

FIITJEE Talent Reward Exam-2014

for student presently in
Class 10

PAPER-2

Time: 3 Hours

Maximum Marks: 207

Instructions:

Caution: Question Paper CODE as given above MUST be correctly marked in the answer OMR sheet before attempting the paper. Wrong CODE or no CODE will give wrong results.

1. This Question paper consists of 2 sections. All questions will be multiple choice single correct out of four choices with marking scheme in table below:

Section	Subject	Question no.	Marking Scheme for each question	
			correct answer	wrong answer
SECTION – I	Physics	Q. 1 to 8	+3	-1
	Chemistry	Q. 9 to 16	+3	-1
	Mathematics	Q. 17 to 24	+3	-1
SECTION – II	Physics	Q. 25 to 34	+3	-1
		Q. 35 to 37	+5	-2
	Chemistry	Q. 38 to 47	+3	-1
		Q. 48 to 50	+5	-2
	Mathematics	Q. 51 to 60	+3	-1
		Q. 61 to 63	+5	-2

2. Answers have to be marked on the OMR sheet.
3. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.
4. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.
5. **Before attempting paper write your Registration Number, Name, Answer Sheet No. and Test Centre in the space provided at the bottom of this sheet.**

Note: Please check this Question Paper contains all **63** questions in serial order. If not so, exchange with the correct Question Paper.

Registration Number : _____

Name of the Candidate : _____

Answer Sheet No. : _____

Test Centre : _____

Section-I**Physics****Comprehension Passage Comprising of 3 Questions (1 – 3)****Straight Objective Type**

When electrical power is transmitted over large distances, it is economical to use a high voltage and low current to minimize the $I^2 R$ heating loss in the transmission lines. Transformers are useful for transmitting power over long distances because when the generator voltage is stepped up, the current in the transmission lines is reduced, thereby reducing $I^2 R$ losses. A generator produces 10 A (rms) of current at 400 V. the voltage is stepped up to 4500 V by an ideal transformer and transmitted a long distance through a power line of total resistance 30Ω .

With the help of the comprehension given above, choose the most appropriate alternative to each of the following questions.

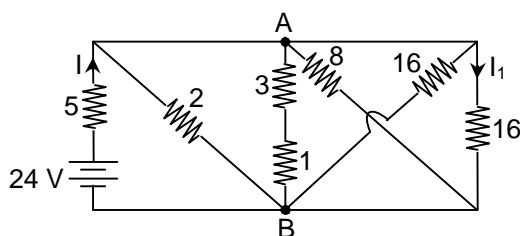
- The percentage of power lost in the transmission line when the voltage is stepped up is :
(A) 10% (B) 20%
(C) 0.60% (D) 2%
- The percentage of power lost in the transmission line if the voltage were not stepped up is :
(A) 100% (B) 90%
(C) 75% (D) 50%
- If the transmission line is cooled so that the resistance is reduced to 5.0Ω and it carries a current of 0.89 A, the power lost in the line is :
(A) 5 W (B) 4 W
(C) 8 W (D) 24 W

Space for rough work

Comprehension Passage Comprising of 5 Questions (4 – 8)

Straight Objective Type

Based on the circuit shown, answer the following questions. Assume that all the resistances have value in ohm.



4. Equivalent resistance of circuit is
 (A) 2Ω (B) 3Ω
 (C) 4Ω (D) 6Ω
5. The current in wire AB is
 (A) 2A (B) 1A
 (C) 3A (D) 5A
6. The current I in the circuit is given by
 (A) 2A (B) 4A
 (C) 6A (D) 8A
7. The current I_1 is given by
 (A) 1A (B) $\frac{1}{2}$ A
 (C) $\frac{1}{4}$ A (D) $\frac{1}{8}$ A
8. The potential difference across the points AB is V_{AB} . Then
 (A) $V_{AB}=4V$ (B) $V_{AB}=8V$
 (C) $V_{AB}=6V$ (D) $V_{AB}=0$

Space for rough work

Chemistry

Comprehension Passage comprising of 3 Questions (9 – 11)

Straight Objective Type

The solubility of an ionic compound in water mainly depends on two factors.

