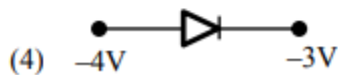# PHYSICS SECTION-A

1. Which among the following is forward biased:

(1) 0 V — ▷| — −3V

(2) 0V — ▷| — +5V

(3) +2V — ▷| — +10V

(4) −4V — ▷| — −3V
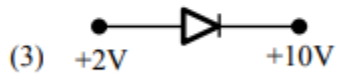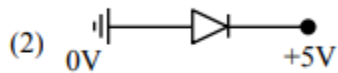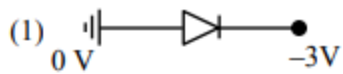
Ans - (1)

2. Acceleration due to the earth on the surface is g_0. If the mass of the earth remains the same but the radius is half, then find the acceleration on the surface for a new system :

(1) $0 g 2$ (2) g_0 (3) $2 g_0$ (4) $4 g_0$

Ans. (D)

3. 5. Two particles having a mass of 4g & 25g have the same kinetic energy. Find the ratio of their momentum.
 (1) $2/5$ (2) $2/3$ (3) $4/5$ (4) $3/4$
Ans. (1)

4. A uniform and homogeneous rod has resistance R. If the rod is cut into 5 equal parts and connected in parallel find equivalent resistance.
 Ans. $R/25$

5. A point charge q is placed at the centre of a charged ring of total charge Q. Find tension in the ring.

Ans. KQq 2 R

6. An object of mass 1000 kg is moving at 6 m/s. Find the speed of an object if a mass of 200 kg is added to it.
(1) 4 m/s (2) 5 m/s (3) 8 m/s (4) 6 m/s
Ans. (2)

7. If the electron revolving in the third Bohr's orbit of hydrogen species has a radius of R, then what will be its radius in the fourth orbit in terms of R?
(1) 25R /9 (2) 16R /9 (3) 36R /9 (4) 9R /16
Ans - (2)

8. An EM wave is given by E = 200 sin [1.5 ×107 t 3 0.05 x] N/C Find the intensity of wave. [õ0 = 8.85 × 10312 SI units]
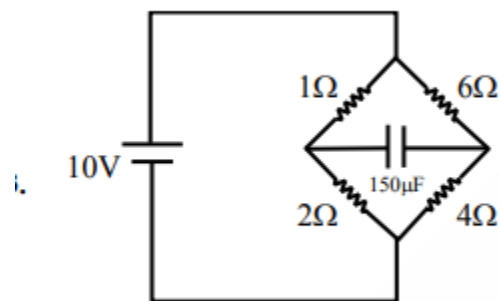Ans. 53.1

9. A particle performs SHM with an amplitude of 4 cm. Speed of the particle at the mean position is 10 cm/sec. Find position from mean where speed is 5 cm/sec
(1) 2 cm (2) 2 3 cm (3) 0.5 cm (4) 3cm
Ans. (2)

10.

Find the charge on capacitor at steady state?
(1) 200 C (2) 300 C (3) 400 C (4) 500 C

11. A gas undergoes isothermal expansion from 30 dm3 to 45 dm3 . Find heat absorbed by gas if external pressure is 10 kPa?
(1) 100 J (2) 150 J (3) 120 J (4) 200 J
Ans. (3)

Chemistry

1. Mass of methane required to produce 22 g CO_2 upon combustion is _____.
Ans. (8)
Solution - Moles of CO_2 = 22 44 = 0.5 ü CH_4 n 0.5 ü CH_4 m 8g

2. $NaCl + H_2SO_4 + K_2Cr_2O_7$ Products Above reaction gives red fumes
(A) which on hydrolysis with aqueous NaOH gives yellow solution (B). Compounds (A) and (B) are :
Ans. CrO_2Cl_2, Na_2CrO_4

3. Electronic configuration of Nd(Z = 60) is :
Ans. [Xe] 4f 4 6s

4. Assertion: Boron has very high melting point (2453 K)
Reason: Boron has a strong crystalline lattice.
Ans. A-T; R-T ; Exp. Right

5. How many of following have +4 oxidation number of central atom: $BaSO_4$, $SOCl_2$, SF_4, H_2SO_3, $H_2S_2O_7$, SO_3
Ans. (3)
Solution $SOCl_2$, SF_4, H_2SO_3

