\pi}{2}$ is-

   (1) $12\hat{j}\,Ns$ (2) $9\hat{j}\,Ns$

   (3) $4\hat{j}\,Ns$ (4) $14\hat{j}\,Ns$

12. A uniform cable of mass 'M' and length 'L' is placed on a horizontal surface such that its $\left(\dfrac{1}{n}\right)^{th}$ part is hanging below the edge of the surface. To lift the hanging part of the cable upto the surface, the work done should be:

   (1) $\dfrac{MgL}{n^2}$ (2) $\dfrac{MgL}{2n^2}$

   (3) $\dfrac{2MgL}{n^2}$ (4) $nMgL$

13. A particle of mass 'm' is projected with a velocity $v = kV_e\ (k < 1)$ from the surface of the earth.
   (V_e = escape velocity)
   The maximum height above the surface reached by the particle is

   (1) $\dfrac{Rk^2}{1-k^2}$ (2) $R\left(\dfrac{k}{1-k}\right)^2$

   (3) $R\left(\dfrac{k}{1+k}\right)^2$ (4) $\dfrac{R^2k}{1+k}$

14. Two coherent sources of intensity ratio x^2 interfere. Then, in interference pattern,

   (1) $\dfrac{I_{max} - I_{min}}{I_{max} + I_{min}} = \dfrac{1+x^2}{2\sqrt{x}}$ (2) $\dfrac{I_{max} + I_{min}}{I_{max} - I_{min}} = \dfrac{1+x}{2\sqrt{x}}$

   (3) $\dfrac{I_{max} - I_{min}}{I_{max} + I_{min}} = \dfrac{2x}{1+x^2}$ (4) $\dfrac{I_{max} + I_{min}}{I_{max} - I_{min}} = \dfrac{2x}{1+x^2}$

15. Five point charge each having magnitude 'q' are placed at the corner of hexagon as shown in fig. Net electric field at the centre 'O' is $\vec{E}$. To get net electric field at 'O' be $6\vec{E}$, charge placed on the remaining sixth corner should be
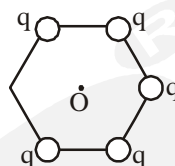
   (1) $6q$ (2) $-6q$ (3) $5q$ (4) $-5q$

CHEMISTRY

16. When 1.04 g of $BaCl_2$ is present in 10^5 g of solution the concentration of solution is
   (1) 0.104 ppm   (2) 10.4 ppm
   (3) 0.0104 ppm   (4) 104 ppm

17. Solubility of a substance is its maximum amount that can be dissolved in a specified amount of solvent. It depends upon
   (i) nature of solute   (ii) nature of solvent
   (iii) temperature   (iv) pressure
   (1) Only (i), (ii) and (iii)
   (2) Only (i), (iii) and (iv)
   (3) Only (i) and (iv)
   (4) (i), (ii), (iii) and (iv)

18. The system that forms maximum boiling azeotrope is
   (1) acetone - chloroform
   (2) ethanol - acetone
   (3) *n*-hexane - *n*-heptane
   (4) carbon disulphide - acetone

19. If 1 g of solute (molar mass = 50 g mol^{-1}) is dissolved in 50 g of solvent and the elevation in boiling point is 1 K. The molar boiling constant of the solvent is
   (1) 2   (2) 3
   (3) 2.5   (4) 5

20. Which of the following will have the highest freezing point at one atmosphere?
   (1) 0.1 M NaCl solution   (2) 0.1 M sugar solution
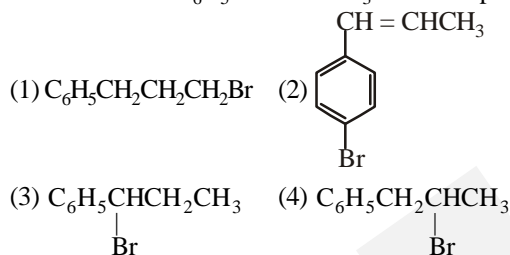   (3) 0.1 M $BaCl_2$ solution   (4) 0.1 M $FeCl_3$ solution

21. Which of the following reaction will tend to proceed to more extent towards completion?
(1) $H_2(g) + Br_2(g) \rightleftharpoons 2HBr(g)$; $K_C = 1.4 \times 10^{-21}$
(2) $2NO(g) \rightleftharpoons N_2(g) + O_2(g)$; $K_C = 2.1 \times 10^{30}$
(3) $2BrCl(g) \rightleftharpoons Br_2(g) + Cl_2$ (in CCl_4 solution); $K_C = 0.145$
(4) Both (1) and (3)

