TEST SERIES CSIR-NET/JRF JUNE 2019

BOOKLET SERIES C

PHYSICAL CHEMISTRY

Paper Code 01 **Test Type: TEST SERIES**

CHEMICAL SCIENCES

Duration: 2:00 Hours **Date: 02-06-2019**

Maximum Marks: 180

Read the following instructions carefully:

* Single Paper Test is divided into **THREE** Parts.

Part - A: This part shall carry **10** questions. Each question shall be of **2 marks.**

Part - B: This part shall carry **20** questions. Each question shall be of **2 marks.**

Part - C: This part shall contain **30** questions. Each question shall be of **4 marks**.

* Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.
* There will be negative marking @25% for each wrong answer.
* The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.
* For rough work, blank sheet is attached at the end of test booklet.

PART – A

1. If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be :
(a) 4 days (b) 5 days (c) 6 days (d) 7 days

2. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is
(a) 1 hour (b) 2 hours (c) 3 hours (d) 4 hours

3. If in a certain language 'GIVE' is coded as 'FWJH' and 'TAKE' is coded as 'FLBU', then in the same language code for 'MINE' is
(a) NOJM (b) NOJN (c) FOJN (d) FONJ

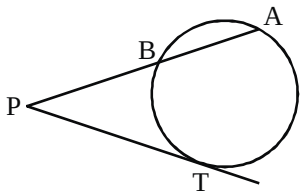
4. If
1. Jatin is older than Ram, but younger than Sita.
2. Neither Sita nor Shyam is the youngest member.
3. Shyam is older than Ram, but younger than Lakshman.
4. Ram is older than Madhu, but younger than Lakshman.
5. Lakshman is older than Jatin, but younger than Sita.
Then who is the youngest ?
(a) Ram (b) Sita (c) Madhu (d) Jatin

5. Find the length of canvas1.25 m wide required to build a conical tent having base radius 7 metres and height 24 metres.
(a) 200 (b) 440 (c) 400 (d) 308

6. D is mother of B.
C and E are married couple.
A and F are brothers.
A and D are married coupled.
C is father of D.
How is D related to F ?
(a) Wife (b) Sister (c) Sister-in-law (d) Aunt

7. A broker's commission is 5 % on all sales upto ` 10,000 and 4 % on all sales exceeding ` 10,000 . He gives ` 31,100 to the owner. What is the total sales ?
(a) ` 33,000 (b) ` 32,500 (c) ` 34,200 (d) ` 33,100

8. If in the figure given below, PBA is a secant and PT is a tangent having a length of 6 cm and PA = 9 cm, then what is the length of AB in cm ?

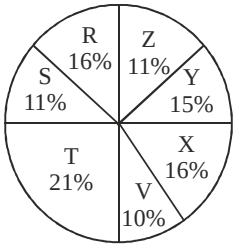


(a) 4 (b) 3 (c) 5 (d) 6

9. The average temperature of the town in the first four days of months was 58 degrees.The average for the second, third, fourth and fifth days was 61 degrees. If the temperatures of the first and fifth days were in the ratio 7 : 8, then what is the temperatrue on the fifth day ?
(a) 68 degrees (b) 60 degrees (c) 96 degrees (d) 80

10. Study the following pie-chart and the table and answer the question based on it.

PERCENTAGE OF POPULATION OF SEVEN VILLAGES IN 1997



Village	% Population Below Poverty Line
X	38
Y	52
Z	42
R	51
S	49
T	46
V	58

Find the population of village *S* if the population of village *X* below poverty line in 1997 is 12160.

(a) 18500 (b) 20500 (c) 22000 (d) 26000

PART – B

11. Which one is not a suitable unnormalized wave function for the excited $\sigma_g^1\sigma_u^1$ electron configuration of the H_2 molecule?

