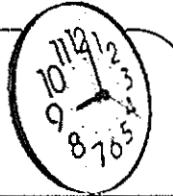


Model Test Paper-3



Time : $3\frac{1}{2}$ hours.

Maximum Marks : 200

PHYSICS

1. There are two combination of n equal resistances. In combination A , all the resistances are in series and in combination B , all the resistances are in parallel. The ratio of the resistances of combination A to that of combination B is
 (a) $n^2 : 1$ (b) $n : 1$
 (c) $1 : 1/n$ (d) $1 : n^2$
2. If the time period of a magnet is T when $T \propto \sqrt{x}$, then x represents
 (a) length of the magnet
 (b) moment of inertia of the magnet
 (c) breadth of the magnet
 (d) mass of the magnet
3. The electric intensity E , current density J and specific resistance p are related to each other through the relation
 (a) $E = p/J$ (b) $E = Jp$
 (c) $E = J/p$ (d) $E = JE$
4. The distances of two planets from the Sun are 10^{13} and 10^{12} metres respectively. The ratio of time periods of these two planet is
 (a) $10\sqrt{10}$ (b) 100
 (c) $\sqrt{10}$ (d) 10
5. There will be an increase in potential energy of the system, if work is done upon the system by
 (a) a conservative force
 (b) a non-conservative force
 (c) any conservative or nonconservative force
 (d) none of the above
6. The amplitude of a particle in SHM decreases from 20 cm to 15 cm in 2 minutes. Its energy decreases by nearly
 (a) 22.5% (b) 25%
 (c) 50% (d) 12.5%
7. A small masses of rock like material surrounded by vapours of large masses and revolving in highly elliptical orbits are called
 (a) meteorites (b) galaxy
 (c) comets (d) asteroids
8. In a $n-p-n$ transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, then
 (a) the base current will be 2 mA
 (b) the emitter current will be 11 mA
 (c) the emitter current will be 9 mA
 (d) the base current will be 0.1 mA
9. What led to the discovery of proton ?
 (a) scattering of α -particles by the heavier nuclei
 (b) artificial disintegration of ${}_{7}N^{14}$ with α -particles.
 (c) artificial disintegration of ${}_{4}Be^{9}$ with α -particles
 (d) radioactive decay of certain elements
10. Maxwell's equation involving $d\vec{B}/dt$ is obtained from
 (a) Biot-Savart's law (b) Ampere's law
 (c) Gauss' law (d) Faraday's law
11. Two coils of self-inductances L_1 and L_2 are placed so close together that effective flux in one coil is completely linked with the other. If M is the mutual inductance between them, then
 (a) $M = (L_1 L_2)^2$ (b) $M = L_1/L_2$
 (c) $M = L_1 L_2$ (d) $M = \sqrt{(L_1 L_2)}$
12. The north pole of a bar magnet is rapidly introduced into a solenoid at the end A . Which of the following statements taking place ?
 (a) the end A of the solenoid behaves like a north pole
 (b) the end A of the solenoid behaves like a south pole
 (c) no induced e.m.f. is developed
 (d) the end A of the solenoid acquires positive potential

13. A material produces a magnetic field which opposes the applied magnetic field, then it is
 (a) electromagnetic (b) paramagnetic
 (c) diamagnetic (d) ferromagnetic
14. To reduce the range of voltmeter, its resistance need to be reduced. A voltmeter has resistance R_0 and range V . Which of the following resistances when connected in parallel will convert it into a voltmeter of range V/n ?
 (a) $(n - 1) R_0$ (b) $(n + 1) R_0$
 (c) nR_0 (d) none of these
15. What is the magnetic field at the point of intersections of diagonals of a current carrying square loop of each side L while the current through the loop is I ?
 (a) $\frac{\mu_0 8\sqrt{2}I}{4\pi L}$ (b) $\frac{\mu_0 4\sqrt{2}I}{4\pi L}$
 (c) $\frac{\mu_0 \sqrt{2}I}{4\pi L}$ (d) none of these
16. The radius of the trajectory of a charged particle in a uniform magnetic field is proportional to
 (a) momentum of the particle
 (b) energy of the particle
 (c) charge on the particle
 (d) magnetic field
17. A wire of resistance 3Ω is cut into three equal pieces, which are joined to form a triangle. The equivalent resistance between any two corners of the triangle is
 (a) $\frac{1}{4}\Omega$ (b) $\frac{2}{3}\Omega$
 (c) $\frac{3}{2}\Omega$ (d) 4Ω
18. Two capacitors of capacitances $4 \mu F$ and $6 \mu F$ are connected across a $120 V$ battery in series with each other. What is the potential difference across the $4 \mu F$ capacitor?
 (a) $60 V$ (b) $48 V$
 (c) $40 V$ (d) $72 V$
19. The persistence of sound in a hall is called
 (a) reverberation (b) acoustics
 (c) resonance (d) articulation
20. Which of the following statements is correct about the stationary wave?

