6. Science Education

(a) Physics (Sc.Ed.321)
Exam 2067

Time: 3 hrs   Full Marks: 80

Attempt ALL the questions.

Group 'A' (6×7=42)

1. State and explain the triangle and polygon laws of vector. Derive maximum height and range in projectile motion.

2. Define gravitational potential energy and derive its expression. Verify principles of moment.

3. Write Stoke's formula and determine the terminal velocity by using it. A constant torque of 500 Nm turns a wheel which has a moment of inertia 20kg m^2 about its center. Find the angular velocity gained in 2 S and kinetic energy gained.

OR

Explain the molecular theory of surface tension.
A body is thrown vertically upwards and rises to a height of 10 meters. Calculate.
a) the velocity with which body was thrown upwards and
b) the time taken by the body to reach the highest point.

4. Define compound pendulum. Derive an expression of time period for it. Deduce the expression for work done in stretching wire.

5. Explain working principle of thermo couple thermometer.
15 grams of iron at temperature of 100°C is added to a containing 50g of water at 20°C. After stirring the water the highest temperature recorded is 23°C. Calculate the specific heat of iron.

OR

Explain the thermal equilibrium and Zeroth law of thermodynamics. Show that PV' = constant, where symbols have their usual meanings.

6. Derive the expression for the deviation produced by a small angled prism.
The image of real object is a diverging lens of focal length 10cm if formed 47 cm from the lens. Find the object distance and magnification.

OR

Derive lens Maker's formula. Explain image formed when object is placed at various distances in concave mirror.

Group 'C' (2×12=14)

7. Explain work done during adiabatic process. Obtain relation between molar heat capacities of gas. State and explain first law of thermodynamics.

OR

Derive an expression for refractive index of a prism. Describe the measurement of refractive index by real and apparent depth method. Define lateral magnification and chromatic aberration.

8. Explain the chief contribution to the knowledge of planetary motion made by following:
Copernicus, Tycho, Kepler, Galilee and Newton.
Discuss lunar eclipse with diagram.

Group 'A' (14)

Attempt ALL the questions. Tick (√) the best answers.

1. The example of vector quantity is
   a) work   b) torque
   c) angular momentum   d) both b and c

2. The relation between time period and distance in planetary motion was discovered by
   a) Newton   b) Kepler   c) Bernoulli   d) Stoke

3. An object of mass 4 kg moves round a circle of radius 6m with constant speed of 12mS^{-1}. The force towards center is
   a) 96 N   b) 40N   c) 288N   d) 48N

4. The kinetic energy in rotatory motion is

a) $\frac{1}{2}mv^2$ b) $\frac{1}{2}lw^2$ c) $\frac{1}{2}mw^2r^2$ d) $\frac{1}{2}\frac{lv^2}{r}$

5. Spherical shape of rain drop is due to
   a) viscosity b) surface tension
   c) up thrust of air d) elasticity

6. The orbital velocity is given by relation
   a) $\sqrt{29R}$ b) $\sqrt{9R}$ c) $\sqrt{6R}$ d) $R\sqrt{9}$

7. A sprayer works on principle of
   a) Hydraulic life b) Archimedes principle
   c) Bernoulli principle d) Pascal law

8. Mercury is used in thermometer due to following reason
   a) it is bad conductor of heat
   b) it has low specific heat capacity
   c) it wets the walls of glass tube
   d) it cannot be easily seen

9. Work done is given by relation
   a) force × distance b) mass × pressure
   c) pressure × distance d) both a and c

10. For 60° glass prism, the angle of minimum deviation is 37.2°. The refractive index is
    a) 1.5 b) 1.3 c) 2.4 d) 1.0

11. An object is placed 15cm from a convex mirror of focal length 10cm. The image distance is
    a) 6 cm b) 4 cm c) 5 cm d) 3 cm

12. The maximum angle of deviation is for
    a) red b) violet c) blue d) green

13. Astronomical instrument is
    a) periscope b) kaleidoscope
    c) photo cell d) binocular

14. The second largest planet is
    a) Mars b) Jupiter c) Saturn d) Uranus

EXAM 2068
Group 'B' 6×7=42

1. State parallelogram law of vectors. What is scalar and vector product? Prove that Kepler's third law is considered with Newton's law of gravitation.

2. Define coefficient of Restitution. Moment of inertia and torque. Show that escape velocity $V_e = \sqrt{29r}$, where symbols have their usual meanings.

3. Define surface tension. Explain with necessary theory, the capillary tube method for the measurement of surface tension of a liquid. A body oscillates SHM–with a amplitude of 10cm and with a frequency of 10 Hz. Calculate the maximum value of velocity and acceleration.

OR

Define centripetal acceleration. Show that the centripetal acceleration is equal to $\frac{V^2}{r}$ of a particle moving in a circle. A steel wire 4m in length and $2.4\times10^{-7}m^2$ in cross–sectional area is stretched by a force of 36N. Calculate stress, aria strain $(Y = 1.8\times10^{11}N/m^2)$

4. Differentiate between streamlined and turbulent flow. Define equation of continuity. State and prove Bernoulli's principle.

5. State principle of platinum resistance thermometer of specific latent heat of fusion of ice.

OR

Define entropy. State and explain first law and second law of thermodynamics.

6. Show that for convex lens $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$, where symbols have their usual meanings.

An object is placed 15cm from convex mirror of focal length 10cm. Calculate the image distance and magnification produced.

OR

Derive lens Maker's formula.

For a 60° glass prism, the angle of minimum deviation is 37.2°. Calculate the refractive index.

Group 'C' [2×12=24]

7. Differentiate between isothermal and adiabatic process. Derive equations PV^γ = constant. Obtain relation between molar heat = constant. Obtain relation between molar heat capacities of gas capacities of gas.

OR

Define total internal reflection and total critical angle. Describe measurement of refractive index by (i) ray tracing (ii) real and apparent depth method.

8. Describe the method of determination of distance, size, mass and surface temperature of astronomical objects.

Group 'A' [14]

Attempt ALL the questions. Tick the best answers.

1. If is linear momentum and F is radius vector, the torque is given by
   a) $\vec{r} \times \vec{V}$
   b) $\vec{r} - \vec{P}$
   c) rp sin
   d) 2rp cos

2. According to Kepler's laws the path of planet around the sun is a
   a) circle
   b) ellipse
   c) parabola
   b) hyperbola

3. The weight of a body will be maximum at
   a) top of the mountain
   b) sea level
   c) center of the earth
   d) inside the earth

4. The velocity of .... with increase in temperature
   a) liquid inucase
   b) gas decrease
   c) liquid decrease and gas increase
   d) liquid and gas

5. The coefficients of restitutions is perfectly in elastic collision is
   a) e −0
   n) c = −1
   c) e =
   d) e = ½

6. The unit of Young modulus is
   a) Pascal
   b) Newton meter
   c) Newton
   d) Newton/sqm

7. Momentum of a body of mass 5kg is $15 kgS^{-1}$. DE kinetic energy will be
   a) 25J
   b) 40J
   c) 22.5J
   d) 28.8J

8. The ratio of two molar heat capacities of diatomic gas
   a) 1.67
   b) 1.4
   c) 1.29
   d) 1.33

9. The heat is constant in, the process
   a) isothermal
   b) adiabatic
   c) isochoric
   d) isobaric

10. To see wider view of a person outside the door, one can use
    a) convex lens
    b) concave lens
    c) periscope
    d) microscope

11. The maximum wavelength in the spectrum is for
    a) red
    b) blue
    c) green
    d) violet

12. The critical angle for diamond is
    a) 19°
    b) 50°
    c) 42°
    d) 24°

13. The brightest planet is
    a) Mercury
    b) Venus
    c) Mars
    d) Jupiter

14. Radio telescope can work

a) only in day   b) only in night
c) only in good weather   d) even in cloudy condition

Attempt ALL the questions. Tick the best answers.