(a) $\left[\sigma_g(1)\sigma_u(2)-\sigma_u(1)\sigma_g(2)\right]\left[\alpha(1)\alpha(2)\right]$

(b) $\left[\sigma_g(1)\sigma_u(2)+\sigma_u(1)\sigma_g(2)\right]\left[\alpha(1)\beta(2)-\beta(1)\alpha(2)\right]$

(c) $\left[\sigma_g(1)\sigma_u(2)+\sigma_u(1)\sigma_g(2)\right]\left[\alpha(1)\beta(2)\right]$

(d) $\left[\sigma_g(1)\sigma_u(2)-\sigma_u(1)\sigma_g(2)\right]\left[\beta(1)\beta(2)\right]$

12. The value of the magnetic quantum number of a d_{xy} orbital is

(a) +2 (b) –2 (c) +1 (d) Undefined

13. In case of particle in box, constant of motion defined by

(a) $\hat{x}$ (b) $\hat{p}_x$ (c) both (a) and (b) (d) None of these

14. Which of the following set of molecule will show a microwave rotational spectrum

(a) (SF_6, CH_4, HCl, CH_3Cl) (b) (HCl, CH_3Cl, CH_2Cl_2, H_2O)

(c) (H_2, SiH_4, CH_3OH) (d) (CO_2, HCl, H_2O)

15. The fundamental vibrational frequency and rotational constant of CO molecule are 6.5×10^{13} s^{-1} and 1.743×10^{11} s^{-1}, respectively. The rotational quantum number for which the CO molecule will have same energy as it would have in its first vibrational state with no rotational energy

(a) 19 (b) 30 (c) 51 (d) None of above

16. The correct order of rotational entropy for SbH_3 and NF_3 is

(a) $SbH_3 > NF_3$ (b) $SbH_3 < NF_3$

(c) $SbH_3 \approx NF_3$ (d) sufficient information is not provided

17. Which is the complete and correct set of subgroups for D_3h point group?

(a) D_3, C_3, C_{3V} and S_3 (b) D_3, C_3, C_{3V}, C_{3h} and S_3

(c) C_{3V}, C_{3h}, C_s, C_2 and C_1 (d) D_3, C_3, C_{3V}, C_{3h}, C_s, C_2 and C_1

18. Chiral and Non-polar molecules belongs to which of the given point group?

(a) C_n (b) S_n (c) D_n (d) C_s

19. 3 moles of O_2 and 2 moles of He are mixed at 300 K. The entropy of mixing is

(a) 14 JK^{-1} (b) 22 JK^{-1} (c) 28 JK^{-1} (d) 35 JK^{-1}

20. 3 moles of gas is introduced in a 3L flask at 298 K. After sometime, gas is introuced in 5L flask at 298K. The change in Gibb's free energy

(a) $-3.80\ kJmol^{-1}$ (b) $-1.26\ kJmol^{-1}$ (c) $-2.42\ kJmol^{-1}$ (d) $-4.32\ kJmol^{-1}$

21. 10 moles of an ideal gas is heated from 300K to 400K at constant pressure. The amount of heat is (Given: Variation of $C_{p,m}$ with temperature is $C_{p,m} = 5+0.1\ T$).

(a) 10 kJ (b) 20 kJ (c) 30 kJ (d) 40 kJ

22. Ethylene is produced by

$$C_4H_8\,(\text{cyclobutane}) \xrightarrow{\Delta} 2C_2H_4$$

The rate constant is $2.48\times10^{-4}\ S^{-1}$. The time at which the ratio of ethylene to cyclobutane in reaction mixture is 1 is

(a) 27.25 min (b) 46.57 min (c) 62.35 min (d) 54.47 min

23. For an enzyme catalysis, the slope and intercept of a plot was found to be 2 seconds and $1.2\times10^{-3} mol^{-1}Ls$. The value of Michaelis-Menten constant ($molL^{-1}$) is

(a) 9.78×10^5 (b) 1.66×10^3 (c) 4.23×10^4 (d) 3.27×10^5

24. Species A undergoes a unimolecular reaction as follows:

$$A + A \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} A^* + A$$

$$A^* \xrightarrow{k_2} P$$

For this reaction, the first order rate constant at high pressure is k_∞. The first order rate constant become $\frac{k_\infty}{2}$ when pressure of A is $[A]_{1/2}$. The value of $[A]_{1/2}$ will be

