

JEE MAIN 2020 · QUESTION PAPER

6 Sep 2020 **Shift 2**

69 questions in exam order, with answer key

Subject	Section A multiple choice	Section B numerical value
● Physics	19 Q1 to Q19	4 Q20 to Q23
● Chemistry	18 Q24 to Q41	5 Q42 to Q46
● Mathematics	18 Q47 to Q64	5 Q65 to Q69
In this PDF	69 questions · answer key at the end	

- 1 Set a 3 hour timer and attempt the paper in one sitting, like the real exam.
- 2 Check yourself against the answer key at the end. Every question names its chapter, so you can see where marks went.
- 3 Got one wrong? Tap “Step-by-step solution” at the top right of it for the full working, where available.

Attempt this paper online

The same questions in the same order, with instant answer checking and step-by-step solutions where available.

prepwise.in/pyqs/paper/2020-09-06-evening · Free, no signup needed to start

Answers follow NTA's final answer keys. Typing errors are possible, so check doubtful answers against the official key. Spotted a mistake?
prepwise.in/feedback · Terms: prepwise.in/terms

Q1 Nuclear Physics

[Step-by-step solution](#) > [prepwiser.in/questions/5AUBQA_o3y](https://www.prepwiser.in/questions/5AUBQA_o3y)

Given the masses of various atomic particles

$$m_p = 1.0072 \text{ u}, m_n = 1.0087 \text{ u}, m_e = 0.000548 \text{ u},$$

$$m_{\bar{\nu}} = 0, m_d = 2.0141 \text{ u}, \text{ where } p \equiv \text{proton}, n \equiv \text{neutron},$$

$e \equiv \text{electron}$, $\bar{\nu} \equiv \text{antineutrino}$ and $d \equiv \text{deuteron}$. Which of the following process is allowed by momentum and energy conservation?

- (A) $n + n \rightarrow \text{deuterium atom}$
(electron bound to the nucleus)
- (B) $n + p \rightarrow d + \gamma$
- (C) $p \rightarrow n + e^+ + \bar{\nu}$
- (D) $e^+ + e^- \rightarrow \gamma$

Q2 Collision

[Step-by-step solution](#) > [prepwiser.in/questions/IS0dcfei6X](https://www.prepwiser.in/questions/IS0dcfei6X)

Particle A of mass m_1 moving with velocity $(\sqrt{3}\hat{i} + \hat{j}) \text{ ms}^{-1}$ collides with another particle B of mass m_2 which is at rest initially. Let $\vec{V}_1$ and $\vec{V}_2$ be the velocities of particles A and B after collision respectively. If $m_1 = 2m_2$ and after

collision $\vec{V}_1 = (\hat{i} + \sqrt{3}\hat{j})$, the angle between $\vec{V}_1$ and $\vec{V}_2$ is:

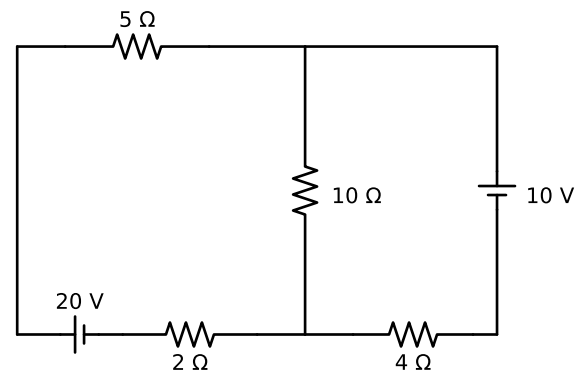
- (A) 105° (B) 15° (C) -45° (D) 60°

Q3 Current Electricity

[Step-by-step solution](#) > [prepwiser.in/questions/p5tr1WB0TC](https://www.prepwiser.in/questions/p5tr1WB0TC)

In the figure shown, the current in the 10 V battery is close to:

- (A) 0.36 A from negative to positive terminal
- (B) 0.42 A from positive to negative terminal
- (C) 0.71 A from positive to negative terminal
- (D) 0.21 A from positive to negative terminal



Q4 Current Electricity

[Step-by-step solution](#) > [prepwiser.in/questions/OWm3PuOFrb](https://www.prepwiser.in/questions/OWm3PuOFrb)

A circuit to verify Ohm's law uses ammeter and voltmeter in series or parallel connected correctly to the resistor. In the circuit:

- (A) Ammeter is always connected in series and voltmeter in parallel
- (B) Both ammeter and voltmeter must be connected in series
- (C) Both ammeter and voltmeter must be connected in parallel
- (D) Ammeter is always used in parallel and voltmeter is series

Attempt this paper online with instant answer checking > [prepwiser.in/pyqs/paper/2020-09-06-evening](https://www.prepwiser.in/pyqs/paper/2020-09-06-evening)