1. Two vectors $\vec{A}$ and $\vec{B}$ will be perpendicular if
   a) $\vec{A} . \vec{B} = 1$ b) $\vec{A} . \vec{B} = 0$
   c) $\vec{A} \times \vec{B} = 1$ d) $\vec{A} \times \vec{B} = 0$

2. Which of the following will not change in the absence of an external torque on a system?
   a) linear momentum   b) angular momentum
   c) moment of couple   d) both (a) and (b)

3. For a particle moving along a circular path with constant speed, the acceleration is constant in
   a) magnitude   b) direction
   c) both magnitude and direction   d) neither magnitude nor direction

4. Kg m^2S^{-1} is the unit of
   a) torque   b) moment of inertia
   c) angular momentum   d) force

5. Gravitational potential on the surface of earth is
   a) $-\dfrac{GM}{2R}$ b) $-gR$

   c) gR d) $\dfrac{GM}{R}$

6. A soap bubble of radius r is formed within soap solution. the excess pressure inside the bubble is
   a) $\dfrac{4T}{\gamma}$ b) $\dfrac{2T}{\gamma}$

   c) $P_o + \dfrac{2T}{\gamma}$ d) $P_o - \dfrac{4T}{\gamma}$

7. Young's modulus for a perfectly plastic body is
   a) zero   b) infinity
   c) one   d) finite

8. Bernoulli's theorem is based on
   a) conservation of momentum   b) conservation of energy
   c) conservation of mass   d) mass–energy equivalence

9. In which of the following process, internal energy of a system remains constant?
   a) Isochoric   b) Isobaric
   c) Isothermal   d) Adiabatic

10. Which of the following pressure temperature relation is true for an adiabatic change?
    a) $P^{r-1}T = constant$ b) $P^rT^{r-1} = constant$
    c) $P^rT^{1-r} = constant$ d) $P^{1-r}T^r = constant$

11. Chromatic aberration in a lens is caused by
    a) reflection   b) interference
    c) diffraction   d) dispersion

12. Total internal reflection occurs if light travels from
    a) air to water   b) water to glass
    c) air to gas   d) glass to water

13. Which of the following is the lightest planet of the solar system?
    a) Earth   b) Jupiter
    c) Pluto   d) Venus

14. Radio–telescopes are used
    a) to detect radio waves from space

b) to take photograph

c) to magnify stars   d) to study motion of stars

Group 'B'   [6×7=42]

1. What is meant by resolution of a vector? Find the rectangular components of a vector?
   Two forces of 30N and 40N are inclined to each other at an angle of 60°. Find their resultant. What will be the resultant if the forces are inclined at right angles to each other?

2. Define orbital velocity and obtain its expression. Explain Geostationary satellite and find out total energy of the satellite.

3. Explain molecular theory of surface tension. What is meant by surface energy? Show that surface tension is numerically equal to the surface energy.

OR

What is simple harmonic motion? Find an expression for the energy of the particles executing SHM.
The moment of inertia of a wheel is 100 kg m^2. At a given instant, its angular velocity is 10 rad S^{-1}. After the wheel rotates through an angle of 100 radians, the wheel's angular velocity is 100 rad S^{-1}. Calculate the torque applied on the wheel.

4. State and explain Stokes' law and deduce it from dimensional analysis.
   Explain equation of continuity for non–viscous liquid.

5. Define bulk and shear modulus. Explain properties of rubber by stress–strain curve.
   What force must be applied to a steel wire 6m long and diameter 1.6mm to produce an extension of 1mm?
   (Young's modulus for steel = $2.0×10^{11} Nm^{-2}$)

OR

Explain the thermal equilibrium and zeroth law of thermodynamics. Derive an expression of work done during adiabatic process.

6. Explain the images formed by a convex lens when object is placed at different distances. Derive an expression of refractive index by using prism.

OR

Derive the lens formula for a concave lens using proper sign convention.
If the ratio of the principle specific heat capacities of a certain gas is 1.40 and its density at s.t.p. is 0.090kg m^{-3}, calculate the values of the spefic heat capacity at constant pressure and at constant volume. (Standard atmospheric pressure = $1.01 × 10^5 N/m^2$).

Group 'C'   [2×12=24]

7. Give the theory of a compound pendulum and derive an expression for its period. Classify the equilibrium with conditions.
   define radius of gyration and derive an expression for it.

OR

Explain the work done by a gas and obtain its expression.
State and explain first and second law of thermodynamics.
Derive thermal efficiency of heat engine.

8. Explain the chief contribution to the knowledge of planetary motions made by following scientists:
   Copernicus, Tycho, Kepler, Galilee and Newton
   Discuss solar eclipse with diagram.

Exam. 2070

Time: 3 hrs.   Full Marks: 80

Attempt all the questions.

Group "B"   [6×7=42]

1. State and explain the triangle and polygon laws of vector. Explain scalar and vector products.

2. Define centripetal acceleration and derive its expression.
   A ballet dancer spins with 2.4 rev. S^{-1} with her arms outstretched; when the moment of inertia about the axis of rotation is I. with her arms folded, the moment of inertia about the same axis becomes 0.61. Calculate the new rate of spin.

135

OR

Give the theory of a compound pendulum and derive an expression for its time period.

3. What do you understand by gravitational potential in the earth's gravitational field? Calculate its value on the earth's surface. Define and explain geostationary satellite.

4. State and prove Bernoulli's theorem.
   Differentiate between Streamlined flow and Torbulent flow.

OR

Define Young's modulus of elasticity and explain its experimental determination.
A Capillary tube of 0.4 mm diameter is placed vertically inside a liquid of density 800kg m^{-3}, surface tension 5.0×10^{-2} Nm^{-1} and angle of contact 30^0. Calculate the height to which the liquid rises in the capillary in each case.

5. Explain the experimental determination of the specific heat of solid by the method of mixture. Deduce the expression of work done during isothermal process.

6. State and explain second law of thermodynamics.
   A convex lens of focal length 24 cm (refractive indes1.5) is totally immersed in water (refractive index = 1.33) Find its focal length in water.

OR

Derive the mirror formula for concave mirror.
Explain chromatic aberration in lenses.

Group "C" [2×12=24]

7. Explain the working principle of gas thermometer.
   show that PV^r = constant; where symbols carry their usual meanings.
   Derive thermal efficiency of heat engine.

OR

Derive Lens Maker's formula.
Describe measurement of refractive index by real and apparent depth method.
Define the total internal reflection and critical angle.

8. Explain the determination of the distance, size, mass and surface temperature of astronomical objects.

Group "A" [14]

1. The example of scalar quantity is
   (a) angular momentum   (b) torque
   (c) velocity   (d) work

2. The coefficient of restitution for perfectly elastic collision is
   (a) 1   (b) 0
   (c) ∞   (d) −1

3. Which one of the following expression is correct expression for the time period of Torsional pendulum?

   (a) $2\pi\sqrt{\dfrac{1}{C}}$ b. $\dfrac{1}{2p}\sqrt{\dfrac{1}{c}}$

   (c) $2\pi\sqrt{\dfrac{C}{I}}$ (d) $2\pi\sqrt{\dfrac{I}{G}}$

4. Radius of gyration of a body is independent of its
   (a) mass   (b) axis of rotation
   (c) size of the body   (d) distribution of mass

5. The escape velocity from the earth's surface in km/sec is about
   (a) 4.2   (b) 7.2
   (c) 9.2   (d) 11.2

6. Which one of the following describes the motion of a liquid in a tube?
   (a) Bernoulli's theorem   (b) Poiseuilli's equation
   (c) Stoke's law   (d) Archimede's principle

7. On stretching a wire, the elastic energy stored per unit volume is

(a) $\dfrac{F.Dl}{2Al}$ (b) $\dfrac{FA}{2l}$

(c) $\dfrac{Fl}{2A}$ (d) $\dfrac{Fl}{2}$

8. Surface tension arises due to
   (a) adhesive force between molecules
   (b) cohesive force between molecules
   (c) gravitational force between molecules
   (d) both (a) and (c)

9. Which one of the following is correct value for the latent heat of fusion of ice?
   (a) 50 cal/gm   (b) 80 cal/gm
   (c) 70 cal/gm   (d) 540 cal/gm

10. For a certain gas the ratio of specific heats is given to be r=1.5. Then for this gas
    (a) C_p=5R   (b) C_p=4R
    (c) C_p=3R   (d) C_v=5R

11. If the angle of a prism is 60^0 and angle of minimum deviation is 40^0, then the angle of refraction will be
    (a) 30° (b) 4°
    (c) 3° (d) 2.6°

12. Rainbow is formed due to
    (a) diffraction   (b) dispersion
    (c) reflection   (d) refraction

13. Which one of the following Astronomical instrument is based on the principle that a reflected ray is turned through double the angle through which the mirror is rotated?
    a) optical telescope   (b) radio telescope
    (c) sextant   (d) photocell

14. Which is the hottest planet of the solar system?
    (a) Mars   (b) Mercury
    (c) Venus   (d) Pluto

Exam 2071

Group "A"   14

Attempt ALL the questions. Tick ($\sqrt{}$) the best answers.