(a) $\frac{k_\infty}{k_2}$ (b) $\frac{k_2}{k_{-1}}$ (c) $k_\infty - [A]_{1/2}$ (d) $\frac{[A]_{1/2}}{k_\infty}$

25. For the reaction, $2A + B \longrightarrow C$. The concentration of A, B and C are 2, 5, 3 mol L^{-1}. The value of equilibrium constant is

(a) 0.75 (b) 0.35 (c) 0.15 (d) 0.015

26. The BET equation reduce to Langmuir equation when

(a) $P^0 >> P$ (b) $P^0 = P$ (c) $P^0 < P$ (d) $P^0 << P$

27. Sedimentation method used to determine molecular weight of polymer. It gives the value of

(a) $\bar{M}_n$ (b) $\bar{M}_w$ (c) $\bar{M}_v$ (d) $\bar{M}_z$

28. If the atoms/ions in the crystal are taken to be hard spheres touching each other in the unit cell, the fraction of volume occupied in the diamond cubic structure is

(a) $\frac{\sqrt{3}\,\pi}{8}$ (b) $\frac{\pi}{6}$ (c) $\frac{\sqrt{2}\,\pi}{6}$ (d) $\frac{\sqrt{3}\,\pi}{16}$

29. Asymmetric effect and electrophoretic effect does not observed in the presence of high frequency alternating current. This effect is known as

(a) Wein effect (b) Debye-Huckel effect

(c) Debye-Falkenhagen effect (d) Onsager effect.

30. The electrode potential of $A^+ \mid A = 0.7V$, $B^{2+} \mid B = 0.2V$, $C^+ \mid C = 0.8V$, $D^+ \mid D = 0.5V$. The order of strength of reducing agent is

(a) B < D < A < C (b) C < A < D < B (c) B < A < C < D (d) C < D < A < B

PART – C

31. Consider a model system of five non-interacting formions in a single-2-dimensional harmonic oscillator. The Hamiltonian of a single particle is

$$\hat{H} = \frac{1}{2m}\left(\hat{p}_x^2 + \hat{p}_y^2\right) + \frac{1}{2}m\omega^2\left(4x^2 + y^2\right)$$

where m is the mass of particle, ω is the angular frequency, $\hat{p}_x$, $\hat{p}_y$ are the momentum operators. The ground state energy of the system of 5 non-interacting fermions is

(a) $5\hbar\omega$ (b) $8\hbar\omega$ (c) $\frac{23}{2}\hbar\omega$ (d) $\frac{27}{2}\hbar\omega$

32. A certain 2-level system has stationary state energies are +0.5 unit and +1.5 unit with normalized wave functions ϕ_1 and ϕ_2 respectively. The energy correction up to second order for the state ϕ_1 in the pressure of the perturbation V for which $V_{21} = \sqrt{\frac{1}{2}}$ unit and $V_{11} = \frac{1}{4}$ unit has been found to be

(a) $+\frac{1}{2}$ unit (b) $-\frac{1}{2}$ unit (c) $\frac{1}{4}$ unit (d) $-\frac{1}{4}$ unit

33. The wave function for a quantum mechanical particle in a 1-dimensional box is given by $\psi = A \cdot \sin\frac{2\pi x}{a}$, then $\left|p_x\right|$ is given by

(a) 0 (b) $\frac{\pi h}{2a}$ (c) $\frac{2h}{a}$ (d) $\frac{h}{a}$

34. The Hamiltonian operator for He-atom is written as $\hat{H} = h_1 + h_2 + \frac{1}{r_{12}}$ (in atomic unit), where h_1 and h_2 are single electron atomic Hamiltonian and $\frac{1}{r_{12}}$ is repulsive perturbation. If first order repulsive perturbation energy correction is 1.25 Hartree then total energy of He-atom up to the first order correction is

(a) –2 Hartree (b) –2.25 Hartree (c) –2.75 Hartree (d) –3.25 Hartree

35. The approximate energy of a system is given by $E = a^2 + 3a - 6$ (in arbitrary energy units) where a is a variational parameter. The minimum energy of the system is