6. If 3 moles of an ideal gas at 300 K expands isothermally from 30 dm3 to 45 dm3 against a constant pressure of 80 K pascal then the amount of heat transfer is ___ joule.
Ans. (1200)

7. Which of the following has a +4 oxidation state?
(1) $H_2S_2O_7$ (2) H_2SO_3
Ans. (2)

8. For negative deviation from Raoult's law :
(1) BP increases; VP increases (2) BP decreases; VP increases (3) BP decreases ; VP decreases (4) BP increases ; VP decreases
Ans. (4)

9. Which halogen does not show a variable oxidation state?
(1) F_2 (2) Cl_2 (3) Br_2 (4) I_2
Ans. (1)

10. The correct statement regarding stereochemistry of SN1 and SN2 reaction is
(1) SN1 – Racemisation SN2 – Retention (2) SN1 – Racemisation SN2 – Inversion
(3) SN1 – Retention SN2 – Inversion (4) SN1 – Inversion SN2 – Retention

Ans. (2)

Mathematics

1. Let $8 = 3 + 3\,p\,4\ + 2\,3\,2p\,4\ + \ldots f$, then p is
(1) 9 (2) 5 4 (3) 3 (4) 1
Ans. (1)

2. If $|z - i| = |z - 1| = |z + i|$, $z \in C$, then the numbers of z satisfying the equation are
(1) 0 (2) 1 (3) 2 (4) 4
Ans. (2) Sol. z is equidistant from 1, i, & – i only z = 0 is possible ? number of z equal to 1

3. If the minimum distance of the centre of the circle $x^2 + y^2 - 4x - 16y + 64 = 0$ from any point on the parabola $y^2 = 4x$ is d, find d^2
Ans. (20)
Solution - Normal to parabola is $y = mx - 2m - m^3$ centre (2, 8) o $8 = 2m - 2m - m^3$ Ÿ m = –2 ?
p is $(m^2 , -2m) = (4, 4)$ Ÿd $^2 = 4 + 16 = 20$

5. If $f(x) = x^3 + x^2 f'(1) + x f''(2) + f'''(3)$, then find $f'(10)$.
Ans. (202)
Solution -
 $f'(x) = 3x^2 + 2x f'(1) + f'(2)$
$f''(x) = 6x + 2f'(1)$ $f'''(3) = 6$
$f'(1) = -5$ $f''(2) = 2$
Ÿ $f'(10) = 300 + 20(-5) + 2 = 202$

6. If $Dx + Ey + 9\ln|2x + 3y - 8O| = x + C$ is the solution of $(2x + 3y - 2)dx + (4x + 6y - 7)dy = 0$, then D + E + J =
(1) 18 (2) 19 (3) 20 (4) 21
Ans. (1)

7. If P(X) represents the probability of getting a '6' in the Xth roll of a die for the first time. Also
a = P(X = 3)
b = P(X t 3)
c = P X 6 x 3 § · t ¨ ¸ © ¹ ! , then b c a = ?
Ans. (12)

8. If four points (0, 0), (1, 0), (0, 1), (2k, 3k) are concyclic, then k is
(1) 4 13 (2) 5 13 (3) 7 13 (4) 9 13
Ans. (2)
Solution - The equation of circle is

x(x − 1) + y(y − 1) = 0 x 2 + y2 − x − y = 0 B(2k, 3k)

$\ddot{Y}$ 4k2 + 9k2 − 2k − 3k = 0

$\ddot{Y}$ 13k2 = 5k

$\ddot{Y}$ k = 0, 5 13 ?

k = 5 13

9. If cos(2x) − a sinx = 2a − 7 has a solution for a   [p, q] and r = tan9° + tan63° + tan81° + tan27°, then p.q. r = ?

 (1) 40 5 (2) 32 5 (3) 30 5 (4) 48 5

Ans. (4)

10. Let dx dt + ax = 0 and dy by 0 dt

 where y(0) = 1, x(0) = 2, and x(t) = y(t), then t is

(1) ln 3/ a − b (2) ln 2/ b − a (3) ln 2/ a − b (4) ln 3/ b − a

Ans. (3)