1. Wave length of the compound pendulum has its minimum time period?
   a. length equal to its radius of gyration
   b. length greater than its radius of gyration
   c. length less than its radius of gyration
   d. length equal to the half of radius of gyration

2. Which one of the following is correct expression of work done by torque?
   a. W =Ia   b. W = IQ
   c. W = tO   d. W = FS

3. Forces F_1 and F_2 act at a point mass in two mutually perpendicular directions. The resultant force on the point mass will be
   a. $F_1 + F_2$ b. $\sqrt{(F_1^2 + F_2^2)}$
   c. $F_1 - F_2$ d. $F_1^2 + F_2^2$

4. If R is the radius of the earth and g the acceleration due to gravity on the earth's surface, the mean density of the earth is
   a. $\dfrac{4\pi G}{3gR}$ b. $\dfrac{3\pi G}{4gR}$
   c. $\dfrac{3g}{4\pi RG}$ d. $\dfrac{\pi Rg}{12G}$

5. Rotational kinetic energy of a body depends on
   a. distribution of mass   b. impulse
   c. linear velocity   d. buth (b) and (c)

6. Which one of the following is correct unit of surface tension in SI system of unit?
   a. N/m^2 b. N/m
   c. N-m   d. J/m

7. The first law of thermodynamics is a special case of

a. Newton's law   b. Charle's law
c. Low of the heat exchange   d. Law of conservation of energy

8. After terminal velocity is reached the acceleration of a body falling through of fluid is
   a. equal tog   b. zero
   c. less than g   d. more than g

9. Chromatic aberration in a lens is caused by
   a. reflection   b. interference
   c. diffraction   d. dispersion

10. The planet having the largest number of natural satellites is
    a. Neptune   b. Earth
    c. Saturn   d. Jupiter

11. What is the unit of stress in SI Unit?
    a. Nm^2 b. Nm^{-1}
    c. Nm^{-2} d. Jm^{-1}

12. For a certain gas the ratio of specific heats is given to be r = 1.5. Then for this gas
    a. $C_P = 5R$ b. $C_P = 4R$
    c. $C_P = 3R$ d. $C_v = 5R$

13. An object is placed 15cm from a convex mirror of focal length 10cm. The image distance is
    a. 6cm   b. 4cm
    c. 5cm   d. 3cm

14. The shape of Milky way galaxy is
    a. square type   b. circular type
    c. flat lens shaped disc type   d. rectangular type

Attempt ALL the questions.

<div align="center">Group "B"</div>   6×7=42

1. Explain resolution of vector quality and resold a vector into rectangular components.
   The magnitude of two vectors are equal and the angle between them is 9. Show that their resultant divides angle θ equally.

2. State Kepler's laws. Prove that Kepler's third law is consistent with Newton's law of gravitation.

3. Explain surface tension. Discuss molecular theory of surface tension.
   What should be the pressure inside air bubble of 0.1mm radius situated just below the water surface?
   Surface tension of water = 7.2×10^2 Nm^{-1} and
   atmospheric pressure = 1.013×105 Nm^{-2}

<div align="center">OR</div>

   Classify the equilibrium with conditions. Explain Torsion pendulum and derive time period it.

4. State Hooke's law. Explain properties of rubber by stress-strain curve.
   What is the percentage increase in the length of a wire diameter 2.5 mm stretched by a force of 100 kg?

OR   Define enthalpy and entropy.
   Prove that $C_P - C_v = r$; where symbols have their usual meanings.

5. Explain how streamline flow is different from turbulent flow? State and prove Bernoulli's theorem.

6. Obtain mirror formula for a concave mirror in case of forming virtual image. A glass prism has a refracting angle of 60^0 and a refractive index of 1.5. Calculate the angle of minimum deviation and the value of the angle of incidence at position of minimum deviation.

<div align="center">OR</div>

Derive Lens Maker's formula.

<div align="center">Group "C"</div>   2×12=24

7. Discuss the determination of the distance, size, mass and surface temperature of astronomical objects.

8. Explain elastic and inelastic collision with their properties. Describe moment of inertia, torque and couple.

OR

Explain isothermal and adiabatic process. Find the equation and work done during adiabatic process only.

Time: 3 hrs.   Full Marks: 80

Attempt All the questions.

Group "B"   6×7=42

1. State the parallelogram law of vector addition. Derive an expression for the magnitude and direction of resultant vector $\vec{R}$, if two vectors $\vec{A}$ and $\vec{B}$ make an angle θ with each other at a point.

2. Explain, with mathematical detail, the variation of 'g' with the rotation of the earth. A space-ship is launched into a circular orbit close to the earth's surface what additional velocity should now be imparted to the space ship in the orbit to overcome the gravitational pull. [4+3]
   (Given: Radius of earth = 6400 km and g = 9.8 m/s^2)

3. Discuss the excess pressure of a liquid drop. Deduce an expression for the excess pressure inside a spherical drop of a liquid in terms of its radius of curvature and surface tension. How is the expression modified in the case of a soap bubble? [2+4+1]

OR

Define and verify principle of moment.
A wheel of moment of inertia 20kg m^2 about its axis rotated from rest about its centre by a constant torque T and the energy gained in 10 sex is 360 j. Calculate the angular velocity at the end of 10 sec and torque T applied [3+4]

4. State and explain Newton's formula for viscosity
   Define coefficient of viscosity by using it.
   In a test experiment on a model aircraft in a wind tunnel, the flow speeds on the upper and lower surface of wing are 80mS^{-1} and 73 mS^{-1} respectively. What is the left on the wing, if its area is 2.5 m^2?
   (Density of air = 1.29 kg m^{-3}). [4+3]

5. Define Young's Bulk and Shear modulus of elasticity. Show that the energy density of a strained wire is 1/2 Y. (strain)2; Y is the Young's modulus of the material of the strained wire. [3+4]

OR

Explain critical angle and total internal reflection. Establish a relation between refractive index and critical angle of the medium. [5+2]

6. Discuss the working principle of platinum resistance thermometer and gas thermometer.
   A person took in aluminum cup weighing 0.120 kg at 20°C, during morning. Intending to drink tea he poured 0.300 kg of tea from a kettle initially at 70°C. Find the common temperature of the tea and the cup. (Given: specific heat capacity of aluminum = 910J kg^{-1} and specific heat capacity of water = specific heat capacity of tea = 4190J kg^{-1} k^{-1}).

OR

Explain adiabatic process. Show that PVr = constant for a gas undergoing adiabatic change. .... [3+4]

Group 'C'   2×12=24

7. Explain the chief contribution to the knowledge of planetary motion made by Copernicus, Kepler, Galilee and Newton
   Describe the3 lunar eclipses with diagram.. [6+6]

8. Define simple harmonic motion. Find an expression for the total energy of the particle executing S.H.M.
   Show the maximum potential energy is same as that of maximum kinetic energy which is equal to total energy.

Give the theory of a compound pendulum and derive an expression for its time period. ....[1+4+2+5]

OR

Define parallax. Explain image formed when object is placed at various distances in principal axis of concave and convex mirror. Derive an expression of refractive index by using refraction through prism. ....[2+6+4]

Group "A"

14

Attempt All the questions. Tick (√) the best answers.

1. Two vectors $\vec{A}$ and $\vec{B}$ will be perpendicular if

   a. $\vec{A} \cdot \vec{B} = 1$ b. $\vec{A} \cdot \vec{B} = 0$

   c. $\vec{A} \cdot \vec{B} = 1$ d. $\vec{A} \cdot \vec{B} = 0$

2. Which of the following is correct unit of angular momentum?

   a. $kg - m^2 s^2$ b. $kg m^2 s^{-1}$

   c. $kg - ms^{-1}$ d. $kg^{-1} - m^{-2} s^{-1}$

3. What happens to the centripetal acceleration of particle, when its speed id doubled and angular velocity is halved?

   a. doubled   b. halved

   c. remains unchanged   d. becomes times

4. A satellite is orbiting close to earth's surface, its time period is

   a. $\pi\sqrt{\dfrac{2R}{g}}$ b. $2\pi\sqrt{\dfrac{2R}{g}}$ c. $2\pi\sqrt{\dfrac{R}{2g}}$ d. $\dfrac{\pi}{2}\sqrt{\dfrac{R}{g}}$

5. A liquid will wet a surface of a solid if angle of contact is

   a. less than 90°   b. more than 90°

   c. 90°   d. any negative value

6. The change in the shape of a regular body is due to

   a. shearing strain b. bulk strain

   c. longitudinal strain   d. tensile strain

7. The angle between viscous force and the motion of flow of liquid is

   a. 0°   b. $\dfrac{\pi}{4}$ c. $\dfrac{\pi}{2}$ d. π

8. In which of the following process, internal energy of a system remains constant?

   a. isochoric   b. isobaric   c. isothermal   d. adiabatic

9. The equivalence of two systems in thermal equilibrium is represented by

   a. heat   b. energy   c. specific heat   d. temperature

10. Radius of curvature of convex mirror is 40cm and the size of object is twice as that of image, then the image distance is

    a. 20cm   b. 10cm   c. 40cm   d. 30cm

11. The maximum angle of deviation is for

    a. red   b. violet   c. blue   d green

12. Which of the following is the brightest planet in the solar system?

    a. Mercury   b. Venus   c. Mars   d. Jupiter

13. Which one of the following astronomical instrument is based on the law of rotation of light?

    a. optical telescope   b. radio telescope

    c. sextant   d. photocell

14. A simple harmonic motion has amplitude A and time period T. The maximum velocity will be

    a. 4AT   b. $\dfrac{2A}{T}$ c. $2\pi\dfrac{A}{T}$ d. $2\pi\sqrt{\dfrac{A}{T}}$

Exam 2067

Time: 3 hrs.
Full Marks: 80

Botany

Attempt all the question.