(a) $-\frac{3}{2}$ (b) $-\frac{13}{4}$ (c) $-\frac{21}{4}$ (d) $-\frac{33}{4}$

36. Two different approximate wavefunctions for a given system are given by the linear combinations $\psi_1 = c_1\phi_1 + c_2\phi_2$ and $\psi_2 = d_1\phi_1 + d_2\phi_2 + d_3\phi_3$, where the $\{c_i\}$ and $\{d_i\}$ are variational paramters and the $\{\phi_i\}$ are the basis functions. If λ_1 and λ_2 are the roots of the secular equation for ψ_1, ϵ_1 and ϵ_2 are corresponding roots of secular equation of ψ_2 then it is always true that

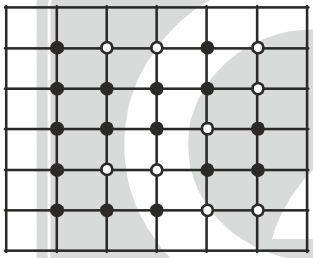
(a) $\lambda_1 < \epsilon_1 < \lambda_2 < \epsilon_2$ (b) $\lambda_1 < \lambda_2 < \epsilon_1 < \epsilon_2$ (c) $\epsilon_1 < \lambda_1 < \epsilon_2 < \lambda_2$ (d) $\epsilon_1 < \epsilon_2 < \lambda_1 < \lambda_2$

37. The rotational heat capacities at constant volume for hydrogen molecule is (Consider H_2 molecule consists of ortho and para hydrogen and $(C_V)_{ortho} = 0.25 \frac{J}{mol\text{-}K} (C_V)_{para} = 1.45 \frac{J}{mol\text{-}K}$ at 150 K)

(a) $0.25 \frac{J}{mol\text{-}K}$ (b) $0.55 \frac{J}{mol\text{-}K}$ (c) $0.75 \frac{J}{mol\text{-}K}$ (d) $0.95 \frac{J}{mol\text{-}K}$

38. Consider the following statements and find out the correct one
(a) Ceasing the rotational motion will change the Mayer's equation ($C_P - C_V = nR$)
(b) Ceasing the translational motion will change the Mayer's equation ($C_P - C_V = nR$)
(c) Ceasing the vibrational motion will change the Mayer's equation ($C_P - C_V = nR$)
(d) Mayer's equation would not get affected by any change in motions.

39. Consider a two dimensional lattice shown in a figure

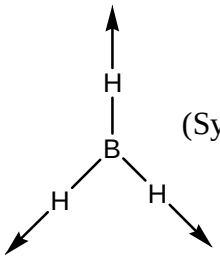


If this lattice represents a schematic of a polymer and filled balls represents the cis linkage and unfilled balls represents the trans linkages. Find out the total number of arrangements in which cis and trans linkages can be arranged on the lattice.

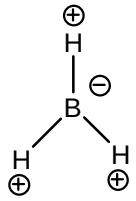
(a) $\frac{\lfloor 25}{\lfloor 16 \lfloor 9}$ (b) $\frac{25}{16 \times 9}$ (c) $\frac{\lfloor 9}{\lfloor 16 \lfloor 5}$ (d) $\frac{\lfloor 16}{\lfloor 20 \lfloor 5}$

40. Match the following

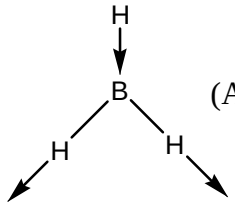
Column-I **Column-II**

(I)  (Symm-Stretch)

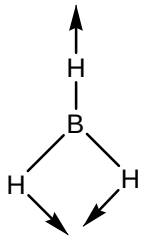
(P) RAMAN → Active
I.R.→ Active

(II)  (Out of plane bending)
⊕ ⟶ upward motion
⊖ ⟶ downward motion

(Q) RAMAN → Active
I.R.→ Inactive

(III)  (Assymetric stretch)