(i) Lattice energy and (ii) hydration energy.

Both these factors oppose each other and the resultant of these guides the solubility of the compound in water. If lattice energy has greater value, the solubility is less. In case, hydration energy is more, then the compound is freely soluble in water.

Answer the following question.

9. Compounds of alkaline earth metals are less soluble in water in comparison to alkali metals. This is due to
(A) their higher ionization energy (B) their high lattice energy
(C) their high hydration energy (D) their increased covalent nature
10. Which of the following is most soluble in water?
(A) MgSO_4 (B) CaSO_4
(C) SrSO_4 (D) BaSO_4
11. BeF_2 is soluble in water whereas fluorides of other alkaline earth metals are insoluble because of
(A) ionic nature of BeF_2 (B) covalent nature of BeF_2
(C) greater hydration energy of Be^{+2} ion (D) greater lattice energy of Be^{+2} ion

Space for rough work

Comprehension Passage comprising of 5 Questions (12 – 16)**Straight Objective Type**

Bleaching powder is a mixed salt of hydrochloric acid and hypochlorous acid. It has the formula, $\text{CaOCl}_2 \cdot \text{H}_2\text{O}$. It is manufactured by the action of chlorine on dry slaked lime at 40°C . There is also a view that bleaching powder is a mixture of calcium hypochlorite and basic calcium chloride [$\text{Ca}(\text{OCl})_2 + \text{CaCl}_2 \cdot \text{Ca}(\text{OH})_2 \cdot \text{H}_2\text{O}$].

The amount of chlorine obtained from a sample of bleaching powder by the treatment with excess of dilute acids or CO_2 is called available chlorine. A good sample of bleaching powder contains 35-38% of available chlorine. On long standing, it undergoes auto-oxidation and the amount of available chlorine decreases.

The estimation of available chlorine is done volumetrically by (a) iodometric method or by (b) arsenite method.

In textile industry, the cotton cloth is mainly bleached with the help of bleaching powder.

12. Maximum percentage of available chlorine on the basis of $\text{CaOCl}_2 \cdot \text{H}_2\text{O}$ formula is:
(A) 35 (B) 40
(C) 45 (D) 49
13. The percentage of available chlorine in commercial samples of bleaching powder is usually between 33- 38%. The low value is due to:
(A) incomplete reaction between slaked lime and Cl_2 during its formation
(B) impurities present in the original slaked lime
(C) decomposition of bleaching powder when kept in air
(D) all of the above
14. 3.55g of bleaching powder when treated with acetic acid and excess of KI liberated iodine which required 60mL of 0.5N sodium thiosulphate solution. The percentage of available chlorine in the sample is:
(A) 30.0 (B) 25.0
(C) 20.0 (D) 35.0
15. On long standing, the bleaching powder undergoes auto-oxidation. The products formed are:
(A) calcium chloride only (B) calcium chlorate only
(C) calcium chloride and calcium chlorate (D) calcium chloride and calcium chlorite
16. The chemical name of bleaching powder is:
(A) calcium hypochlorite (B) calcium chlorohypochlorite
(C) calcium chlorate (D) calcium perchlorate

Space for rough work

Mathematics

Comprehension Passage comprising of 3 Questions (17 – 19)

Straight Objective Type

If a polynomial equation of degree of n can be represented as $P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_1 x + a_0 = 0$ and roots are $\alpha_1, \alpha_2, \alpha_3, \dots, \alpha_n$ then $P(x) = a_n (x - \alpha_1)(x - \alpha_2)(x - \alpha_3) \dots (x - \alpha_n)$