Group "B" 3x7=21

1. Describe with near sketches the activity of cambium in a dicot stem.
2. with the help of diagrams. Describe the prophase I of meiosis.

OR

Briefly describe the Watson and Crick's model of BNA.

3. with the help of suitable sketches. Describe the development of embryo sac in Angiosperms.

OR

Give the symptoms and control measures of black rot of crucifers.

Group "C" 12

4. Describe the mechanism of Krebs's cycle and explain its significance in plant respiration.

OR

What is hybridization? Describe the various steps involved in the hybridization procedure.

Group "A" 7

Attempt all the questions. Tick (√) the best answers.

1. Conjoint, collateral and closed vascular bundles are fount in
   a. Monocot root   b. Monocot stem   c. Dicot stem   d. Dicot root
2. Periderm includes
   a. cork cambium, cork and secondary cortex
   b. cork cambium and cork
   c. cork
   d. cork and secondary phloem
3. A nucleoside is a combination of
   a. base and pentose sugar   b. base and phosphate
   c. pentose sugar and phosphate   d. base, pentose sugar and phosphate
4. Independent assortment will not take place between genes borne in the same chromosome. They are side to be.
   a. recessive genes   b. dominant genes
   c. linked genes   d. cross genes
5. Which one is female gametophyte?
   a. Embryo   b. Embryo sac   c. Endosperm   d. Synergid
6. In photosynthesis, dark reactions take place in
   a. Stroma   b. Grana   c. Cytoplasm   d. Mitochondria
7. Late blight of potato is caused by
   a. Virus   b. Bacteria   c. Fungi   d. Nematode

Zoology

Attempt all the questions.

Group "B" 3x7=21

1. List down the different types of animal breeding. Explain in-breeding with their advantages and disadvantages.
2. Describe different insect products of Bee and Silk-worm used by human being.

OR

Explain different types of diseases of bee with their causes and treatment.

3. Explain anatomical and physiological evidences of organic evolution.

OR

Write down different theories explaining origin of life.

Group "C"   12

1. Describe structure of kidney of human being with well labelled diagram. Write down its functions also.

OR

Describe photoreceptor organ of human being with well labelled diagram. Write down its functions also.

Group "A"

7

Attempt all the questions. Tick (√) the best answers.

1. of the following. Which one can't secrete wax?
   - a. Apes dorsata
   - b. Apes labriosa
   - c. Apes cerana
   - d. Apes mellipona

2. Of the following, which one is most harmful method of pest control?
   - a. Biological control
   - b. Cultural control
   - c. Natural control
   - d. Chemical control

3. Of the following which one is the first animal to be domesticated?
   - a. Cat
   - b. Goat
   - c. Cow
   - d. Dog

4. "Cry of a baby" is which type of behavior?
   - a. Learned behavior
   - b. Aggressive behavior
   - c. Instinct behavior
   - d. Leadership behavior

5. Which of the following organ maintain the pH of our body fluids?
   - a. Lung
   - b. Ureter
   - c. Kidney
   - d. Skin

6. Which of the following is "Synovial joint"?
   - a. Rib's joint
   - b. joint in tools socket
   - c. Saddle joint
   - d. Sternum joint

7. Which of the following is embryological evidence of organic evolution?
   - a. Connecting links
   - b. Missing links
   - c. Fossils
   - d. Ontogeny repeats phylogeny

EXAM 2068

Students are required to give their answers in separate answer books.

(Botany+Zoology)

Botan (S.Ed.322)

Attempt ALL the questions.

Group 'B'

[3×7=21]

1. Explain Mendel's law of independent assortment.

OR

Define linkage. Explain its significance.

2. With the help of suitable sketches illustrate the genesis in angiosperms.

OR

Give the symptoms, modes of transmission and control measures of Tobacco mosaic virus.

3. Explain the factors affecting photosynthesis.

Group 'C'

[12]

4. With the help of series of neat and well labeled diagram describe the process of secondary growth in dicot stem.

OR

What are growth hormones? Describe the role and application of any two growth hormones in agriculture and horticulture.

Zoology (S.Ed.322)

Attempt ALL the questions.

Group 'B'

[3×7=21]

1. Write won the role of poultry in rural development. Explain the use of byproducts of poultry.

2. Differentiate natural and artificial type of pest control. Write down artificial type of pest control.

OR

What is IPM? Explain the different insects controlling methods used in IPM.

3. Write down well labeled diagram of skin and mention its functions.

OR

Write down function of tongue with well labeled diagram.

4. What is pisci–culture? Explain different types of ponds necessary for pisci–culture. Write down different types of pisci culture and also mention the qualities of culturable fishes.

OR

Write down the principles of animal husbandry. Explain different types of animal breeding with their advantages and disadvantages. Name two breeds of cow and buffalo.

Zoology (Biology S.Ed.322)
Group 'A' [7]
Attempt ALL the questions. Tick the best answers.

1. Which of the following is the first fish far of Nepal?
   a) Tarahara   b) Parwanipur
   c) Godawari   d) Hetauda
2. Which one of the following is 'fibrous joint'?
   a) joint between ribs and sternum
   b) wrist joint
   c) shoulder joint
   d) joints between skull bones
3. Of the following which one is the natural type of pest control?
   a) using repellent   b) using fumigants
   c) using attractants   d) using predators
4. Which of the following is, basic functional unit of kidney?
   a) Helen's loop   b) Nephron
   c) Nephridiun   d) Malpighian body
5. Of the following how much is the tolerable sound intensity?
   a) 50 dB   b) 40dB
   c) 90dB   d) 80dB
6. Which of the following is responsible for colour detection?
   a) Rods   b) Cones
   c) Rods and cones   d) Choroid
7. Which receptors are responsible for the sense of taste?
   a) Photo receptor   b) Tango–receptors
   c) Gustato–receptors   d) Olfacto–receptors

Botany (Biology Sc.Ed.322)
Group 'A' [7]
Attempt ALL the questions. Tick the best answers.

1. Another tern for cork is
   a) phellogen   b) phelloderm
   c) periderm   d) phellem

2. A vascular bundle in which protoxylem faces towards the periphery is called
   a) Exarch   b) Endarch
   c) Mesarch   d) Centrach
3. In meiosis homologous chromosomes separate from one another in
   a) Metaphase I   b) Metaphase II
   c) Anaphase I   d) Anaphase II
4. In DNA Guanine pairs with
   a) Thyrnine   b) Adenine
   c) Uracil   d) Cytosine
5. Emasculation is achieved by
   a) removal of anthers   b) removal of style
   c) removal of ovary   d) removal of periarith
6. Endosperm in angiosperms results after fertilization form
   a) Zygote   b) Secondary nucleus
   c) Syriergids   d) Antipodals
7. Growth hormone responsible for apical dominance is

a) auxin   b) cytokinin
c) gibberellins   d) ethylene

Exam 2069
Group 'A'   [7]

Attempt ALL the questions. Tick the best answers.

1. Periderm is formed from
   a) vascular cambium   b) phellogen
   c) fascicular cambium   d) interfascicular cambium
2. In a dicot stem, the vascular bundle is
   a) radial   b) eccentric
   c) concentric   d) interfascicular
3. The chromosome with median centromere and almost equal arms is called
   a) acrocentric   b) metacentric
   c) submetacentric   d) collateral
4. When, during the meiotic division, do the centromers divide?
   a) Diplotene   b) Metaphase I
   c) Diakinesis   d) Anaphase II
5. In double fertilization, the male gamete and secondary nucleus give rise to
   a) embryo   b) endosperm
   c) gamete   d) zygote
6. Apical dominance is related to
   a) gibberrellin   b) auxim
   c) cytokinir   d) abscisic acid
7. The causative agent of Black rot crucifer is
   a) virus   b) bacterium
   c) fungus   d) insect

Attempt ALL the questions.

Group 'B'   [3×7=21]

1. Draw neat and well labelled diagram of transverse section of dicot stem and mono cot stem. Point out their distinguishing characters.
2. What do you mean by crossing over? Explain out their distinguishing characteristics.
2. What do you mean by crossing over? Explain its significance.

OR

Explain Watson and Crick's model of DNA.

3. Describe the development of dicotyledonous embryo.

OR

What are the symptoms of late blight of potato? What measures will you adopt to control this disease?