(R) RAMAN → Inactive
I.R.→ Active

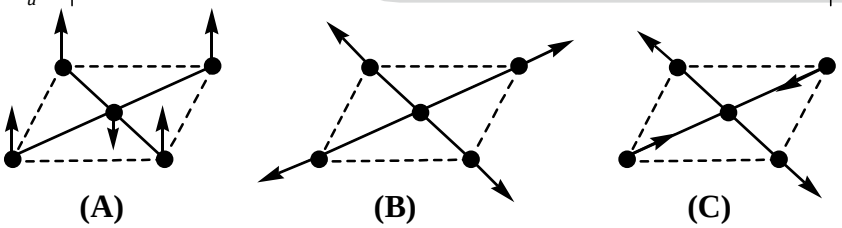
(IV)  (In plane bending)

(a) I-Q, II-Q, III-P, IV-R (b) I-Q, II-Q, III-R, IV-P
(c) I-Q, II-R, III-P, IV-P (d) I-P, II-P, III-R, IV-Q

41. The HCl molecule is well described by Morse Potential with D_e(depth of the potential minima) = 5.33 eV, $\bar{\nu}_e = 2989.7\ \text{cm}^{-1}$ (wave number) and $\bar{\nu}_e x_e\ (\text{Anharmonicity}) = 52.05\ \text{cm}^{-1}$. The depth of the potential minima D_e for DCl will be
(a) 30, 361 cm^{-1} (b) 4.9 eV (c) 42901 cm^{-1} (d) 6.3 eV

42. The correct symmetry transformation of below three A-C normal modes of vibration for square planar molecule. Irreducible representations are

D_{4h}	E	$2C_4$	C_2	$2C_2'$	$2C_2''$	i	$2S_4$	σ_h	$2\sigma_v$	$2\sigma_d$		
A_{1g}	1	1	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_{2g}	1	1	1	−1	−1	1	1	1	−1	−1	R_z	
B_{1g}	1	−1	1	1	−1	1	−1	1	1	−1		x^2-y^2
B_{2g}	1	−1	1	−1	1	1	−1	1	−1	1		xy
E_g	2	0	−2	0	0	2	0	−2	0	0	(R_x, R_y)	(xz, yz)
A_{1u}	1	1	1	1	1	−1	−1	−1	−1	−1		
A_{2u}	1	1	1	−1	−1	−1	−1	−1	1	1	z	
B_{1u}	1	−1	1	1	−1	−1	1	−1	−1	1		
B_{2u}	1	−1	1	−1	1	−1	1	−1	1	−1		
E_u	2	0	−2	0	0	−2	0	2	0	0	(x, y)	



(A) **(B)** **(C)**

(a) A_{2u}, B_{1g} and A_{1g} respectively (b) A_{2u}, A_{1g} and B_{1g} respectively
(c) B_{1g}, A_{1g} and A_{2u} respectively (d) A_{1g}, B_{1g} and A_{2u} respectively

43. Which is the correct set of classified symmetry operations of S_6 point group?
(a) E $2C_3$ i $2S_3$
(b) E C_3^1 C_3^2 i S_6^1 S_6^5
(c) E $2C_6$ $2C_3$ C_2 S_6^1 S_6^5
(d) E S_6^1 S_6^2 S_6^3 S_6^4 S_6^5

44. If compressibility factor, Z = 1+ B(T)P, then at low or moderate pressure (P <<1), fugacity is equal to

(a) $P\,e^{bf/RT}$ (b) $e^{B(T)P}$ (c) Pz (d) $e^{-B(T)P}$

45. $\left(\frac{\partial H}{\partial P}\right)_T$ for a gas following an equation $\left(P+\frac{a}{V^2}\right)V = RT$ is equal to

(a) $\frac{-2aV}{PV^2-a}$ (b) $\frac{PV-a}{2aV}$ (c) $\frac{2a}{V}\left(P-\frac{a}{V^2}\right)^{-1}$ (d) $\frac{2a}{V}$

46. The compressibility factor (z) is represented as $Z=\frac{P\bar{V}}{RT}$. The value of $\left(\frac{\partial H}{\partial P}\right)_T$ is equal to