- (a) particles at the consecutive anti-nodes are in same phase
 (b) particles at the consecutive anti-nodes differ in phase by π
 (c) all the particles of the medium vibrate in the same phase
 (d) the phase lag between the particles continuously varies with the increase in distance
21. When a tuning fork produces sound waves in air, which one of the following properties of sound is same in the material of tuning fork as well as air?
 (a) velocity (b) frequency
 (c) wavelength (d) amplitude
22. The relation between velocity amplitude a , the displacement amplitude ' A ' and the angular frequency ω of S.H.M. is
 (a) $A = \omega a$ (b) $a = \omega A$
 (c) $A = \omega v$ (d) $a = \omega A^2$
23. Two steam engines X and Y have their source at $1000 K$ and $1100 K$ and their sinks are at $500 K$ and $400 K$ respectively. If η_x and η_y be their efficiencies, then which of the following statements about their efficiencies is true?
 (a) $\eta_x = \eta_y$ (b) $\eta_x < \eta_y$
 (c) $\eta_x > \eta_y$ (d) the data is not sufficient to make the above prediction
24. What are thermal radiations?
 (a) electromagnetic waves
 (b) mechanical longitudinal waves
 (c) mechanical transverse waves
 (d) none of these
25. Cloudy nights are usually warmer, because clouds
 (a) have low thermal conductivity
 (b) do not radiate heat
 (c) do not absorb heat
 (d) have high thermal conductivity
26. Let R be the radius of soap bubble and σ be the surface tension of soap solution. If p be the excess of pressure inside the soap bubble, then
 (a) $p \propto R \sigma$ (b) $p \propto \frac{R}{\sigma}$
 (c) $p \propto \frac{\sigma}{R}$ (d) $p \propto \frac{1}{R \sigma}$

the farthest distance is R . If the orbital velocity of the planet closest of the Sun be v , then what is the velocity at the farthest point?

- (a) $\left(\frac{r}{R}\right)^{1/2}$ (b) $\frac{vR}{r}$
 (c) $\frac{vr}{R}$ (d) $v\left(\frac{R}{r}\right)^{1/2}$

Which of the following is not true for stationary satellite of the earth ?

(a) it is stationary in space
 (b) its angular speed is equal to that of earth about its own axis.
 (c) its time period is 24 hours
 (d) it revolves from west to east

Two identical copper spheres of radius k are in contact with each other. If the gravitational attraction between them is R , then which of the following relations is correct ?

(a) $F \propto \frac{1}{R^2}$ (b) $F \propto R^4$
 (c) $F \propto R^2$ (d) $F \propto \frac{1}{R^4}$

If the gravitational mass of a body on the moon be denoted by M_m and that on the earth by M_e then

(a) $M_m = \sqrt{M_e}$ (b) $M_m = M_e$
 (c) $M_m = \frac{1}{6} M_e$ (d) $M_m = 6M_e$

If the radius of the circular path of particle going round the circle is double without changing its frequency of rotation, then centripetal force on it will be

(a) doubled (b) unchanged
 (c) halved (d) quadrupled

It is easier for a swimmer jumping into water from a height to describe a loop in the air by

(a) keeping the arms and legs straight
 (b) spreading the arms and legs
 (c) pulling the arms and legs closer
 (d) none of these

Three identical balls each of radius 10 cm and

- mass 1 kg each are placed touching one another on a horizontal surface. Where is their centre of mass located ?
- at the centre of one ball
 - at the point of contact of any two spheres
 - on the horizontal surface
 - none of these
40. A nucleus of mass number A originally at rest emits α -particle with speed v . What will be the recoil speed of the daughter nucleus ?
- $v/(A - 4)$
 - $4v/(A + 4)$
 - $4v(A - 4)$
 - $v/(A + 4)$
- Instructions for Q. No. 41 to 60**
- Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.*
- If both assertion and reason are true and the reason is a correct explanation of the assertion*
 - If both assertion and reason are true but the reason is not a correct explanation of the assertion*
 - If the assertion is true, but the reason is false*
 - If both assertion and reason are false*
41. Assertion (A) : In a radioactive disintegration an electron is emitted by the nucleus.
Reason (R) : Electrons are always present inside the nucleus.
42. Assertion (A) : In Rutherford's experiment, α -particles from a radium source were allowed to fall on a 10^{-4} mm thick gold foil. Most of α -particles passed straight through the foil.
Reason (R) : The entire positive charge and nearly whole of the mass of the nucleus is concentrated in the nucleus.
43. Assertion (A) : The relative velocity of two photons travelling in opposite direction is C.
Reason (R) : The rest mass of a photon is zero.
44. Assertion (A) : Tiny drops of liquid resist deforming forces better than bigger drops.
Reason (R) : Excess pressure inside a drop is directly proportional to the surface tension.
45. Assertion (A) : The couple acting on a body is