Group 'C'   [12]

4. Define the term hybridization. Describe the various steps involved in the hybridization procedure.

OR

What is photosynthesis? Describe the process of light and dark reactions.

Zoology (S. Ed. 322)

Attempt ALL the questions.

Group 'B'   [3×7=21]

1. Define embryology. Write down different types of eggs. Differentiate oogenesis and spermatogenesis.

OR

What is cleavage? Write down different types of clevage and theories of development.

2. Name different excretory organs of human body. Explain the major excretory organ.

OR

Write down well labelled diagram of tongue and explain its functions.

3. Differentiate instinct and learned behaviour. Explain social behaviour with example.

4. Write down different indigenous animal breeds. Describe different types of animal breeding with their advantages and disadvantages.

OR

Write down the role of poultry farming in rural development. Write down different breeding methods used in poultry farming. Explain the different diseases & parasites of fowl with their remedies.

Exam. 2070
Botany

Time: 3 hrs.   Full Marks: 80
Attempt all the questions.

Group "B"   [3×7=21]

1. What is secondary growth? Explain the activity of cambium in dicotyledonous stem.
2. Define crossing over. Explain its significance.

OR

Explain in brief the structure of DNA.

3. With the help of suitable sketches describe the development of typical embryo sac in Angiosperms.

OR

Write the symptoms and control measures of loose smut of wheat.

Group "C"   [12]

4. What is growth hormone? Describe the role and applications of any two growth hormones in agriculture and horticulture.

OR

What is hybridization? Describe the various steps involved in the hybridization procedure.

Group "A"   [7]

Attempt all the questions. Tick the best answers.

1. Inter fascicular cambium is situated
    (a) between vascular bundles   (b) within the single vascular bundle
    (c) outside the vascular bundle   (d) between epidermis and endodermis
2. Independent assortment is absent in case of
    (a) genes located in the same chromosome
    (b) genes located on homologous chromosomes
    (c) genes located on non-homologous chromosomes
    (d) genes located in separate chromosomes
3. Nucleotides are made of
    (a) purines + sugar + phosphate
    (b) pyrimidines + sugar + phosphate
    (c) purines/pyrimidines + sugar + phosphate
    (d) Pentose sugar + phosphate
4. The process of removing stamens from floral buds during hybridization experiment is
    (a) selfing   (b) crossing
    (c) emasculation   (d) pollination
5. In angiosperm, endosperm is normally
    (a) haploid   (b) diploid
    (c) triploid   (d) tetraploid
6. Krebs cycle takes place in
    (a) endoplasmic reticulum   (b) cytoplasm
    (c) Golgi complex   (d) mitochondria
7. The final product of glycolysis is
    (a) glucose   (b) pyruvic acid
    (c) phosophoglyceric acid   (d) citric acid

Zoology

Attempt all the questions.

Group "B" [3×7=21]

1. Differentiate territorial and social behaviour. Explain learned behavious.

   OR

   List different types of pests. Describe any three safe ways of pest control.

2. Describe the structure and functions of skin of human body with labeled diagram.

   OR

   Describe the development of rabbit up to the formation of gastrula.

3. What is fossil? Explain the anatomical evidences of organic evolution with examples.

Group "C" [12]]

4. What are the principles of animal husbandry? Write down indigenous and exotic breeds of cow. How many types of animal breeding are in practice ? Give their advantages and disadvantages.

   OR

   Define pisciculture, Enumerate the different qualities of culturable fishes. Describe different types of ponds necessary for pisci-culture.

Exam 2071

Botany (Biology S.Ed.322) 7

Group "A"

Attempt ALL the questions. Tick (√) the best answers.

1. The parenchymatous cells in between the xylem and phloem bundles are known as
   - a. conductive tissues
   - b. connective tissues
   - c. conjunctive tissues
   - d. convention tissues

2. Crossing over is a mechanism to produce
   - a. recombination between linked genes
   - b. expression of linked genes
   - c. synopsis between homologous chromosomes
   - d. linkage between two genes

3. Which of the following plant hormones stimulates the synthesis of a - amylase L
   - a. auxin
   - b. gibberellins
   - c. cytokinin
   - d. ethylene

4. The minimum photosynthesis takes place in
   - a. red light
   - b. yellow light
   - c. blue light
   - d. green light

5. The cell organelle associated with protein synthesis is
   - a. mitochondria
   - b. Golgi body
   - c. ribosome
   - d. chloroplast

6. Double fertilization was discovered by
   - a. P. Maheshwari
   - b. S.G. Nawaschin
   - c. Hofmeister
   - d. E. Strasburger

7. Late blight of potato is caused by
   - a. synchytrium endobioticum
   - b. phytophthora infestans
   - c. alternaria solani
   - d. albugo Candida

Zoology (Biology S.Ed.322) 7

Group "A"

Attempt ALL the questions. Tick (√) the best answers.

1. Of the following which one is the connecting link between fishes and amphibian?
   - a. Lizard
   - b. Snakes
   - c. Protopterus
   - d. Newts

2. Selecting a site is
   - a. agnostic behaviour
   - b. social behaviour
   - c. territorial behaviour
   - d. parental behaviour

3. Which one of the following is "Cartilaginous joint"?

146

a. elbow joint   b. knee joint
c. shoulder joint   d. joint between ribs and sternum*

4. The basic functional unit of kidney is
   a. Henle's loop   b. Nephron
   c. Capsule   d. Malpighian body

5. The most effective pest control is
   a. cultural control   b. mechanical control
   c. genetic control   d. chemical control

6. Which of the following is covering of corneal?
   a. choroids   b. ciliary part
   c. conjunctiva   d. iridial part

7. Which one of the following animal suffer from disease called 'bird flu'? H_5N_1
   a. fish   b. bee
   c. bug   d. bird

Students Are required to give their answer in separate answer books (Botany + Zoology).

Botany (Sc.Ed.322)

Attempt ALL the questions.

Group "B"   3×7=21

1. What is secondary growth? With the help of suitable diagrams, highlight the role of vascular cambium in the secondary growth.

2. Explain Mendel's law of independent assortment.

OR

Explain the morphological nature of chromosome.

3. With the help of well labeled diagram, illustrate the process of microsporogenesis.

OR

Describe the symptoms, causal organism and control measures of white rust of crucifers.

Group "C"   12

4. Describe the mechanism of Kreb's cycle and explain its significance in plant respiration.

OR

Describe the chemical nature of chromosome.

Zoology (Sc.Ed.322)

Attempt ALL the questions.

Group "B"   3×7=21

1. What is cleavage? Write down different types of cleavage and theories of development.

OR

Describe the structures of gametes of Rabbit with labeled diagram.

2. Enumerate the different functions of kidney of human being with well labeled diagram.

OR

Write down different types and functions of bones with diagram.

3. Define organic evolution. Explain embryological evidences of organic evolution.

Group "C"   12

4. List down different silk-worms. Describe the life history of silk-worm with labeled diagram and give its economic importance also.

OR

Explain how poultry farming promotes rural development in Nepal. Write down different poultry breeds and breeding methods as well.

Exam 2072

Time: 3 hrs.   Full Marks: 80

Attempt All the questions.

Group "B"   3×7=21

1. What is secondary growth? Describe the role of cambium for secondary growth in dicot stem with suitable diagrams.

2. Explain Mendel's law of segregation with suitable example.

OR

Briefly describe the structure of DNA.

3. Describe the development of typical dicot embryo sac with suitable sketches.

OR

Give the symptoms and causal organisms of the following:
a. Black rot of crucifers
b. Late blight of potato

Group "C"   12

4. What are plant growth hormones? Describe the role and application of any two growth hormones in agriculture and horticulture.

OR

What is hybridization? Describe the various steps involved in the operation of hybridization programmes.

Group "A"   14

Attempt All the questions. Tick (√) the best answers.

1. Which one is lacking in Monocot stem?
   a. sieve tube   b. companion cells
   c. phloem parenchyma   d. wood parenchyma

2. Independent assortment is absent in case of
   a. genes located in the same chromosome
   b. genes located in homologous chromosomes
   c. genes located on non-homologous chromosomes
   d. genes located in separate chromosomes

3. Endosperm tissue in Angiosperms is normally
   a. haploid   b. diploid   c. triploid   d. tetraploid

4. Oxidative phosphorylation is formation of
   a. $NADPH_2$ in respiration   b. ATP in respiration
   c. NADPH in photosynthesis   d. ATP in photosynthesis

5. Minimum photosynthesis takes place in
   a. red light   b. yellow light   c. blue light   d. green light

6. Loose smut of what is caused by
   a. Puccinia   b. Albugo   c. Ustilago   d. Phytophthora

7. In which of the following stages meiosis reduction of chromosome number into half takes place?
   a. Metaphase I   b. Anaphase I
   c. Metaphase II   d. Anaphase II
                              Zoology

Attempt All the questions.