22. Which of the following is the least reactive towards nucleophile?
(1) CH_3CH_2Cl (2) CH_3Cl
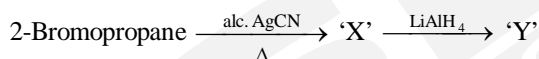(3) $H_2C = CH - CH_2Cl$ (4) C_6H_5Cl

23. Methyl bromide reacts with AgF to give methyl fluoride and AgBr. This reaction is called:
(1) Finkelstein reaction   (2) Fittig reaction
(3) Swarts reaction   (4) Wurtz reaction

24. Which of the following compounds will give a yellow precipitate with iodine and alkali?
(1) Acetophenone   (2) Methyl acetate
(3) Acetamide   (4) 2-Hydroxy propane
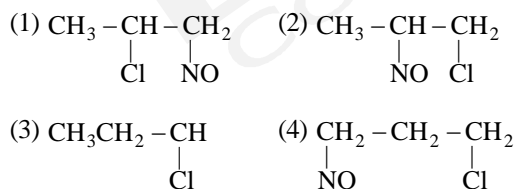
25. The reaction of $C_6H_5CH = CHCH_3$ with HBr produces:
(1) $C_6H_5CH_2CH_2CH_2Br$

(2)
$$\underset{Br}{\overset{CH=CHCH_3}{\bigcirc}}$$

(3) $C_6H_5\underset{|}{\overset{}{C}}HCH_2CH_3$ (4) $C_6H_5CH_2\underset{|}{\overset{}{C}}HCH_3$
$\quad\quad\quad Br \quad\quad\quad\quad\quad\quad\quad\quad Br$

26. In the given set of reactions:

2-Bromopropane $\xrightarrow[\Delta]{\text{alc. AgCN}}$ 'X' $\xrightarrow{\text{LiAlH}_4}$ 'Y'

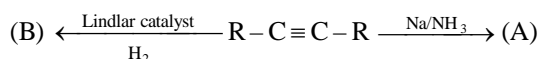The IUPAC name of the product 'Y' is:
(1) N-isopropyl methanamine
(2) N-methylpropan-2-amine
(3) N-methylpropan-1-amine
(4) butan-2-amine

27. $CH_3CH = CH_2 + NOCl \longrightarrow P$
Identify the adduct:
(1) $CH_3 - \underset{Cl}{\overset{}{C}}H - \underset{NO}{\overset{}{C}}H_2$ (2) $CH_3 - \underset{NO}{\overset{}{C}}H - \underset{Cl}{\overset{}{C}}H_2$

(3) $CH_3CH_2 - \underset{Cl}{\overset{}{C}}H$ (4) $\underset{NO}{\overset{}{C}}H_2 - CH_2 - \underset{Cl}{\overset{}{C}}H_2$

28. In the reactions
(B) $\xleftarrow[H_2]{\text{Lindlar catalyst}}$ $R - C \equiv C - R$ $\xrightarrow{Na/NH_3}$ (A)
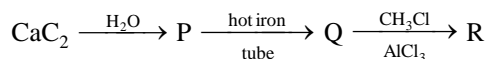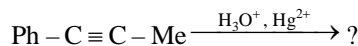
(A) and (B) are geometrical isomers. Then:
(1) A is cis and B is trans
(2) A is trans and B is cis
(3) A and B are cis
(4) A and B are trans

29. In the following reaction, the product 'R' is:

$CaC_2 \xrightarrow{H_2O} P \xrightarrow[\text{tube}]{\text{hot iron}} Q \xrightarrow[\text{AlCl}_3]{\text{CH}_3\text{Cl}} R$

(1) benzene
(2) ethylbenzene
(3) toluene
(4) n-propyl benzene

30. Identity the product in the reaction

$Ph - C \equiv C - Me \xrightarrow{H_3O^+, Hg^{2+}} ?$
(1) $PhCH_2CH_2CHO$
(2) $PhCOCH_2CH_3$
(3) $PhCH_2COCH_3$
(4) $PhCOCOMe$

BOTANY

31. Select the incorrect statement regarding reproduction in Rhodophyceae.
(1) Asexual reproduction occurs by non-motile spores.
(2) Sexual reproduction occurs by motile gametes.
(3) Sexual reproduction is oogamous.
(4) Complex post-fertilisation developmental events occur.