(a) $-\frac{RT^2}{P}\left(\frac{\partial Z}{\partial P}\right)_T$ (b) $-\frac{RT^2}{P}\left(\frac{\partial Z}{\partial T}\right)_P$ (c) $\frac{ZRT}{P}$ (d) $-\frac{ZRT}{P}$

47. The activation energy of the reaction : $A + B \longrightarrow$ Product is 105.73 kJ mol^{-1}. At 40ºC, the products are formed at the rate of 0.13 mol $L^{-1}min^{-1}$. The rate of formation of product at 80ºC is

(a) 100 $molL^{-1}s^{-1}$ (b) 77.34 $molL^{-1}s^{-1}$ (c) 43.13 $molL^{-1}s^{-1}$ (d) 13.30 $molL^{-1}s^{-1}$

48. For the photochemical reaction,

$A_2 \xrightarrow{h\nu} 2A$

The following mechanism has been proposed.

$A_2 \xrightarrow{h\nu} A_2^*$

$A_2^* \xrightarrow{k_2} 2A$

$A_2^* + A_2 \xrightarrow{k_3} 2A_2$

The expression for $\frac{d[A]}{dt}$ is

(a) $\frac{k_2 I_{abs}}{k_2 + k_3[A_2]}$ (b) $\frac{2k_2 I_{abs}}{k_2 + k_3[A_2]}$ (c) $\frac{2k_2 I_{abs}}{k_3[A_2]}$ (d) $\frac{k_2 I_{abs}}{k_3[A_2]}$

49. The vapour pressure of solid and liquid chlorine is given by

$\log_e P^{solid} = 24 - \frac{3900}{T}$ and $\log_e P^{liq} = 18 - \frac{2600}{T}$

The ratio of slope of the solid-gas curve to the slope of the liquid-gas curve at the triple point is

(a) 1 (b) 1.5 (c) 2 (d) 2.5

50. Acetic acid content in commercial vinegar was analyzed by titrating against 1.5 M NaOH solution. A 20 mL vinegar sample required 18 mL of titrant to give end point. The concentration of acetic acid in the vinegar (in $molL^{-1}$) is

(a) 0.5 (b) 1.35 (c) 1.80 (d0 0.75

51. Charcoal (1 gm) of surface area 100 m^2 per gram adsorbs 60 mg of acetic acid from an aqueous solution at 25ºC and 1 atm. The number of moles of acetic acid adsorbed per cm^2 of charcoal surface is
(a) 10^{-2} (b) 10^{-6} (c) 10^{-5} (d) 10^{-9}

52. Helium gas (showing Langmuir adsorption) adsorbed on charcoal to the extent of 0.921 cm^3g^{-1} at a pressure 4.8 atm and at temperature of 190K, but at 250K the same amount of adsorption is observed when pressure is 32 atm. The molar enthalpy of adsorption of Helium on charcoal is
(a) –3.5 kJ mol^{-1} (b) –8.4 $kJmol^{-1}$ (c) –12.7 $kJmol^{-1}$ (d) –28.9 $kJmol^{-1}$

53. A polymer has following composition

Number of molecules	Molecular weight
20	2000
60	4000
20	6000

The ratio of $\bar{M}_w$ to $\bar{M}_n$ is

(a) $\frac{11}{10}$ (b) $\frac{12}{11}$ (c) $\frac{13}{12}$ (d) $\frac{10}{9}$

54. The (111) plane of an elemental simple cubic crystal diffracts X-rays $(\lambda = 0.154\, nm)$ at Bragg angle 30º. The lattice parameter of the crystal is
(a) 1.54Å (b) 2.66Å (c) 1.33Å (d) 2.18Å

55. A metal crystallizes in face-centered cubic lattice. If the lattice parameter and density of the ctystal are 4Å and 6250 kg/m^3, respectively. The molar mass of the metal is close to
(a) 40 (b) 50 (c) 30 (d) 60