Assuming the nitrogen molecule is moving with r.m.s. velocity at 400 K, the de-Broglie wavelength of nitrogen molecule is close to:

(Given : nitrogen molecule weight : 4.64×10^{-26} kg,

Boltzman constant: 1.38×10^{-23} J/K,

Planck constant : 6.63×10^{-34} J.s)

(A) $0.44 \text{ \AA}$

(B) $0.34 \text{ \AA}$

(C) $0.20 \text{ \AA}$

(D) $0.24 \text{ \AA}$

For a plane electromagnetic wave, the magnetic field at a point x and time t is

$$\vec{B}(x, t) =$$

$$\left[1.2 \times 10^{-7} \sin (0.5 \times 10^3 x + 1.5 \times 10^{11} t) \hat{k} \right]$$

T

The instantaneous electric field $\vec{E}$ corresponding to $\vec{B}$ is:

(speed of light $c = 3 \times 10^8 \text{ ms}^{-1}$)

(A) $\vec{E}(x, t) = \left[36 \sin (1 \times 10^3 x + 1.5 \times 10^{11} t) \hat{i} \right] \frac{\text{V}}{\text{m}}$

(B) $\vec{E}(x, t) = \left[36 \sin (0.5 \times 10^3 x + 1.5 \times 10^{11} t) \hat{k} \right] \frac{\text{V}}{\text{m}}$

(C) $\vec{E}(x, t) = \left[36 \sin (1 \times 10^3 x + 0.5 \times 10^{11} t) \hat{j} \right] \frac{\text{V}}{\text{m}}$

(D) $\vec{E}(x, t) = \left[-36 \sin (0.5 \times 10^3 x + 1.5 \times 10^{11} t) \hat{j} \right] \frac{\text{V}}{\text{m}}$

Two identical electric point dipoles have dipole moments $\vec{p}_1 = p\hat{i}$ and $\vec{p}_2 = -p\hat{i}$ and are held on the x axis at distance 'a' from each other. When released, they move along the x-axis with the direction of their dipole moments remaining unchanged. If the mass of each dipole is 'm', their speed when they are infinitely far apart is:

(A) $\frac{p}{a} \sqrt{\frac{3}{2\pi\epsilon_0 ma}}$

(B) $\frac{p}{a} \sqrt{\frac{1}{\pi\epsilon_0 ma}}$

(C) $\frac{p}{a} \sqrt{\frac{1}{2\pi\epsilon_0 ma}}$

(D) $\frac{p}{a} \sqrt{\frac{2}{\pi\epsilon_0 ma}}$

Consider the force F on a charge 'q' due to a uniformly charged spherical shell of radius R carrying charge Q distributed uniformly over it. Which one of the following statements is true for F, if 'q' is placed at distance r from the centre of the shell?

(A) $\frac{1}{4\pi\epsilon_0} \frac{qQ}{R^2} > F > 0$ for $r < R$

(B) $F = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2}$ for $r > R$

(C) $F = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2}$ for all r

(D) $F = \frac{1}{4\pi\epsilon_0} \frac{qQ}{R^2}$ for $r < R$

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A double convex lens has power P and same radii of curvature R of both the surfaces. The radius of curvature of a surface of a plano-convex lens made of the same material with power $1.5 P$ is:

- (A) $\frac{R}{3}$ (B) $\frac{3R}{2}$ (C) $\frac{R}{2}$ (D) $2R$

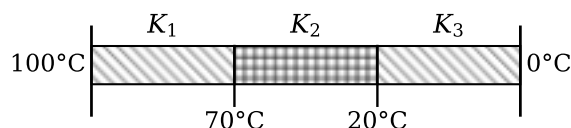
Two planets have masses M and $16 M$ and their radii are a and $2a$, respectively. The separation between the centres of the planets is $10a$. A body of mass m is fired from the surface of the larger planet towards the smaller planet along the line joining their centres. For the body to be able to reach at the surface of smaller planet, the minimum firing speed needed is:

- (A) $2\sqrt{\frac{GM}{a}}$ (B) $\sqrt{\frac{GM^2}{ma}}$ (C) $\frac{3}{2}\sqrt{\frac{5GM}{a}}$ (D) $4\sqrt{\frac{GM}{a}}$

In a dilute gas at pressure P and temperature T , the mean time between successive collisions of a molecule varies with T as:

- (A) $\sqrt{T}$ (B) T (C) $\frac{1}{T}$ (D) $\frac{1}{\sqrt{T}}$

Three rods of identical cross-section and lengths are made of three different materials of thermal conductivity K_1 , K_2 and K_3 , respectively. They are joined together at their ends to make a long rod (see figure). One end of the long rod is maintained at 100°C and the other at 0°C (see figure). If the joints of the rod are at 70°C and 20°C in steady state and there is no loss of energy from the surface of the rod, the correct relationship between K_1 , K_2 and K_3 is:



- (A) $K_1 : K_3 = 2 : 3$,
 $K_2 : K_3 = 2 : 5$ (B) $K_1 < K_2 < K_3$ (C) $K_1 : K_2 = 5 : 2$,
 $K_1 : K_3 = 3 : 5$ (D) $K_1 > K_2 > K_3$

A particle moving in the xy plane experiences a velocity dependent force

$\vec{F} = k(v_y\hat{i} + v_x\hat{j})$, where v_x and v_y are the x and y components of its velocity $\vec{v}$. If $\vec{a}$ is the acceleration of the particle, then

which of the following statements is true for the particle?