32. In pteridophytes, main plant body is a (i) , which is (ii) into true roots, stem and leaves.
Fill the blanks in above statement and select the correct option.
(1) (i)–sporophyte; (ii)–differentiated
(2) (i)–sporophyte; (ii)–not differentiated
(3) (i)–gametophyte; (ii)–differentiated
(4) (i)–gametophyte; (ii)–not differentiated

33. Heterospory is found in some members of _____ and all members of _____.
(1) Bryophyta, Pteridophyta
(2) Pteridophyta, Bryophyta
(3) Bryophyta, Gymnospermae
(4) Pteridophyta, Spermatophyta

34. Select the incorrect statement regarding the anatomy of a typical monocotyledonous stem.
(1) Phloem parenchyma is absent.
(2) Vascular bundles are scattered, conjoint, collateral and closed.
(3) Each vascular bundle is surrounded by a bundle sheath.
(4) Ground tissue is differentiated into cortex, endodermis, pericycle and pith.

35. Identify A, B, C, D and E in the given flow chart showing Z-scheme of light reaction.
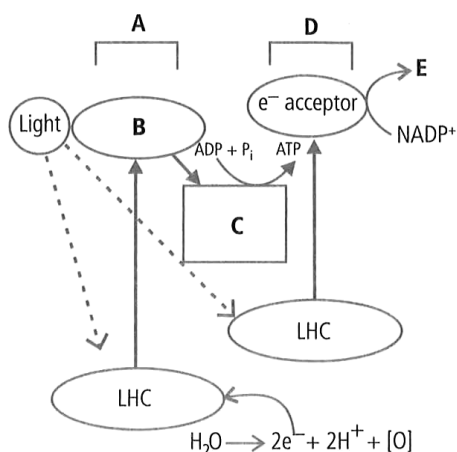

(1) $A-P_{700}$; $B-H^+$acceptor; $C-e^-$acceptor; $D-P_{680}$; E–NADPH

(2) A–Photo-system I; $B-e^-$acceptor; $C-e^-$transport system; D–Photo-system II; E–NADPH

(3) A–Photo-system II; $B-H^+$acceptor; $C-e^-$acceptor; $D-P_{700}$; E–NADPH

(4) A–Photo-system II; $B-e^-$acceptor; $C-e^-$transport system; D–Photo-system I; E–NADPH

36. The given figure shows development of an embryo that undergoes two phases A and B. Select the correct option regarding it.
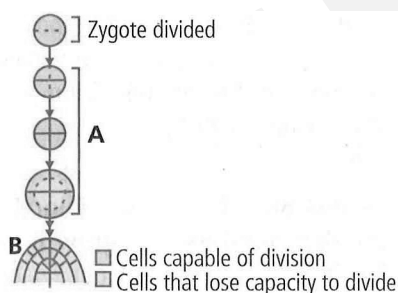
(1) A–Geometric phase; B–Arithmetic phase
(2) A–Arithmetic phase; B–Geometric phase
(3) A–Arithmetic phase; B–Exponential phase
(4) A–Exponential phase; B–Stationary phase

37. Which of the following is an example of differentiation?
(1) Lignocellulosic wall thickenings of tracheids
(2) Loss of nucleus, vacuolisation and end wall perforations in sieve tube elements
(3) Elongation, thickening and emptying of sclerenchyma fibres
(4) All of these

38. Select the incorrect statement out of the following.
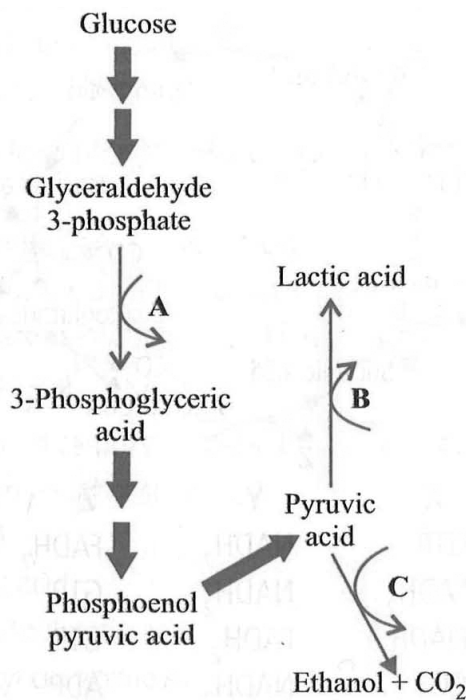(1) All animals belonging to various phyla are assigned to the Kingdom Animalia.