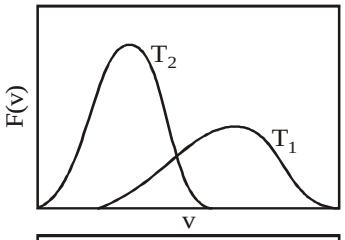
56. The concentration of AB_2 and AB_3 solution is 0.2 M and 0.1 M. The ratio of Debye-Huckel screening length in water at 300K is
(a) $\kappa_{AB_2}^{-1} = \kappa_{AB_3}^{-1}$ (b) $2\kappa_{AB_2}^{-1} = \kappa_{AB_3}^{-1}$ (c) $\kappa_{AB_2}^{-1} = 2\kappa_{AB_3}^{-1}$ (d) $2\kappa_{AB_2}^{-1} = 3\kappa_{AB_3}^{-1}$

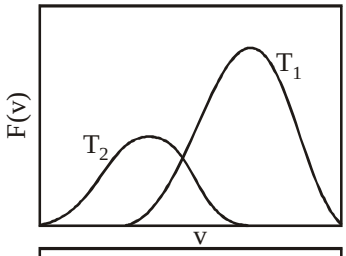
57. The $E^0_{A^{2+}|A} = 1.7V$ and $E^0_{X^-|AX_2|A} = 0.8V$. The concentration of X^- in a saturated solution of AX_2 at 298 K is
(a) $4.26\times10^{-13.45}$ (b) $7.23\times10^{-15.46}$ (c) $5.36\times10^{-7.85}$ (d) $1.26\times10^{-10.15}$

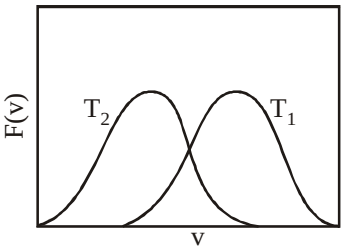
58. The total current observed in polarographic experiment with 0.2 M solution was 1.2μA and total current with X M solution was 2.7μA. If 0.2μA is observed before the experiment started then the value of X is
(a) 0.7 M (b) 0.6 M (c) 0.5 M (d) 0.4 M

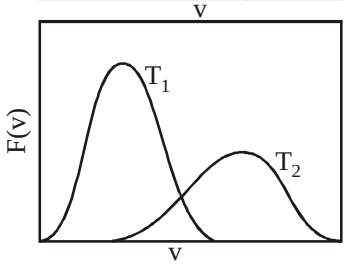
59. The mean $(\bar{x})$ variance (σ^2) and standard deviation (σ) for the numbers 2, 4, 6, 8 are respectively
(a) 5, 25, 5 (b) 5, 5, $\sqrt{5}$ (c) 4, 16, 4 (d) 5, 1, 1

60. For temperature $T_1 > T_2$, the qualitative temperature dependence of the probability distribution F(v) of the speed v of a molecule in three dimensions is correctly represented by the following figure:

(a) 

(b) 

(c) 

(d) 

Space for rough work

CAREER ENDEAVOUR
Best Institute for IIT-JAM, NET & GATE

CSIR-UGC-NET/JRF | GATE CHEMISTRY

CHEMICAL SCIENCES

TEST SERIES-C

Date : 02-06-2019

ANSWER KEY [PHYSICAL CHEMISTRY]

PART-A

1. (a)	2. (a)	3. (c)	4. (c)	5. (b)	6. (c)	7. (b)
8. (c)	9. (c)	10. (c)				

PART-B

11. (c)	12. (d)	13. (b)	14. (b)	15. (a)	16. (b)	17. (d)
18. (c)	19. (c)	20. (b)	21. (d)	22. (a)	23. (b)	24. (b)
25. (c)	26. (a)	27. (d)	28. (d)	29. (c)	30. (b)	

PART-C

31. (c)	32. (d)	33. (d)	34. (c)	35. (d)	36. (c)	37. (b)
38. (b)	39. (a)	40. (c)	41. (c)	42. (b)	43. (b)	44. (c)
45. (a)	46. (b)	47. (d)	48. (b)	49. (b)	50. (b)	51. (d)
52. (d)	53. (a)	54. (b)	55. (d)	56. (a)	57. (d)	58. (c)
59. (b)	60. (a)					