- (A) kinetic energy of particle is constant in time (B) quantity $\vec{v} \times \vec{a}$ is constant in time
(C) quantity $\vec{v} \cdot \vec{a}$ is constant in time (D) $\vec{F}$ arises due to a magnetic field

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Q14 Moving Charges & Magnetism[Step-by-step solution](#) > [prepwisar.in/questions/6lh9zQcg](https://www.prepwisar.in/questions/6lh9zQcg)

A charged particle going around in a circle can be considered to be a current loop. A particle of mass m carrying charge q is moving in a plane with speed v under the influence of magnetic field $\vec{B}$. The magnetic moment of this moving particle:

- (A) $\frac{mv^2\vec{B}}{2B^2}$ (B) $-\frac{mv^2\vec{B}}{2B^2}$ (C) $-\frac{mv^2\vec{B}}{B^2}$ (D) $-\frac{mv^2\vec{B}}{2\pi B^2}$

Q15 Projectile Motion & Relative Motion[Step-by-step solution](#) > [prepwisar.in/questions/8uVlQtpGtG](https://www.prepwisar.in/questions/8uVlQtpGtG)

When a car is at rest, its driver sees rain drops falling on it vertically. When driving the car with speed v , he sees that rain drops are coming at an angle 60° from the horizontal. On further increasing the speed of the car to $(1 + \beta)v$, this angle changes to 45° . The value of β is close to:

- (A) 0.50 (B) 0.73 (C) 0.37 (D) 0.41

Q16 Fluid Mechanics[Step-by-step solution](#) > [prepwisar.in/questions/En4hEjR_c](https://www.prepwisar.in/questions/En4hEjR_c)

A fluid is flowing through a horizontal pipe of varying cross-section, with speed $v \text{ ms}^{-1}$ at a point where the pressure is P pascal. At another point where pressure is $\frac{P}{2}$ Pascal its speed is $V \text{ ms}^{-1}$. If the density of the fluid is $\rho \text{ kg m}^{-3}$ and the flow is streamline, then V is equal to:

- (A) $\sqrt{\frac{P}{2\rho} + v^2}$ (B) $\sqrt{\frac{P}{\rho} + v^2}$ (C) $\sqrt{\frac{2P}{\rho} + v^2}$ (D) $\sqrt{\frac{P}{\rho} + v}$

Q17 Rotational Motion[Step-by-step solution](#) > [prepwisar.in/questions/dalGr1A25f](https://www.prepwisar.in/questions/dalGr1A25f)

The linear mass density of a thin rod AB of length L varies from A to B as $\lambda(x) = \lambda_0 \left(1 + \frac{x}{L}\right)$, where x is the distance from A. If M is the mass of the rod then its moment of inertia about an axis passing through A and perpendicular to the rod is:

- (A) $\frac{2}{5}ML^2$ (B) $\frac{5}{12}ML^2$ (C) $\frac{7}{18}ML^2$ (D) $\frac{3}{7}ML^2$

Q18 Simple Harmonic Motion[Step-by-step solution](#) > [prepwisar.in/questions/qQU1NywHc5](https://www.prepwisar.in/questions/qQU1NywHc5)

When a particle of mass m is attached to a vertical spring of spring constant k and released, its motion is described by

$y(t) = y_0 \sin^2 \omega t$, where ' y ' is measured from the lower end of unstretched spring. Then ω is:

- (A) $\sqrt{\frac{g}{y_0}}$ (B) $\frac{1}{2}\sqrt{\frac{g}{y_0}}$ (C) $\sqrt{\frac{2g}{y_0}}$ (D) $\sqrt{\frac{g}{2y_0}}$

Q19 Experimental Skills[Step-by-step solution](#) > [prepwisar.in/questions/7WaEGv6n1f](https://www.prepwisar.in/questions/7WaEGv6n1f)

A student measuring the diameter of a pencil of circular cross-section with the help of a vernier scale records the following four readings 5.50 mm, 5.55 mm, 5.45 mm, 5.65 mm. The average of these four readings is 5.5375 mm and the standard deviation of the data is 0.07395 mm. The average diameter of the pencil should therefore be recorded as:

- (A) $(5.54 \pm 0.07) \text{ mm}$ (B) $(5.5375 \pm 0.0740) \text{ mm}$
(C) $(5.5375 \pm 0.0739) \text{ mm}$ (D) $(5.538 \pm 0.074) \text{ mm}$

Q20 Alternating Current **NUMERICAL**
[Step-by-step solution](#) › prepwiser.in/questions/j_k8vtU1f1

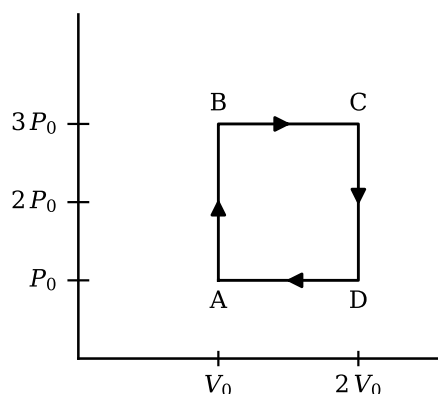
In a series LR circuit, power of 400W is dissipated from a source of 250 V, 50 Hz. The power factor of the circuit is 0.8. In order to bring the power factor to unity, a capacitor of value C is added in series to the L and R. Taking the value of C as $\left(\frac{n}{3\pi}\right) \mu\text{F}$, then value of n is _____.

Q21 Centre of Mass & Linear Momentum **NUMERICAL**
[Step-by-step solution](#) › prepwiser.in/questions/COD5xfWaBv

The centre of mass of solid hemisphere of radius 8 cm is x from the centre of the flat surface. Then value of x is _____.

Q22 Thermodynamics **NUMERICAL**
[Step-by-step solution](#) › prepwiser.in/questions/tr54ZAEpqx

An engine operates by taking a monoatomic ideal gas through the cycle shown in the figure. The percentage efficiency of the engine is close to _____.


Q23 Wave Optics **NUMERICAL**
[Step-by-step solution](#) › prepwiser.in/questions/5TyksKFjRS

A Young's double-slit experiment is performed using monochromatic light of wavelength λ . The intensity of light at a point on the screen, where the path difference is λ , is K units. The intensity of light at a point where the path difference is $\frac{\lambda}{6}$ is given by $\frac{nK}{12}$, where n is an integer. The value of n is _____.

Chemistry Section A · Multiple choice

Q24 Aldehydes & Ketones

[Step-by-step solution](#) › prepwiser.in/questions/vtw_HXaRHY

The correct match between Item-I (starting material) and Item-II (reagent) for the preparation of benzaldehyde is:

Item-I	Item-II
(I) Benzene	(P) HCl and SnCl_2 , H_3O^+
(II) Benzonitrile	(Q) H_2 , Pd-BaSO ₄ , S and quinoline
(III) Benzoyl Chloride	(R) CO, HCl and AlCl_3

(A) (I) - (R), (II) - (P) and (III) - (Q)

(B) (I) - (P), (II) - (Q) and (III) - (R)

(C) (I) - (Q), (II) - (R) and (III) - (P)

(D) (I) - (R), (II) - (Q) and (III) - (P)

Q25 Coordination Compounds

[Step-by-step solution](#) › prepwiser.in/questions/U3RS3EdQue

For a d^4 metal ion in an octahedral field, the correct electronic configuration is:

(A) $t_{2g}^4 e_g^0$ when $\Delta_0 < P$ (B) $t_{2g}^3 e_g^1$ when $\Delta_0 > P$ (C) $e_g^2 t_{2g}^2$ when $\Delta_0 < P$ (D) $t_{2g}^3 e_g^1$ when $\Delta_0 < P$

Mischmetal is an alloy consisting mainly of:

- (A) lanthanoid and actinoid metals (B) actinoid and transition metals
(C) lanthanoid metals (D) actinoid metals

For the given cell:



change in Gibbs energy (ΔG) is negative, if:

- (A) $C_2 = \sqrt{2}C_1$ (B) $C_2 = \frac{C_1}{\sqrt{2}}$ (C) $C_1 = 2C_2$ (D) $C_1 = C_2$

Dihydrogen of high purity (> 99.95%) is obtained through:

- (A) the electrolysis of acidified water using Pt electrodes
(B) the electrolysis of warm Ba(OH)_2 solution using Ni electrodes
(C) the electrolysis of brine solution
(D) the reaction of Zn with dilute HCl

The element that can be refined by distillation is:

- (A) gallium (B) nickel (C) zinc (D) tin

Reaction of an inorganic sulphite X with dilute H_2SO_4 generates compound Y. Reaction of Y with NaOH gives X. Further, the reaction of X with Y and water affords compound Z. Y and Z, respectively, are:

- (A) S and Na_2SO_3 (B) SO_2 and NaHSO_3 (C) SO_2 and Na_2SO_3 (D) SO_3 and NaHSO_3