(2) As we go higher from species to kingdom, number of common characteristics goes on increasing.
(3) Different classes comprising fish, amphibians, reptiles, birds and mammals together constitute the Phylum Chordata.
(4) Plant order Polymoniales includes the families like Solanaceae and Convolvulaceae based on the vegetative and floral characters.

39. On the basis of inputs given, one can put the given organism, in which of the following kingdom? (as per understandings of Linnaeus)
(A) Cell type-Eukaryotic
(B) Cell wall-Present (without cellulose)
(C) Nuclear membrane-Present
(D) Body organisation-Multicellular/loose tissue
(E) Mode of nutrition-Heterotrophic (Saprophytic/Parasitic)
(1) Plantae   (2) Fungi
(3) Animalia   (4) Protista

40. ATP assimilation takes place in
(1) Mitochondrial & chloroplast processes
(2) Mitochondrial processes only
(3) All cellular processes
(4) None of the above

41. In a bisexual flower undergoing self fertilization, all the meiotic divisions result in formation of all functional gametes. The number meiotic divisions to produce 28 seeds is
(1) 28   (2) 35   (3) 14   (4) 7

42. Given figure depicts the light harvesting complex (LHC) of photosystem I (PS I).
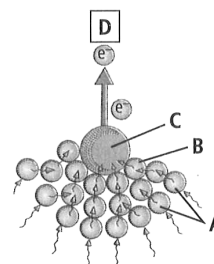
Select the correct identification for A, B, C and D.
(1) A–Core molecules; B–Antenna molecule; $C-P_{680}$; D–Primary e^- acceptor
(2) A–Antenna molecules; B–Core molecule; $C-P_{700}$; D–Primary e^- acceptor
(3) A–Antenna molecules; B–Core molecule; $C-P_{700}$; D–Plastocyanin
(4) A–Core molecules; B–Reaction centre; $C-P_{680}$; D–Plastocyanin

43. What does A, B and C depict in the given pathways of anaerobic respiration?

Glucose

↓

Glyceraldehyde 3-phosphate

↓ A

3-Phosphoglyceric acid

↓

Phosphoenol pyruvic acid → Pyruvic acid

Lactic acid ↑ B

C

Ethanol + CO_2

(1) A–NADH + H$^+$→NAD$^+$; B–NAD$^+$→NADH + H$^+$; C–NAD$^+$→NADH + H$^+$

(2) A–NADH + H$^+$→NAD$^+$; B–NADH + H$^+$→NAD$^+$; C–NAD$^+$→NADH + H$^+$

(3) A–NAD$^+$→NADH + H$^+$; B–NADH + H$^+$→NAD$^+$; C–NADH + H$^+$→NAD$^+$

(4) A–NAD$^+$→NADH + H$^+$; B–NADH + H$^+$→NAD$^+$; C–NAD$^+$→NADH + H$^+$

44. Which of the following combinations of characters is true for slime moulds?

(1) Parasitic, plasmodium without walls, spores dispersed by air currents

(2) Saprophytic, plasmodium with walls, spores dispersed by water

(3) Parasitic, plasmodium without walls, spores dispersed by water

(4) Saprophytic, plasmodium without walls, spores dispersed by air currents

45. What is the number of bivalents in beginning of meiosis I, if the gamete of same organism has 32 chromosomes

(1) 16　　　　　　(2) 32

(3) 64　　　　　　(4) 16 pairs

46. Match the columns :

Column-I	Column-III
A. Neophron	(i) Vulture
B. Struthio	(ii) Penguin
C. Pavo	(iii) Peacock
D. Aptenodytes	(iv) Ostrich

(1) A = (ii), B = (i), C = (iv), D = (iii)

(2) A = (i), B = (iv), C = (ii), D = (iii)

(3) A = (i), B = (iii), C = (i), D = (iv)

(4) A = (i), B = (iv), C = (iii), D = (ii)

47. Adipose tissue :

(1) Stores fat and mainly present beneath the skin

(2) Is a type of loose connective tissue

(3) Possess abundant mast cells

(4) More than one option is correct

48. Match the columns :

	Column-I		Column-II
A.	Hyaline cartilage	(i)	Intervertebral disc and pubic symphysis
B.	White fibrous cartilage	(ii)	Tip of nose
C.	Elastic cartilage	(iii)	Ribs & Sternum
D.	Calcified cartilage	(iv)	Head of Humans

(1) A = (iii), B = (i), C = (iv), D = (ii)

(2) A = (ii), B = (iii), C = (i), D = (iv)

(3) A = (iii), B = (i), C = (ii), D = (iv)

(4) A = (iv), B = (ii), C = (i), D = (iii)

49. The first heart sound LUB is associated with the ......x..... whereas, the second heart sound DUB is associated with the ......y......