- not equal to the rotational K.E. of the body.
Reason (R) : Couple and K.E. have different units
46. Assertion (A) : A thin aluminium disc spinning freely about a central pivot is quickly brought to rest when placed between the poles of a strong U-shaped magnet.
Reason (R) : A current induced in a disc rotating in a magnetic field produces a force which tends to oppose the disc's motion.
47. Assertion (A) : The period of simple pendulum is independent of the mass of the bob.
Reason (R) : Inertial and gravitational masses are equivalent.
48. Assertion (A) : The frequencies of incident, reflected and refracted beam of monochromatic light incident from one medium to another are the same.
Reason (R) : The incident, the reflected and the refracted rays are coplanar.
49. Assertion (A) : Radio waves can be polarised.
Reason (R) : Sound waves in air are longitudinal in nature.
50. Assertion (A) : A hollow metallic closed container maintained at a uniform temperature can act as a black body for radiations.
Reason (R) : All metals acts as black bodies.
51. Assertion (A) : The Sun appears bigger at sunrise and sunset than at mid-day.
Reason (R) : The phenomenon of interference bends light rays.
52. Assertion (A) : On a rainy day it is safer to drive a car or a bus at high speed.
Reason (R) : Coefficient of friction is higher on wetting the surface.
53. Assertion (A) : Electric appliances with metallic body e.g. heaters have two pin connections, whereas an electric bulb has three pin connection.
Reason (R) : Three pin connections reduce heating of connecting wires.
54. Assertion (A) : Environmental damage has increased the amount of ozone in the atmosphere.
Reason (R) : Increase of ozone increases the amount of ultraviolet radiation on the earth.

55. *Assertion (A)* : The rainbow is seen sometimes in the sky when it is raining to an observer with his back towards the Sun.
Reason (R) : Total internal reflection from water droplets causes dispersion. The final rays are in the backward direction.
56. *Assertion (A)* : The relative velocity of two photons travelling in opposite directions is C.
Reason (R) : The rest mass of photon is zero.
57. *Assertion (A)* : Brilliant colours are seen in thin layer of oil on the surface.
Reason (R) : White light is composed of several colours.
58. *Assertion (A)* : Activity of 10^8 undecayed radioactive nuclei of half life 50 days is equal to that of 1.2×10^8 undecayed nuclei of some other material with half life 60 days.
Reason (R) : Activity is proportional to half life.
59. *Assertion (A)* : Any hollow metallic closed container maintained at a uniform temperature can act as a source of black body radiation.
Reason (R) : All metals act as black bodies.
60. *Assertion (A)* : In LCR series circuit. The resonance occurs at one frequency only.
Reason (R) : At resonance the inductive reactance is equal to the capacitive reactance.

CHEMISTRY

61. 'Placebo' is often given to patients. It is
 (a) a sugar pill
 (b) a broad spectrum antibiotic
 (c) an anti-depressant
 (d) a tonic
62. The presence of a bacterium, virus or foreign protein triggers the production of specialised protein molecules known as antibodies or
 (a) immunoglobulin (b) lymphocyte
 (c) myoglobin (d) antigen
63. A tyndall effect would most likely be observed in which one of the following ?
 (a) sol (b) precipitate
 (c) solution (d) solvent