The reaction of NO with N_2O_4 at 250 K gives:

- (A) N_2O_3 (B) N_2O_5 (C) N_2O (D) NO_2

The correct match between Item - I and Item - II is:

Item - I	Item - II
(a) Natural rubber	(I) 1, 3-butadiene + styrene
(b) Neoprene	(II) 1, 3-butadiene + acrylonitrile
(c) Buna-N	(III) Chloroprene
(d) Buna-S	(IV) Isoprene

- (A) (a) - (IV), (b) - (III), (c) - (II), (d) - (I) (B) (a) - (III), (b) - (IV), (c) - (I), (d) - (II)
(C) (a) - (III), (b) - (IV), (c) - (II), (d) - (I) (D) (a) - (IV), (b) - (III), (c) - (I), (d) - (II)

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Q33 Hydrogen & s-Block Elements[Step-by-step solution](https://www.prepwiser.in/questions/YYeppNyffx) > prepwiser.in/questions/YYeppNyffx

Match the following compounds (Column-I) with their uses (Column-II):

- (A) (I)-(B), (II)-(C), (III)-(D), (IV)-(A)
 (B) (I)-(B), (II)-(D), (III)-(A), (IV)-(C)
 (C) (I)-(C), (II)-(D), (III)-(B), (IV)-(A)
 (D) (I)-(D), (II)-(A), (III)-(C), (IV)-(B)

S.No.	Column-I	S.No.	Column-II
(I)	Ca(OH)_2	(A)	casts of statues
(II)	NaCl	(B)	white wash
(III)	$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$	(C)	antacid
(IV)	CaCO_3	(D)	washing soda preparation

Q34 Solid State[Step-by-step solution](https://www.prepwiser.in/questions/8xvgt24rs2) > prepwiser.in/questions/8xvgt24rs2

A crystal is made up of metal ions ' M_1 ' and ' M_2 ' and oxide ions. Oxide ions form a ccp lattice structure. The cation ' M_1 ' occupies 50% of octahedral voids and the cation ' M_2 ' occupies 12.5% of tetrahedral voids of oxide lattice. The oxidation numbers of ' M_1 ' and ' M_2 ' are, respectively:

- (A) + 3, + 1 (B) + 4, + 2 (C) + 1, + 3 (D) + 2, + 4

Q35 Solutions & Colligative Properties[Step-by-step solution](https://www.prepwiser.in/questions/DKMk_z4eV6) > prepwiser.in/questions/DKMk_z4eV6

A set of solutions is prepared using 180 g of water as a solvent and 10 g of different nonvolatile solutes A, B and C. The relative lowering of vapour pressure in the presence of these solutes are in the order:

[Given, molar mass of A = 100 g mol^{-1} ; B = 200 g mol^{-1} ; C = $10,000 \text{ g mol}^{-1}$]

- (A) $A > C > B$ (B) $C > B > A$ (C) $A > B > C$ (D) $B > C > A$

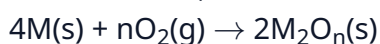
Q36 Mole Concept & Stoichiometry[Step-by-step solution](https://www.prepwiser.in/questions/Lc0YiasKU6) > prepwiser.in/questions/Lc0YiasKU6

The average molar mass of chlorine is 35.5 g mol^{-1} . The ratio of ^{35}Cl to ^{37}Cl in naturally occurring chlorine is close to:

- (A) 1 : 1 (B) 2 : 1 (C) 3 : 1 (D) 4 : 1

Q37 Chemical Thermodynamics[Step-by-step solution](https://www.prepwiser.in/questions/vw2MAEM5Mm) > prepwiser.in/questions/vw2MAEM5Mm

For a reaction,



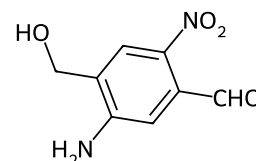
the free energy change is plotted as a function of temperature. The temperature below which the oxide is stable could be inferred from the plot as the point at which:

- (A) the free energy change shows a change from negative to positive value
 (B) the slope changes from positive to negative
 (C) the slope changes from negative to positive
 (D) the slope changes from positive to zero

Q38 General Organic Chemistry (GOC)[Step-by-step solution](https://www.prepwiser.in/questions/uhpRVvNBbT) > prepwiser.in/questions/uhpRVvNBbT

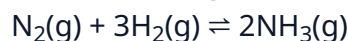
The IUPAC name of the following compound is:

- (A) 2-nitro-4-hydroxymethyl-5-amino benzaldehyde
 (B) 3-amino-4-hydroxymethyl-5-nitro benzaldehyde
 (C) 4-amino-2-formyl-5-hydroxymehtyl nitrobenzene
 (D) 5-amino-4-hydroxymethyl-2-nitro benzaldehyde

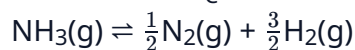


Q39 Chemical Equilibrium[Step-by-step solution](#) > prepwiser.in/questions/rbxm55W957

The value of K_C is 64 at 800 K for the reaction



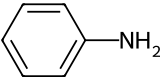
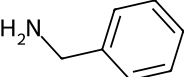
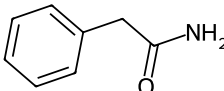
The value of K_C for the following reaction is:



- (A) 8 (B) $\frac{1}{8}$ (C) $\frac{1}{4}$ (D) $\frac{1}{64}$

Q40 Amines & Diazonium Salts[Step-by-step solution](#) > prepwiser.in/questions/ALqAu0OFPO

Which of the following compounds can be prepared in good yield by Gabriel phthalimide synthesis?