17. If α and β are the zeros of the polynomial $f(x) = x^2 + px + q$, then a polynomial having $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ as its zeros is
- (A) $x^2 + qx + p$ (B) $x^2 - px + q$
 (C) $qx^2 + px + 1$ (D) $px^2 + qx + 1$
18. If zeros of the polynomial $f(x) = x^3 - 3px^2 + qx - r$ are in A.P. then
- (A) $2p^3 = pq - r$ (B) $2p^3 = pq + r$
 (C) $p^3 = pq - r$ (D) None of these
19. If α, β, γ are the zeros of the polynomial $f(x) = ax^3 + bx^2 + cx + d$, then $\alpha^2 + \beta^2 + \gamma^2 =$
- (A) $\frac{b^2 - ac}{a^2}$ (B) $\frac{b^2 - 2ac}{a}$
 (C) $\frac{b^2 - 2ac}{b^2}$ (D) $\frac{b^2 - 2ac}{a^2}$

Space for rough work

Comprehension Passage comprising of 5 Questions (20 – 24)**Straight Objective Type**

If a polynomial $P(x)$ divided by a polynomial $d(x)$, leaves remainder $r(x)$ with quotient $q(x)$, then

$$P(x) = d(x).q(x) + r(x)$$

If $r(x) = 0$, then $d(x)$ is the factor of $P(x)$.

20. The polynomial, which when divided by $-x^2 + x - 1$, gives a quotient $(x - 2)$ and remainder 3, is
(A) $x^3 - 3x^2 + 3x - 5$ (B) $-x^3 - 3x^2 - 3x - 5$
(C) $-x^3 + 3x^2 - 3x + 5$ (D) $x^3 - 3x^2 - 3x + 5$
21. The remainder when polynomial $x^{2013} + x^{2012} + x^{2011} + 1$ is divided by $x^2 - 1$ is
(A) 0 (B) $x + 1$
(C) $2x + 2$ (D) $2x - 2$
22. If polynomial x^{2013} leaves remainder $(px^2 + qx + r)$ when divided by $x^3 - x$, then value of
(A) $p = 0, q = 1, r = 0$ (B) $p = 1, q = 0, r = 0$
(C) $p = 0, q = 0, r = 1$ (D) $p = 0, q = 1, r = 1$
23. Polynomial $P(x)$ with leading coefficient 1, of degree 4, is such that $P(1) = 1, P(2) = 2, P(3) = 3, P(4) = 4$. Then, $P(5)$ is
(A) 5 (B) 29
(C) 125 (D) 0
24. A polynomial $P(x)$ with leading coefficient 1 is of degree 5 such that it has roots 1, 2, 3 & 4 and $P(\alpha) = 0$. Then, value of $P(5) - P(0)$ is
(A) 24 (B) -24
(C) -120 (D) 120

Space for rough work

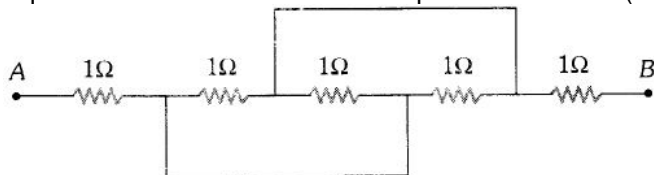
Section-II

Physics

Straight Objective Type

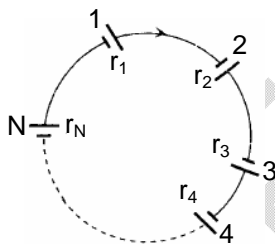
Physics contains 13 multiple choice questions numbered 25 to 37. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

25. Equivalent resistance between the points A and B is (in Ω)



- (A) $\frac{1}{5}$ (B) $1\frac{1}{4}$
 (C) $2\frac{1}{3}$ (D) $3\frac{1}{2}$

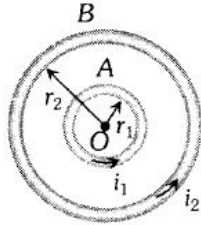
26. A group of N cells whose emf varies directly with the internal resistance as per the equation $E_N = 1.5r_N$ are connected as shown in the figure below. The current I in the circuit is