64. Natural rubber is a
 (a) polyisoprene (b) polyamide
 (c) polyester (d) polysaccharide
65. The radio element has half-life of one day. After three days, the amount of element disintegrated will be
 (a) $\frac{1}{16}$ of original amount
 (b) $\frac{1}{3}$ of original amount
 (c) $\frac{1}{8}$ of original amount
 (d) $\frac{7}{8}$ of original amount
66. Which one among the following is not an organometallic compound ?
 (a) trimethoxy titanium chloride
 (b) trimethyl aluminium
 (c) trimethyl boron
 (d) tetracarbonyl nickel
67. Which of the following electronic configurations will have the highest magnetic moment ?
 (a) d^7 (b) d^4
 (c) d^3 (d) d^5
68. Green colour is imparted to the flame by
 (a) potassium salt (b) calcium salt
 (c) sodium salt (d) barium salt
69. The alkaline earth metals have an outer electronic configuration of
 (a) ns^1 (b) ns^2np^6
 (c) ns^2 (d) ns^2np^1
70. The energy associated with adenosine triphosphate molecule is stored in
 (a) C – O bonds (b) C – N bonds
 (c) C – C bonds (d) O – P bonds
71. A peptide bond consists of a
 (a) acetal linkage (b) hemiacetal linkage
 (c) glycosidic linkage (d) amide linkage
72. In a chemical reaction, negative catalyst will increase the value of
 (a) reaction rate
 (b) ΔS
 (c) ΔH
 (d) activation energy

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertion (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

- (a) If both assertion and reason are true and the reason is a correct explanation of the assertion
 - (b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
 - (c) If the assertion is true, but the reason is false
 - (d) If both assertion and reason are false

- 101.** Assertion (A) : The lactic acid shows the geometrical isomerism.
Reason (R) : Lactic acid has carbon-carbon double bond.
- 102.** Assertion (A) : 2-Hydroxy i.e. butane dioic acid is known as malic acid.
Reason (R) : It is present in unripe apples.
- 103.** Assertion (A) : During the fermentation of grape juice, a reddish brown coloured crust is formed.
Reason (R) : Impure potassium hydrogen tartrate is of reddish brown colour and it is known as argol.
- 104.** Assertion (A) : Amines are more basic than ethers and esters.
Reason (R) : Nitrogen is less electronegative than oxygen, it is in better position to accommodate the positive charge of the proton.
- 105.** Assertion (A) : An orbital cannot have more than two electrons, moreover, if an orbital has two electrons they must have opposite spins.
Reason (R) : No two electrons in an atom can have same set of all the four quantum numbers
- 106.** Assertion (A) : The pairing of electrons in the orbitals of a particular sub-shell does not occur until all the orbitals of the sub-shell are singly occupied.
Reason (R) : Singly occupied orbitals must have the electrons with parallel spins.
- 107.** Assertion (A) : Fluorine molecules has bond order one.
Reason (R) : The number of electrons in antibonding molecular orbitals is two less than that in bonding molecular orbitals.
- 108.** Assertion (A) : The molality of the solution does not change with change in temperature.
Reason (R) : The molality is expressed in units of moles per 1000 gm of solvent.
- 109.** Assertion (A) : The molecularity of the reaction $H_2 + Br_2 \rightarrow 2HBr$ is two.
Reason (R) : The order of this reaction is 3/2.
- 110.** Assertion (A) : Sodium ammonium hydrogen phosphate tetrahydrate is used in the bead test.
- Reason (R)* : The colourless transparent sodium metaphosphate combines with metallic oxides giving coloured orthophosphates.
- 111.** Assertion (A) : Alpha (α) - amino acids exist as internal salt in solution as they have amino and carboxylic acid groups in near vicinity.
Reason (R) : H^+ ion given by carboxylic group (-COOH) is captured by amino group (-NH₂) having lone pair of electrons.
- 112.** Assertion (A) : Methanoic acid reduces mercuric chloride to mercurous chloride on heating while ethanoic acid does not.
Reason (R) : Methanoic acid is a stronger acid than ethanoic acid.
- 113.** Assertion (A) : Sulphur dioxide and chlorine are both bleaching agents.
Reason (R) : Both are drying agents.
- 114.** Assertion (A) : In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.
Reason (R) : The shared electron pairs repel each other with equal force so all bonds are equidistant from each other.
- 115.** Assertion (A) : Nitrous acid (HNO_2) may act as an oxidising as well as a reducing agent.
Reason (R) : The oxidation number of nitrogen remains same in all the compounds.
- 116.** Assertion (A) : The bond order in a molecule can have any value, positive or negative, integral or fractional or zero.
Reason (R) : The bond order in a molecule depends upon the number of electrons in the bonding and antibonding molecular orbitals.
- 117.** Assertion (A) : Phenol undergoes Kolbe's reaction whereas ethanol does not.
Reason (R) : Phenoxide ion is more basic than ethoxide ion.
- 118.** Assertion (A) : A spectral line will be observed for a $2p_x$ - $2p_y$ transition.
Reason (R) : The energy is released in the form of wave of light when electron drops from $2p_x$ to $2p_y$ orbital.