Group "B"   [3×7=21]

1. List down different types of bones. Explain different types of joints in human body.

OR

Describe the structure and function of Kidney

2. Define paleontology. Explain paleontological evidences of organic evolution with examples.

OR

Give an account of Darwin's theory of Natural Selection.

3. IPM is the best method of pest control. Why? Describe.

Group "C"   12

4. Write down different qualities of cultivable fishes. Describe different types of ponds necessary for pisciculture. Differentiate between monoculture and polyculture.

OR

What is cleavage? Describe different types of cleavage and their development with labelled diagram.

Exam 2067

Time: 3 hrs.   Full Marks: 100
Attempt all the questions.

Group "B" 8x7=56

1. Distinguish between general and behavioral objectives.
2. Write in short the learning objectives of psychomotor domain.
3. What are the objectives and advantages of PSSC project?
4. Explain science as product and process.
5. Mention the important factors and approaches in developing science curriculum.

OR

What are the major problems of teaching science in Nepal.

6. Explain the importance of field trip method in teaching science.

OR

Critically analyses the present Biology science curriculum at secondary level.

7. Differentiate between formative and summative evaluation.

OR

Explain the recent trend in science education.

8. Explain the origin and development of science in Nepal.

Group "C" 2x12=24

9. What do you mean by affective domain? Explain the classification of affective domain suggested by David R. Krathwohl.
10. Describe the learning objectives of Bruner's theory.

OR

Write down the methods of preparing Mosaic, collies and origami as instructional materials.

Group "A"   [20]

Attempt all the questions. Tick (√) the best answer.

1. Which of the following statement is related to the comprehension level of cognitive domain?
   a. Remembering of previously learned materials
   b. Translation of the materials and prediction of the consequences
   c. Listing of materials
   d. Judgment of the value materials

2. Which of the following approach is most related with green version BSCS curriculum?
   a. Cellular approach   b. Molecular approach
   c. Experimental approach   d. Ecological approach

3. $CaCO_3(S) + heat \rightarrow CaO(S) + CO_2(g)$
   The significance of this equation shows
   a. knowledge level item   b. application level item
   b. comprehension level item   d. evaluation level item

4. Bruner's approach to learning science is based on
   a. product of learning
   b. structure, readiness, intuition and interest
   c. learning style   d. learning hierarchy

5. The role of science supervisor is to
   a. improve the classroom behavior during instruction
   b. enrich the background of the teachers
   c. guide in selecting and organizing the materials of instruction
   d. all of the above

6. By using diagnostic test the teacher will find out
   a. student's achievements   b. student's learning difficulties
   c. student's progress   d. student's attitude

7. CHEM-study course stress
   a. productive learning and thinking
   b. memorization of principle, theory and laws

c. product approaching learning
d. rote learning

8. Which of the following is the highest level of cognitive domain?
   a. Knowledge   b. Application
   c. Comprehension   d. Evaluation

9. Reasoning on the basis of hypothesis is developed at the stage of
   a. formal operational period   b. concrete operational period
   c. symbolic mode   d. pre-operational period

10. Guided discovery is characterized by
    a. teaching students what to do
    b. consulting the teacher students will work independently
    c. after the planning lesson, student will study according to this plan
    d. solving problems without the help of the teacher

11. The time periods per week allotted for secondary science is
    a. Three   b. four   c. five   d. six

12. The questions "what are the use of radioactive elements?" it denotes a
    a. value level question   b. concept level question
    c. fact level question   d. work experience level question

13. When child makes mistakes. What should the teacher do according to piaget?
    a. He should correct it
    b. He should examine the child's age
    c. He should give the concept
    d. He should give more exercises

14. What does the evaluation expect?
    a. attainment of objectives   b. learning stage
    c. achievement of students   d. all of the above

15. Which of the following principles is utilized in a project method of science teaching?
    a. principle of reality and utility
    b. principle of learning by doing
    c. principle of freedom and economy
    d. all of them

16. The present nature of final evaluation of science SLC test consists of
    a. 100 marks theory
    b. 90 marks theory and 10 marks practical
    c. 80 marks theory and 20 marks practical
    d. 75 marks theory and 25 marks practical

17. What the main purpose of item analysis?
    a. To find the consistency of the score
    b. To select the appropriate test items
    c. To determine the validity of the score
    d. To formulate the objective ;of the lesson

18. Which of the following is not a part of science curriculum?
    a. Objectives   b. Test book
    c. learning theories   d. Teaching aids

19. Science textbook must be
    a. usable anywhere in the country
    b. usable in any time of teaching situation
    c. usable in any type of school
    d. all of the above

20. Action verbs are used to make instructional objectives
    a. measurable   b. broad
    c. attractive   d. short

EXAM 2068

[20]

Group 'A'
Attempt ALL the questions. Tick the best answers.
1. Demonstration method is useful when
   a) students are very tired to de experiment

b) number of students are very few
c) students cannot de experiment
d) teacher is interested to & experiment by himself

2. The main defect of audio–visual material is that
   a) it does not help die teacher to display materials
   b) it cannot demonstrate, the three dimension picture
   c) it cannot create interest in pupil to learn
   d) it cannot be used in classroom

3. Which of the following is the observation test?
   a) written test   b) rating scale
   c) diagram test   d) true and false test

4. What does it mean by scientifically literate?
   a) person–with higher degree in science
   b) person who is literate in science
   c) person who applies knowledge
   d) any literate person

5. What is most important think to be considered while developing science curriculum
   a) community   b) learner
   c) teacher   d) parent

6. Which is flee criteria of good test item?
   a) reliability   b) validity
   c) acceptability   d) all of the above

7. What is e–learning in science education?
   a) as instruction delivered on a computer by the use of Internet
   b) as instruction delivered on a television from station
   c) as instruction delivered on a microscope
   d) as instruction delivered on a large class–size by using overhead projector

8. Curreve which means to run is
   a) Latin word   b) Greek word
   c) English word   d) French word

9. The chief selling point of the essay test is
   a) high validity
   b) appropriateness to measure organization skills
   c) high reliability
   d) total economy

10. At which stage can student diagnose associative transitivity and distributive property of operation?
    a) pre–operational   b) formal operation
    c) problem identification   d) data collection

12. To accumulate information through experimental observation was one of the objective of
    a) CHEM–curriculum model   b) CBA–curriculum model
    c) PSSC–curriculum model   d) Nuffield –curriculum model

13. What does Skinner's induction mean?
    a) generalization of stimulus and response
    b) connection between stimulus and response
    c) connection between reinforcement and feedback
    d) generalization of early experience

14. Who is responsible for the planning of the school curriculum?
    a) National Council for Education Development, Ministry of Education
    b) diagnose learning difficulties
    c) National curriculum Council
    d) Curriculum Development Center

15. A table of specification chant helps teacher
    a) design instructional procedures
    b) diagnose learning procedure
    c) have clear picture of students background

d) build content validity in the test

16. Which is the highest level of learning in psychomotor domain?
    a) evaluation   b) characterization
    c) organization   d) naturalization

17. An action research helps to the teacher
    a) provide feedback to the students
    b) in taking decision for improvement
    c) in suggesting the ideas to the curriculum
    d) to provide feedback to the educationist

18. Evaluation as the determination of degree to which educational programme goals were achieved. Who has defined it?
    a) Anastasi   b) Cronbach
    c) Starrlebean   d) Tyler

19. Which test shows high reliability?
    a) true–false   b) fill of the blanks
    c) essay test   d) Multiple choice item

20. The quality of test over standardized test, when
    a) it is more valid in the local situation
    b) it is more valid in the national situation
    c) it is based on uniform curriculum
    d) it is based on standard scoring

Exam 2069

Attempt All the questions.

Group "B" [8×7=56]

1. Explain the psychological objectives of Piaget's theory in science teaching.
2. What are the importances of inclusion of science in school curriculum?
3. Esplain the Ausubel's theory and its application in science teaching.

OR

Supplementary reading materials help to study science education, Justify it.

4. What is science project 2000⁺? How does it differ from other project?

OR

Explain how a science teacher can act as a facilitator of learniong?

5. What are the basic criteria for the selection of teaching methods? Explain the advantage and disadvantage of inductive and deductive method.

6. Science education is for all students. Justify it.

OR

What are the major problems of teaching science in Nepal? Give suggestion to teach science effectively.

7. What is recent trend in science education? Give the comparison of the traditional and co-operative learning method.

8. What are the major qualities that good science teacher shouls possess? Explain.

Group "C" 2×12=24

9. What are the characteristics of good lesson plan? Develop a lesson plan using student centred apporach on the topic "Eye" for grade nine students.