- (A)  (B)  (C)  (D) $\text{CH}_3\text{—CH}_2\text{—NHCH}_3$

Q41 Qualitative Analysis: Salt Analysis[Step-by-step solution](#) > prepwiser.in/questions/jn3hT6KEjP

Match the following:

- (A) (i)-(b), (ii)-(d), (iii)-(e), (iv)-(a)
(B) (i)-(d), (ii)-(c), (iii)-(e), (iv)-(a)
(C) (i)-(b), (ii)-(a), (iii)-(c), (iv)-(d)
(D) (i)-(d), (ii)-(c), (iii)-(b), (iv)-(e)

Test/Method	Reagent
(i) Lucas Test	(a) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ / aq. KOH
(ii) Dumas method	(b) HNO_3 / AgNO_3
(iii) Kjeldahl's method	(c) CuO/CO_2
(iv) Hinsberg test	(d) Conc. HCl and ZnCl_2
	(e) H_2SO_4

Chemistry Section B · Numerical value

Q42 to Q46

Q42 Alcohols, Phenols & Ethers **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/pxR5vnHTtu

A solution of phenol in chloroform when treated with aqueous NaOH gives compound P as a major product. The mass percentage of carbon in P is _____. (to the nearest integer)

(Atomic mass : C = 12; H = 1; O = 16)

Q43 Chemical Kinetics **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/hzJCfdREwY

The rate of a reaction decreased by 3.555 times when the temperature was changed from 40°C to 30°C. The activation energy (in kJ mol^{-1}) of the reaction is _____. (Round off to the nearest integer)

Take; $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ $\ln 3.555 = 1.268$

Q44 Ionic Equilibrium **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/adp2vmzCF-

If the solubility product of AB_2 is $3.20 \times 10^{-11} \text{ M}^3$, then the solubility of AB_2 in pure water is ____ $\times 10^{-4} \text{ mol L}^{-1}$.

[Assuming that neither kind of ion reacts with water]

Q45 d & f Block Elements **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/Aq_08nP4FW

The atomic number of Unnilunium is _____.

Q46 Surface Chemistry **NUMERICAL**[Step-by-step solution](#) > prepwiser.in/questions/T269RwS5Ei

For Freundlich adsorption isotherm, a plot of $\log (x/m)$ (y-axis) and $\log p$ (x-axis) gives a straight line.

The intercept and slope for the line is 0.4771 and 2, respectively. The mass of gas, adsorbed per gram of adsorbent if the initial pressure is 0.04 atm, is ____ $\times 10^{-4} \text{ g}$.

($\log 3 = 0.4771$)

Q47 Three Dimensional Geometry

[Step-by-step solution](#) › [prepwisar.in/questions/EJF7ndug5b](https://www.prepwisar.in/questions/EJF7ndug5b)

A plane P meets the coordinate axes at A, B and C respectively. The centroid of $\triangle ABC$ is given to be (1, 1, 2). Then the equation of the line through this centroid and perpendicular to the plane P is:

- (A) $\frac{x-1}{1} = \frac{y-1}{1} = \frac{z-2}{2}$ (B) $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{1}$ (C) $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1}$ (D) $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$

Q48 Applications of Derivatives

[Step-by-step solution](#) › [prepwisar.in/questions/KPZrNM6i8u](https://www.prepwisar.in/questions/KPZrNM6i8u)

If the tangent to the curve, $y = f(x) = x \log_e x$, ($x > 0$) at a point (c, f(c)) is parallel to the line-segment joining the points (1, 0) and (e, e), then c is equal to:

- (A) $\frac{e-1}{e}$ (B) $e^{\left(\frac{1}{1-e}\right)}$ (C) $e^{\left(\frac{1}{e-1}\right)}$ (D) $\frac{1}{e-1}$

Q49 Applications of Derivatives

[Step-by-step solution](#) › [prepwisar.in/questions/EIJUDWeIDA](https://www.prepwisar.in/questions/EIJUDWeIDA)

The set of all real values of λ for which the function

$$f(x) = (1 - \cos^2 x)(\lambda + \sin x), x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$$

has exactly one maxima and exactly one minima, is:

- (A) $\left(-\frac{3}{2}, \frac{3}{2}\right) - \{0\}$ (B) $\left(-\frac{3}{2}, \frac{3}{2}\right)$ (C) $\left(-\frac{1}{2}, \frac{1}{2}\right) - \{0\}$ (D) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

Q50 Binomial Theorem

[Step-by-step solution](#) › [prepwisar.in/questions/IZOQ7LbcPw](https://www.prepwisar.in/questions/IZOQ7LbcPw)

If the constant term in the binomial expansion of $\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405, then |k| equals:

- (A) 3 (B) 9 (C) 1 (D) 2

Q51 Complex Numbers

[Step-by-step solution](#) › [prepwisar.in/questions/zxHFipkoDd](https://www.prepwisar.in/questions/zxHFipkoDd)

Let $z = x + iy$ be a non-zero complex number such that $z^2 = i|z|^2$, where $i = \sqrt{-1}$, then z lies on the:

- (A) line, $y = -x$ (B) real axis (C) line, $y = x$ (D) imaginary axis

Q52 Definite Integration

[Step-by-step solution](#) › [prepwisar.in/questions/HxckiFdTuN](https://www.prepwisar.in/questions/HxckiFdTuN)

The integral $\int_1^2 e^x \cdot x^x (2 + \log_e x) dx$ equals:

- (A) $e(4e + 1)$ (B) $e(2e - 1)$ (C) $e(4e - 1)$ (D) $4e^2 - 1$

Q53 Differential Equations

[Step-by-step solution](#) › [prepwisar.in/questions/RayRcL0cDZ](https://www.prepwisar.in/questions/RayRcL0cDZ)

If $y = \left(\frac{2}{\pi}x - 1\right) \operatorname{cosec} x$ is the solution of the differential equation,

$$\frac{dy}{dx} + p(x)y = \frac{2}{\pi} \operatorname{cosec} x,$$

$0 < x < \frac{\pi}{2}$, then the function p(x) is equal to:

- (A) $\cot x$ (B) $\sec x$ (C) $\tan x$ (D) $\operatorname{cosec} x$

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Q54 Ellipse[Step-by-step solution](#) › [prepwiser.in/questions/nqy93NBjVi](https://www.prepwiser.in/questions/nqy93NBjVi)

If the normal at an end of a latus rectum of an ellipse passes through an extremity of the minor axis, then the eccentricity e of the ellipse satisfies:

- (A) $e^4 + 2e^2 - 1 = 0$ (B) $e^4 + e^2 - 1 = 0$ (C) $e^2 + 2e - 1 = 0$ (D) $e^2 + e - 1 = 0$

Q55 Functions (Advanced)[Step-by-step solution](#) › [prepwiser.in/questions/FW7W9ffYv2](https://www.prepwiser.in/questions/FW7W9ffYv2)

For a suitably chosen real constant a , let a function, $f : R - \{-a\} \rightarrow R$ be defined by

$f(x) = \frac{a-x}{a+x}$. Further suppose that for any real number $x \neq -a$ and $f(x) \neq -a$, $(f \circ f)(x) = x$. Then $f\left(-\frac{1}{2}\right)$ is equal to:

- (A) $\frac{1}{3}$ (B) -3 (C) $-\frac{1}{3}$ (D) 3

Q56 Continuity & Differentiability[Step-by-step solution](#) › [prepwiser.in/questions/BFzZ6Uskpg](https://www.prepwiser.in/questions/BFzZ6Uskpg)

Let $f : R \rightarrow R$ be a function defined by

$f(x) = \max\{x, x^2\}$. Let S denote the set of all points in R , where f is not differentiable. Then:

- (A) $\{0, 1\}$ (B) $\{0\}$ (C) ϕ (an empty set) (D) $\{1\}$

Q57 Applications of Derivatives[Step-by-step solution](#) › [prepwiser.in/questions/EcaHIFBOL3](https://www.prepwiser.in/questions/EcaHIFBOL3)

For all twice differentiable functions $f : R \rightarrow R$, with $f(0) = f(1) = f'(0) = 0$

- (A) $f''(x) \neq 0$, at every point $x \in (0, 1)$ (B) $f''(x) = 0$, for some $x \in (0, 1)$
(C) $f''(0) = 0$ (D) $f''(x) = 0$, at every point $x \in (0, 1)$

Q58 Determinants[Step-by-step solution](#) › [prepwiser.in/questions/oALd7Nb4IK](https://www.prepwiser.in/questions/oALd7Nb4IK)

Let $\theta = \frac{\pi}{5}$ and

$$A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$

If $B = A + A^4$, then $\det(B)$:

- (A) lies in $(1, 2)$ (B) lies in $(2, 3)$. (C) is zero. (D) is one.