- 119.** Assertion (A) : Aromatic aldehydes and also formaldehyde undergo Cannizzaro reaction with strong alkali.
 Reason (R) : Aldehydes which have α - hydrogen atoms undergo Cannizzaro reaction.

120. Assertion (A) : With halogens and alkali, amides give primary amines having one carbon atom less.
 Reason (R) : The reaction of amides with alkali is a qualitative test of amides.

BIOLOGY

121. Where would you find chondrin secreting chondrocytes ?
(a) nerve cells (b) bone
(c) cartilage (d) muscles

122. Dermis in frog's skin comprises
(a) stratum spongiosum and compactum
(b) compactum and malpighian
(c) corneum and malpighian
(d) malpighian and stratum spongiosum

123. Hairs in mammals are developed from
(a) stratum compactum
(b) stratum corneum
(c) stratum germinativum
(d) stratum spongiosum

124. Eutheria are characterised by
(a) skin with glands (b) true- placenta
(c) hair (d) skin with glands

125. In the flying birds, the quill feathers are useful for
(a) giving shape to the bird
(b) gaining external heat
(c) flight in air
(d) preventing loss of heat from the body

126. A four-chambered heart is found in
(a) men
(b) all vertebrates
(c) all animals
(d) some reptiles, birds and mammals

127. Among mammals, placenta is not found in
(a) *Platypus* (b) man
(c) mouse/horse (d) kangaroo

- 154.** *Utricularia* is a
 (a) leafless plant
 (b) stemless plant
 (c) rootless plant
 (d) non-flowering plant
- 155.** Which of the following functions are carried out by the leaf ?
 I. photosynthesis II. transpiration
 III. respiration IV. translocation
 (a) II and III (b) I and II
 (c) I and III (d) all of the above
- 156.** Botanical name of pitcher plant is
 (a) *Dionaea* (b) *Drosera*
 (c) *Nepenthes* (d) *Utricularia*
- 157.** Quinine, important in the treatment of malaria, is extracted from
 (a) stem of *Hevea*
 (b) bark of *Cinnamon*
 (c) bark of *Cinchona*
 (d) leaves of *Ocimum*
- 158.** The pulse among following is
 (a) *Ocimum sanctum*
 (b) *Dalbergia latifolia*
 (c) *Coffea arabica* (d) *Cicer arietinum*
- 159.** Hemp fibres are obtained from
 (a) *Linum* (b) *Cannabis*
 (c) *Cochchorus* (d) *Hibiscus*
- 160.** Which is a medicinal plant ?
 (a) *Aconitum* (b) *Linum*
 (c) *Dalbergia* (d) *Tectona*
- Instructions for Q. No. 161 to 180**
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
- (a) If both assertion and reason are true and the reason is a correct explanation of the assertion
 - (b) If both assertion and reason are true but the reason is not a correct explanation of the assertion
 - (c) If the assertion is true, but the reason is false
 - (d) If both assertion and reason are false
- 161.** Assertion (A) : Symbiosis is also furnished by mycorrhiza.
 Reason (R) : In this case symbiosis is established between alga and virus.
- 162.** Assertion (A) : Starved leaves show protoplasmic respiration.
 Reason (R) : They have protein as their respiratory substrates.
- 163.** Assertion (A) : R.Q. during anaerobic respiration is always infinity.
 Reason (R) : Oxygen is never evolved.
- 164.** Assertion (A) : All food chains will come to stand still if bacteria disappear from earth.
 Reason (R) : Bacteria are only associated with the soil fertility and hardly have any role for food chains.
- 165.** Assertion (A) : Fruits are stored in CO_2 environment.
 Reason (R) : With increase in CO_2 , the rate of respiration decreases.
- 166.** Assertion (A) : *Monocystis* parasites in one hosts.
 Reason (R) : *Monocystis* is monogenetic.
- 167.** Assertion (A) : Chordates have poor regeneration power while non chordates have good regeneration power.
 Reason (R) : Non chordates have asexual reproduction so they have good regeneration power.
- 168.** Assertion (A) : Earthworms mate in April-June.
 Reason (R) : Copulation in earthworm lasts for one month.
- 169.** Assertion (A) : Blood takes no part in reproduction in cockroaches.
 Reason (R) : Blood in them lacks respiratory pigments.
- 170.** Assertion (A) : In a graafian follicle, the primary oocyte and the follicle cells may be considered as sibling cells.
 Reason (R) : Both are derived from oogonia.
- 171.** Assertion (A) : Glycolysis begins in the cytoplasm and causing split into 2 three-carbon intermediates, then rearranged further to yield two molecules of pyruvate.