- (A) 0.51 amp (B) 5.1 amp
 (C) 0.15 amp (D) 1.5 amp
27. A proton, a deuteron and an α -particle having the same kinetic energy are moving in circular trajectories in a constant magnetic field. If r_p, r_d and r_α denote respectively the radii of the trajectories of these particles, then
- (A) $r_\alpha = r_p < r_d$ (B) $r_\alpha > r_d > r_p$
 (C) $r_\alpha = r_d > r_p$ (D) $r_p = r_d = r_\alpha$

Space for rough work

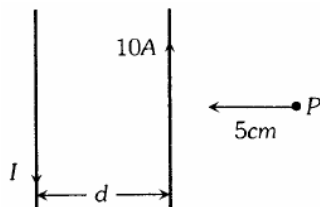
28. The magnetic field at the centre of coil of n turns, bent in the form of a square of side $2l$, carrying current i , is
- (A) $\frac{\sqrt{2}\mu_0 ni}{\pi l}$ (B) $\frac{\sqrt{2}\mu_0 ni}{2\pi l}$
 (C) $\frac{\sqrt{2}\mu_0 ni}{4\pi l}$ (D) $\frac{2\mu_0 ni}{\pi l}$
29. A and B are two concentric circular conductors of centre O and carrying currents i_1 and i_2 as shown in the adjacent figure. If ratio of their radii is 1:2 and ratio of the flux densities at O due to A and B is 1:3, then the value of i_1/i_2 is



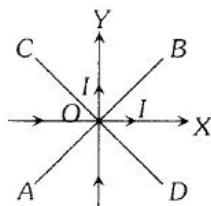
- (A) 1/6 (B) 1/4
 (C) 1/3 (D) 1/2
30. A helium nucleus makes a full rotation in a circle of radius 0.8 metre in two seconds. The value of the magnetic field B at the centre of the circle will be
- (A) $\frac{10^{-19}}{\mu_0}$ (B) $10^{-19} \mu_0$
 (C) $2 \times 10^{-10} \mu_0$ (D) $\frac{2 \times 10^{-10}}{\mu_0}$

Space for rough work

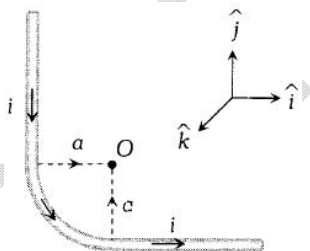
31. Two long parallel conductors carry currents in opposite directions as shown. One conductor carries a current of 10A and the distance between the wires is $d=10\text{cm}$. Current I is adjusted so that the magnetic field at P is zero at a distance of 5cm to the right of the 10A current. Value of I is



- (A) 40A
(B) 30A
(C) 20A
(D) 10A
32. Two very thin metallic wires placed along X and Y- axis carry equal currents as shown here. AB and CD are lines of 45° with the axes with origin of axes at O. The magnetic field will be zero on the line

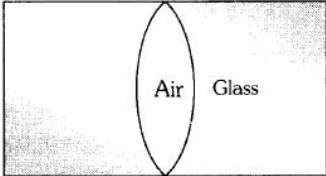


- (A) AB
(B) CD
(C) Segment OB only of line AB
(D) Segment OC only of line CD
33. The unit vectors \hat{i}, \hat{j} and \hat{k} are as shown below. What will be the magnetic field at O in the following figure



- (A) $\frac{\mu_0 i}{4\pi a} \left(2 - \frac{\pi}{2}\right) \hat{j}$
(B) $\frac{\mu_0 i}{4\pi a} \left(2 + \frac{\pi}{2}\right) \hat{j}$
(C) $\frac{\mu_0 i}{4\pi a} \left(2 + \frac{\pi}{2}\right) \hat{i}$
(D) $\frac{\mu_0 i}{4\pi a} \left(2 + \frac{\pi}{2}\right) \hat{k}$