10. What are the basic criterea of good science textbook? Critically evaluate the science textbook of grade nine of Nepal.

OR

Give different views of the definition of curriculum. Critically analyse the secondary science curriculum of Nepal.

Group "A" 20

Attempt all the questions.

1. Which method is more appropriate in teaching science at secondary level?
    (a) Deductive   (b) Inductive
    (c) Analytic   (d) Synthetic

2. What qualities does science education develop in students?
    (a) Attitude   (b) Appreciation
    (c) Confidence   (d) All of the above

3. Which of the following behavior falls under cognitive domain?
   (a) Analyses   (b) Translate
   (c) Judge   (d) All of the above
4. Which of the following is the most formal form of group discussion?
   (a) Buzze group   (b) Seminar
   (c) Panel   (d) Round table
5. The most important feature of the good textbook is
   (a) logical presentation of context   (b) appropriate colour
   (c) attractive layout   (d) good printing and binding
6. Which of the following questions is more specific?
   (a) What do you know about ....
   (b) What do you understand about ......
   (c) What do you mean by ....
   (d) What are the differences between ....
7. The nearest star to the earth is
   (a) The sun   (b) Alpha-centuri
   (c) Sirius   (d) Vega
8. The gold is usually extracted from
   (a) alluvial soil   (b) haematite
   (c) copper glance   (d) argentite
9. Which one of the following is catabolic process?
   (a) ascent of sap   (b) transpiration
   (c) photosynthesis   (d) respiration
10. Which one of the following is known as suicidal bag of cell?
   (a) Ribosome   (b) Mitochondria
   (c) Lysosome   (d) Nucleus
11. Which part of the human brain control emotions?
   (a) cerebellum   (b) olfactory lobe
   (c) spinal cord   (d) cerebrum
12. Diagnostic features of insects is
   (a) three pairs of legs   (b) two pairs of compound eyes
   (c) chitinous endoskeleton   (d) segmented body
13. Who was applied the project method for the first time?
   (a) Stevenson   (b) Froebel
   (c) John-Richardon   (d) Kilpatrik
14. What is the Latin word of science?
   (a) sciencia   (b) scientia
   (c) sciential   (d) scientiae
15. An organism which is a connective link between animals and plant is
   (a) Virus   (b) Bacteria
   (c) Euglena   (d) Amoeba
16. The key aspect of unit plan is
   (a) problem-solving   (b) creative thinking
   (c) content selection   (d) content organization
17. The blue version of BSCS Biology teaching plays emphasis on the approach of
   (a) molecule to man   (b) an inquiry into life
   (c) an ecological approach   (d) evolution
18. Which of the following given planet has the largest number of satellites?
   (a) Saturn   (b) Uranus
   (c) Mercury   (d) Pluto
19. Affective domain is concerned with
   (a) attitude   (b) knowledge
   (c) application   (d) comprehension
20. Bruner's approach to learning science is, based on,
   (a) knowledge   (b) evaluation level item
   (c) comprehension level item   (d) application level item

Time: 3 hrs.

Full Marks: 100

Attempt all the questions.

Group "B"

[8×7=56]

1. Write down the steps of curriculum development. What are the causes of curriculum changes?
2. List out the laboratory safety rule in teaching science.
3. Mention the role of science teacher for developing scientific attitude.
4. Write down the level wise objectives of physics of grade nine curriculum.

OR

What are the defects of present science curriculum? Give your suggestions to improve it.

5. Explain the importance of discovery method in teaching science.
6. What is meant by organization of science club in school? What do you expect from science club in science teaching?

OR

What is unit planning? What step should be followed in preparing unit plan? What are its merits?

7. Discuss the various levels of cognitive domain.
8. What is micro-teaching? Write down the characteristic features of micro-teaching.

OR

Explain the various ways to strengthen our present science education programme.

Group "C"

[2×12=24]

9. What is specification chart? Explain the status of specification grid weight age in secondary school science curriculum?

OR

mention the need and purpose of evaluation. Write down the methods of estimation of reliability and validity.

10. Explain all the phases and versions to biological science curriculum study (BSCS) project.

Group "A"

[20]

Attempt all the questions. Tick (√) the best answers.

1. "My mother wants me to be a science teacher" is an example that denotes the level of
   - (a) evaluation
   - (b) knowledge
   - (c) attitude
   - (d) comprehension
2. The yellow version of B SC biology teaching plays emphasis on the approach of
   - (a) an inquiry into life
   - (b) molecular to man
   - (c) an ecological approach
   - (d) all of them
3. Which of the following is not the characteristic of evaluation?
   - (a) reliability
   - (b) validity
   - (c) continuity
   - (d) rigidity
4. Inquiry as a teaching process, emphasizes on
   - (a) independent learning
   - (b) skill learning
   - (c) dependent learning
   - (d) socialised learning
5. Which of the following gas is responsible for "acid rain"?
   - (a) chlorine
   - (b) hydrogen sulphide
   - (c) sulphur dioxide
   - (d) nitrogen oxide
6. In problem-solving method hypothesis is tested after
   - (a) formation of hypothesis
   - (b) data collection
   - (c) defining the objectives
   - (d) stating the conclusion
7. A school head teacher can also act as a supervisor
   - (a) within the school
   - (b) both within and outside the school
   - (c) in the resource centre
   - (d) in the district where his/her school located
8. Grade repetition is serious education problem in Nepal. At what stage does it occur?
   - (a) Grade 1
   - (b) Grade 3

    (c) Grade 5   (d) Grade 8

9. The Montessori method of teaching is not related to
    (a) motor education   (b) sensory education
    (c) vocational education   (d) language and numeric education

10. Which chromosome group are responsible for determining female body?
    (a) XY   (b) YX   (c) YY   (d) XX

11. If the difficulty level of an item is 25, then this item can be prescribed as
    (a) very easy   (b) very difficult
    (c) highly discriminating   (d) poorly discriminating

12. Multiple choice questions should test the skill of
    (a) analysing   (b) recalling
    (c) comprehending   (d) evaluating

13. Which of the following is not an essential component of a unit plan?
    (a) objective   (b) activity
    (c) evaluation   (d) home work

14. The book "Taxonomy of educational objectives, the classification of educational goals-Hand Book I Cognitive Domain" is written by
    (a) B. Bloom   (b) E.M. Simpson
    (c) Robert Mayer   (d) R. Tyler

15. The addition of solid sodium carbonate to pure water causes
    (a) an increase in hydrogen ion concentration
    (b) an increase in hydroxide ion concentration
    (c) no change in pH
    (d) a decrease in the hydroxide ion concentration

16. The leaves of a plant becomes intensely yellow often
    (a) due to development of carotene   (b) due to breakdown of chloroplast
    (c) excess of Mg.   (d) due to viral infection

17. A bullet hits and gets embedded in a solid block resting on a horizontal frictionless table. What energy is conserved?
    (a) momentum and kinetic energy
    (b) kinetic energy only
    (c) momentum only
    (d) neither momentum nor kinetic energy

18. An aqueous solution of H_2S is,
    (a) weakly acidic   (b) neutral
    (c) strongly acidic   , (d) alkaline

19. Mutation arises due to
    (a) infection micro-organism   (b) abrupt changes in gene
    (c) dominant character of one of the parents
    (d) nutritional factors

20. Which of the below given "action verb" is evaluation level " of cognitive domain?
    (a) compare   (b) convert
    (c) compare   (d) distinguish

<div align="center">

Exam 2071

Group "A"   20

</div>

Attempt ALL the questions. Tick ($\sqrt{}$) the best answers.