(1) X = Closure of tricuspid and bicuspid valves; Y = Opening of semilunar valves

(2) X = Opening of tricuspid and bicuspid valves; Y = Closure of semilunar valves

(3) X = Closure of tricuspid and bicuspid valves; Y = Closure of semilunar valves

(4) X = Opening of tricuspid and bicuspid valves; Y = Opening of semilunar valves

50. Assertion : Bats and whales are classified as mammals.

Reason : Bats and whales have four chambered heart.

(1) Both the assertion and reason are true and reason explains the assertion.

(2) Both the assertion and reason are true but reason does not explain the assertion.

(3) Assertion is true but reason is false

(4) Assertion is false but reason is true

51. A. Acetic acid can form cholesterol
B. Anabolic pathway is endergonic while catabolic pathway is exergonic
C. All biomolecules have a turn over, i.e., they are constantly being changed into some other biomolecules and also made from other biomolecules.
D. Flow of metabolites through metabolic pathway has a definite rate and direction. It is called dynamic state of body constituents.
(1) A and B are correct
(2) Only D is correct
(3) C and D are correct
(4) All are correct

52. Which of the following is a correct sequence of step involved in respiration?
A–Utilization of O_2 by body cells.
B–Transport of gases by blood upto tissues.
C–Pulmonary ventilation.
D–Diffusion of gases at alveolar surface.
E–Exchange of gases between blood and tissues.
(1) D – B – E – A – C
(2) C – D – B – E – A
(3) D – E – B – C – A
(4) C – E – B – D – A

53. Statement A : Human skull is monocondylic.
Statement B : Ribs in human are bicephalic.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statement A and B are correct
(4) Both statement A and B are incorrect

54. Reproductive health in society can be improved by
(a) introduction of sex education in schools
(b) increased medical assistance
(c) awareness about contraception and STDs
(d) equal opportunities to male and female child
(e) ban on amniocentesis
(f) encouraging myths and misconceptions
(1) All of these
(2) (a), (b), (c) and (d)
(3) (a), (b), (c), (d) and (e)
(4) (b) and (e)

55. What should be the features for an ideal contraceptive ?
(a) It should be user-friendly
(b) It should be easily available
(c) It should be ineffective and reversible with least side effects
(d) It should be effective and reversible with least side effect
(e) It should be interfere with the sexual act of the user
(1) (a), (b) and (e)
(2) (a), (b) and (c)
(3) (a), (b) and (d)
(4) (a), (b), (d) and (e)

56. The .... region of pituitary, commonly called anterior pituitary produces GH, PRL, TSH, ACTH, LH and FSH.
(1) Pars distalis
(2) Pars intermedia
(3) Pars tuberalis
(4) Neurohyphophysis

57. A correct systemic circulation pathway is:
(1) Right auricle → Left ventricle → Aorta → Tissues → Veins
(2) Right ventricle → Pulmonary aorta → Tissues → Pulmonary vein → Left auricle
(3) Left auricle → Left ventricle → Aorta → Arteries Tissues → Veins → Right atrium
(4) Left auricle → Left ventricle → Pulmonary aorta → Tissues → Right auricle

58. Which of the following pairs of hormones are not antagonistic (having opposite effects) to each other ?
(1) Parathormone - Calcitonin
(2) Insulin - glucagon
(3) Aldosterone - Atrial Natriuretic Factor
(4) Relaxin - Inhibin

59. A woman presents to her physician complaining that her menstrual cycles are irregular. She reports that she menstruates each month, but she cannot predict when. After reporting the dates of her last 5 periods, her physician concluded that her cycle is normal, but that it is a 35 days cycle. She reports that she wants to get pregnant, but cannot predict when ovulation will occur. Her physician will tell her that she should expect to ovulate on day
(1) 10
(2) 17
(3) 15
(4) 21

60. Mark the incorrect statement
(1) Polyspermy prevented by depolarisation of the membrane is called fast block
(2) Entry of sperm into ovum restarts the cell cycle
(3) If implantation occurs anywhere else other than uterus, it is called tubal pregnancy
(4) Ability to reproduce is lost in female primate after menopause