Space for rough work

34. In a concave mirror experiment, an object is placed at a distance x_1 from the focus and the image is formed at a distance x_2 from the focus. The focal length of the mirror would be
- (A) $x_1 x_2$ (B) $\sqrt{x_1 x_2}$
 (C) $\frac{x_1 + x_2}{2}$ (D) $\sqrt{\frac{x_1}{x_2}}$
35. A fish in water (refractive index n) looks at a bird vertically above in the air. If y is the height of the bird and x is the depth of the fish from the surface, then the distance of the bird as estimated by the fish is
- (A) $x + y\left(1 + \frac{1}{n}\right)$ (B) $y + x\left(1 - \frac{1}{n}\right)$
 (C) $x + y\left(1 - \frac{1}{n}\right)$ (D) $x + ny$
36. In the figure, an air lens of radii of curvature 10cm ($R_1=R_2=10\text{cm}$) is cut in a cylinder of glass ($\mu = 1.5$). The focal length and the nature of the lens is
- 
- (A) 15cm , concave (B) 15cm , convex
 (C) ∞ , neither concave nor convex (D) 0 , concave
37. A thin glass (refractive index 1.5) lens has optical power of -5D in air. Its optical power in a liquid medium with refractive index 1.6 will be
- (A) 25D (B) -25D
 (C) 1D (D) None of these

Space for rough work

Chemistry

Straight Objective Type

Chemistry contains 13 multiple choice questions numbered 38 to 50. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

38. The oxidation states of carbon atoms in diamond and graphite are:
(A) +2, +4 (B) +4, +2
(C) -4, 4 (D) zero, zero
39. Which of the following orders regarding ionization energy is correct?
(A) $N > O > F$ (B) $N < O < F$
(C) $N > O < F$ (D) $N < O > F$
40. The PH of 10^{-8} molar solution of HCl in water is:
(A) 8 (B) -8
(C) between 7 and 8 (D) between 6 and 7
41. 20ml of 0.1N HCl is mixed with 20 ml of 0.1N KOH solution the PH of the solution will be
(A) 0 (B) 2
(C) 7 (D) 9
42. How many times has a solution of PH 2 higher acidity than a solution of PH 6
(A) 10,000 (B) 12
(C) 400 (D) 4
43. The diagonal partner of element B is :
(A) Li (B) Al
(C) Si (D) Mg
44. Which of the following is not a reducing agent
(A) SO_2 (B) H_2O_2
(C) CO_2 (D) NO_2
45. In the reaction $8 Al + 3 Fe_3O_4 \rightarrow 4 Al_2O_3 + 9 Fe$, the number of electrons transferred from the reductant to the oxidant is
(A) 8 (B) 4
(C) 16 (D) 24

Space for rough work

46. Brass & bronze have one metal is common this is
(A) Zn (B) Fe
(C) Cu (D) Al
47. When copper reacts with hot and conc. H_2SO_4 gives:
(A) H_2 (B) SO_2
(C) O_2 (D) N_2
48. Chlorine is dried over:
(A) CaO (B) NaOH
(C) H_2SO_4 (D) HBr
49. Aqua- regia is:
(A) conc. HNO_3 + 2 conc. HCl (B) conc. HNO_3 + 3 conc. HCl
(C) conc. HNO_3 + NO_2 (D) conc. HNO_3 + conc. H_2SO_4
50. When a mixture of air and steam is passed over red hot coke the out going gas contain
(A) producer gas (B) water gas
(C) coal gas (D) mixture of (a) and (b)
-