Q59 Circles[Step-by-step solution](#) › [prepwiser.in/questions/V3pobV31j1](https://www.prepwiser.in/questions/V3pobV31j1)

The centre of the circle passing through the point $(0, 1)$ and touching the parabola $y = x^2$ at the point $(2, 4)$ is:

- (A) $\left(\frac{6}{5}, \frac{53}{10}\right)$ (B) $\left(\frac{3}{10}, \frac{16}{5}\right)$ (C) $\left(\frac{-53}{10}, \frac{16}{5}\right)$ (D) $\left(\frac{-16}{5}, \frac{53}{10}\right)$

Q60 Probability: Basic[Step-by-step solution](#) › [prepwiser.in/questions/Zf6IUdOvBW](https://www.prepwiser.in/questions/Zf6IUdOvBW)

The probabilities of three events A , B and C are given by

$P(A) = 0.6$, $P(B) = 0.4$ and $P(C) = 0.5$.

If $P(A \cup B) = 0.8$, $P(A \cap C) = 0.3$, $P(A \cap B \cap C) = 0.2$, $P(B \cap C) = \beta$

and $P(A \cup B \cup C) = \alpha$, where $0.85 \leq \alpha \leq 0.95$, then β lies in the interval:

- (A) $[0.35, 0.36]$ (B) $[0.20, 0.25]$ (C) $[0.25, 0.35]$ (D) $[0.36, 0.40]$

If α and β are the roots of the equation $2x(2x + 1) = 1$, then β is equal to:

- (A) $-2\alpha(\alpha + 1)$ (B) $2\alpha(\alpha + 1)$ (C) $2\alpha^2$ (D) $2\alpha(\alpha - 1)$

The common difference of the A.P. $b_1, b_2, \dots, b_m$ is 2 more than the common difference of A.P. $a_1, a_2, \dots, a_n$. If $a_{40} = -159$, $a_{100} = -399$ and $b_{100} = a_{70}$, then b_1 is equal to:

- (A) 127 (B) 81 (C) -127 (D) -81

The area (in sq. units) of the region enclosed by the curves $y = x^2 - 1$ and $y = 1 - x^2$ is equal to:

- (A) $\frac{8}{3}$ (B) $\frac{4}{3}$ (C) $\frac{7}{2}$ (D) $\frac{16}{3}$

Let L denote the line in the xy -plane with x and y intercepts as 3 and 1 respectively. Then the image of the point $(-1, -4)$ in this line is:

- (A) $\left(\frac{11}{5}, \frac{28}{5}\right)$ (B) $\left(\frac{29}{5}, \frac{11}{5}\right)$ (C) $\left(\frac{29}{5}, \frac{8}{5}\right)$ (D) $\left(\frac{8}{5}, \frac{29}{5}\right)$

Mathematics Section B · Numerical value

Q65 to Q69

Suppose that a function $f: \mathbb{R} \rightarrow \mathbb{R}$ satisfies $f(x + y) = f(x)f(y)$ for all $x, y \in \mathbb{R}$ and $f(1) = 3$. If $\sum_{i=1}^n f(i) = 363$ then n is equal to _____.

The sum of distinct values of λ for which the system of equations

$$(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$$

$$(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$$

$2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$ has non-zero solutions, is _____.

The number of words (with or without meaning) that can be formed from all the letters of the word "LETTER" in which vowels never come together is _____.

Consider the data on x taking the values $0, 2, 4, 8, \dots, 2^n$ with frequencies ${}^nC_0, {}^nC_1, {}^nC_2, \dots, {}^nC_n$ respectively. If the mean of this data is $\frac{728}{2^n}$, then n is equal to _____.

If $\vec{x}$ and $\vec{y}$ be two non-zero vectors such that

$$|\vec{x} + \vec{y}| = |\vec{x}|$$

and $2\vec{x} + \lambda\vec{y}$ is perpendicular to $\vec{y}$, then the value of λ is _____.

Answer key: JEE Main 2020 · 6 Sep · Shift 2

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Physics

1.	B	2.	A	3.	D	4.	A	5.	D	6.	D	7.	C	8.	B	9.	A	10.	C
11.	D	12.	A	13.	B	14.	B	15.	B	16.	B	17.	C	18.	D	19.	A	20.	400
21.	3	22.	19	23.	9														

Chemistry

24.	A	25.	D	26.	C	27.	A	28.	B	29.	C	30.	B	31.	A	32.	A	33.	B
34.	D	35.	C	36.	C	37.	A	38.	D	39.	B	40.	B	41.	B	42.	69	43.	100
44.	2	45.	101	46.	48														

Mathematics

47.	C	48.	C	49.	A	50.	A	51.	C	52.	C	53.	A	54.	B	55.	D	56.	A
57.	B	58.	A	59.	D	60.	C	61.	A	62.	D	63.	A	64.	A	65.	5	66.	3
67.	120	68.	6	69.	1														

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