1.   "The whole of science is nothing more than a refinement of everyday thinking". Who opines this statement?
    a. Albert Einstein   b. Johan Woodborn
    c. Vant Hoff   d. Mendeleeu

2.   Why the use of "multimedia" in classrooms has given a new look to the traditional methods of teaching - learning science?
    a. multimedia is the modern technology
    b. students in the 21st century do not critically think without multimedia
    c. real-life situations can be demonstrated with the results
    d. Students are well familiar with the computers

3.   According to piaget's theory which stage of children develop the understanding of reversibility?

a. sensorimotor   b. pre-operational
c. concrete operational   d. formal operational

4. A teacher presents examples to formulate a general principle which method is used here?
   a. lecture   b. discovery
   c. deductive   d. project

5. Which of the following is not included in the scientific altitude?
   a. making pupil positive thinking
   b. helping pupil make critical observations
   c. making pupils open minded
   d. developing curiosity among pupils

6. Which of the following is an objective of science teaching?
   a. to develop scientific attitude in pupils
   b. to enhance scientific theories, principles and knowledge
   c. to develop personality of the learners
   d. to develop ability to differentiate atoms from molecules

7. Which one is the highest level objective of cognitive domain according to Bloom's taxonomy?
   a. analysis   b. evaluation
   c. application   d. synthesis

8. Which statement is true?
   a. curriculum means only those subjects which are taught
   b. curriculum means the planned activities of schools
   c. curriculum means whole body of course
   d. all of them

9. Which of the following is the most suitable concept of science curriculum?
   a. acquisition of information
   b. course of study
   c. course comprising laboratory activities
   d. experiences of pupils that they receive through manifold activities

10. To accumulate information through experimental observation was one of the objectives of
    a. CBA - curriculum model   b. CHEM - curriculum model
    c. Nuffield - curriculum model   d. PSSC - curriculum model

11. Which of the following teaching aids is the most effective to teach a lesson "solar syste"?
    a. slide projector   b. overhead projector
    c. LCD projector   d. Internet

12. Which one of the following is not the characteristics of a good science textbook?
    a. the book is a reflection of the author's personality
    b. questions and exercises are at the end of the book
    c. the book provides opportunities for the pupils to think and analysis
    d. the language of the books should be simple

13. Which of the following teaching method is student-centred
    a. lecture   b. lecture-demonstration
    c. discussion   d. inductive

14. Demonstration method is specially useful when
    a. problem is to be created
    b. the equipments are easily available
    c. the experiment involves some danger
    d. quick revision of experiments is desired

15. When a teacher says "Look at the roots of the given plants and questions, in what ways do the roots of rice plant differ from pea plant?" the teacher is emphasizing
    a. observation   b. comparison
    c. discussion   d. hypothesize

16. How many specific objectives are mentioned in the unit "Carbon and its compounds" in the secondary school science curriculum?
    a. three objectives   b. four objectives

c. five objectives   d. six objectives

17. The quality of test is over - standardized test when
    a. it is based on standard scoring
    b. it is more valid in the local situation
    c. it is based on uniform curriculum
    d. it is more valid in the national situation

18. A kind of evaluation that is used at the end of a course is known as
    a. summative evaluation   b. affirmative evaluation
    c. cumulative evaluation   d. diagnostic evaluation

19. Which of the following is a limitation of microteaching?
    a. it enables the student teacher to do self-reflection
    b. there is no problem of class management
    c. it provides training in skills of teaching only
    d. it provides an opportunity for student teacher to learn from each other

20. What is the most important role of teacher in a successful field-trip?
    a. be a guide   b. be a demonstrator
    c. be a resource person   d. keep record of students' achievements

Attempt ALL the questions.

Group "B"   8×7=56

1. What is curriculum? Explain the importance of science in school curriculum.
2. What is learning theory? Explain Gagne's model of sequential learning.
3. What is meant by scientific attitude? How does it differ from scientific method?

OR

What are the major laboratory problems in secondary school in Nepal? Suggest the possible solutions to those problems.

4. Identify the criteria for the selection of objectives. Discuss in detail any two of them.
5. Write the objective of B.S.C.S and PSSC Science projects.

OR

'In science teaching affective domain objectives are not given too much importance.' As a teacher do you agree with this statement? Justify your answer.

6. Explain the importance and use of textbooks in teaching science in schools.
7. Define micro-teaching. Should micro-teaching be made compulsory in teacher education programmes? Justify your argument.
8. Now a days it is being widely observed that internet is being misused by learners. As a teacher how can you guide your learners in this respect and motivate them towards proper usage of technology?

OR

Why are questions so important for a teacher? If students are not able to give answers to a particular question. What strategy would you adopt to draw out responses?

Group "C"   2×12=24

9. What is the importance of project work in science? Develop a lesson plan based on project method. The lesson should clearly reflect active student participation and self-construction of knowledge through the projects undertaken. Choose any one of the following topics for the purpose.
    a. Friction   b. Adaptation
    c. Acids, bases and salts

OR

Suppose you have to teach the science in class VIII in your practice teaching programme. Develop a unit plan on any unit of your choice. How will you integrate knowledge of that unit with other units?

10. What is test item? Critically analyze SLC science test paper under the heading (i) Strenth (ii) Weakness (iii) Suggestions for further improvement.

Time: 3 hrs.   Full Marks: 100
Attempt All the questions.

Group "B"   8×7=56

1. Identifies the areas of science curriculum at the secondary level that you think need modification to meet the requirements of today's learner. Why do you think so?

2. Why is it necessary to have national standards in science education at the school stage? Justify your answer.

OR

Explain the origin and importance of "science project 2000+".

3. Explain Piaget's stages of intellectual growth.

4. What is scientific attitude? Describe the ways of developing scientific attitude in science students.

5. Design five cognitive level objectives on the topic "structure of atom".

OR

Explain the basic features of CHEM-study, and Nuffield science.

6. Critically analyse the textbook of science of the class NINE.

7. How would you teach a lesson 'friction' effectively using demonstration method?

OR

How can micro-teaching as a technique be used to train teachers in various modern methods of imparting science education? Discuss with the help of appropriate examples.

8. Justify the need and means of audio-visual aids for teaching science.

Group "C"   2×12=24

9. Why would you prefer student - centered strategies over teacher- centered strategies in science education? Make a lesson plan based on any innovative student- centered strategy to teach any one of the following:
   a. Law of Inertia   b. Bohr's atomic model
   c. Life-cycle of Fern

10. What are test items? Review critically SLC test paper- 2069 under the headings-strength, weakness and suggestions for further improvement.

OR

Suppose you have to organize a science fair for a cluster of schools in your district. What is going to be your strategy at the following stages:
   a. Planning   b. Implementation
   c. Feedback

Group "A"   20

Attempt All the questions. Tick (√) the best answers.

1. What is the primary objective of science teaching?
   a. to study the history of science
   b. to carry out systematic study about the nature
   c. to give knowledge and information about the world
   d. to study the principles and theories of pure science

2. Behavioral objective should be
   a. useful   b. specific   c. attainable   d. ambiguous

3. Which of the following action verbs is used in application level cognitive domain objective?
   a. solve   b. classify   c. judge   d. arrange

4. Which of the following is not included as components in the "Objectives-Based Science Education"?
   a. a holistic view of science   b. decision making
   c. problematic   d. informatics

5. "Truth is beauty". It accounts ..... of science education
   a. practical value   b. psychological value
   c. intellectual value   d. aesthetic value

6. Which of the following principles is used to select teaching aids?
   a. teaching aid should be simple to use and show

b. teaching aid should be real
c. teaching aid should be perceivable
c. teaching aid should be improvised aids

7. Educational programmes on television are highly effect live, because
   a. it is easy to operate
   b. it can be replayed
   c. it is an interesting mode of learning
   d. it is easily accessible

8. How does "E-learning" improve the flexibility and quality of learning?
   a. allowing students to study at their own pace
   b. giving opportunity to the students to expose
   c. providing the chances to work in virtual laboratory
   d. acquiring and accessing information

9. Which method do you use to teach "electronic structure of atom"?
   a. lecture method
   b. lecture - discussion
   c. laboratory method
   d. discussion

10. Before planning a unit or lesson, the teacher needs to keep in mind
    a. the learners' need
    b. the learners' capabilities
    c. resources available in the school
    d. all of them

11. Which lesson of the following is included in the science curriculum of grade TEN?
    a. law of flotation
    b. ionization
    c. life cycle of silk worm
    d. solar eclipse

12. Which of the following statement is most related to CHEM-study curriculum?
    a. it aims on preparing scientists
    b. it is a descriptive chemistry
    c. it has widen the gap between the scientists and science teachers
    d. it has laid emphasis on principles and experimentation.

13. "Any subject can be taught effectively in some intellectually honest form to my child at any stage of development." Who had proposed this hypothesis?
    a. Ausubel
    b. Bruner
    c. Gagne
    d. Piaget

14. Which of the following is the function of discussion?
    a. interpret information
    b. conduct experiment
    c. formulate hypothesis
    d. prepare plan for investigation

15. What should be the first and most important purpose of the students' assessment?
    a. motivate them to work hard
    b. success them in the summative evaluation
    c. classify the students
    d. get feedback on effectiveness of teaching

16. Which of the following in not done in microteaching?
    a. training in classroom management
    b. providing feedback by written means
    c. by reattaching the student-teacher gains confidence in the skill
    d. provide4s and opportunity to learn from each other

17. The time periods per week allocated for secondary science is
    a. three
    b. four
    c. five
    d. six

18. The questioning in a classroom makes the students
    a. busy
    b. curious
    c. attentive
    d. co-operative

19. Which of the following rule, if observed, will help most to avoid accidents in chemistry laboratory?
    a. do not mix chemicals aimlessly
    b. do not use concentrated acids
    c. breakages should be reported to the teacher
    d. nothing should be taken out of the laboratory without the permission of the teacher

20. Which one of the following test-item promotes wild guessing?
    a. multiple choice
    b. matching
    c. yes or no item
    d. fill in the blanks