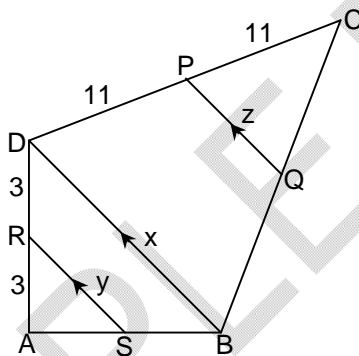
Space for rough work

Mathematics

Straight Objective Type

Mathematics contains 13 multiple choice questions numbered 51 to 63. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

51. If $x+2$ is a factor of $x^2 + ax + 2b$ and $a + b = 4$, then
 (A) $a=1, b=3$ (B) $a=3, b=1$
 (C) $a=-1, b=5$ (D) $a=5, b=-1$
52. Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, the distance between their tops is
 (A) 12 m (B) 14 m
 (C) 13 m (D) 11 m
53. In a right triangle ABC right-angled at B, if P and Q are points on the sides AB and AC respectively, then
 (A) $AQ^2 + CP^2 = 2(AC^2 + PQ^2)$ (B) $2(AQ^2 + CP^2) = AC^2 + PQ^2$
 (C) $AQ^2 + CP^2 = AC^2 + PQ^2$ (D) $AQ + CP = \frac{1}{2}(AC + PQ)$.
54. In the figure, $RS \parallel DB \parallel PQ$. If $CP=PD=11$ cm and $DR=RA=3$ cm. Then the values of x , y and z can be



- (A) 12, 10, 12 (B) 14, 6, 6
 (C) 10, 7, 10 (D) 16, 8, 8
55. If $3 \cos \theta = 5 \sin \theta$, then the value of $\frac{5 \sin \theta - 2 \sec^3 \theta + 2 \cos \theta}{5 \sin \theta + 2 \sec^3 \theta - 2 \cos \theta}$ is
 (A) $\frac{271}{979}$ (B) $\frac{316}{2937}$
 (C) $\frac{542}{2937}$ (D) None of these

Space for rough work

56. $\frac{\cot \theta}{\cot \theta - \cot 3\theta} + \frac{\tan \theta}{\tan \theta - \tan 3\theta}$ is equal to
(A) 0 (B) 1
(C) -1 (D) 2
57. If a and b can take values 1,2,3,4. Then the number of the equations of the form $ax^2 + bx + 1 = 0$ having real roots is
(A) 10 (B) 7
(C) 6 (D) 12
58. If $(a^2 + c^2)x^2 + 2(ab + cd)x + b^2 + d^2 = 0$ has no real roots, then
(A) $ad=bc$ (B) $ab=cd$
(C) $ac=bd$ (D) $ad \neq bc$
59. If in an A.P., $S_n = n^2p$ and $S_m = m^2p$, where S_r denotes the sum of r terms of the A.P., then S_p is equal to
(A) $\frac{1}{2}p^3$ (B) mnp
(C) p^3 (D) $(m+n)p^2$
60. If the sums of n terms of two arithmetic progressions are in the ratio $\frac{3n+5}{5n+7}$, then their n^{th} terms are in the ratio
(A) $\frac{3n-1}{5n-1}$ (B) $\frac{3n+1}{5n+1}$
(C) $\frac{5n+1}{3n+1}$ (D) $\frac{5n-1}{3n-1}$

Space for rough work

61. If A lies in II quadrant and $3 \tan A + 4 = 0$, then value of $2 \cot A - 5 \cos A + \sin A$ is equal to
- (A) $-\frac{53}{10}$ (B) $\frac{23}{10}$
(C) $\frac{37}{10}$ (D) $\frac{7}{10}$
62. If $\sin x + \cos x = \sqrt{y + \frac{1}{y}}$, $x \in [0, \pi]$, then
- (A) $x = \frac{\pi}{4}$ (B) $x = \frac{3\pi}{4}$
(C) $x = \frac{5\pi}{4}$ (D) $x = \frac{7\pi}{8}$
63. $\frac{\cos \theta}{p} = \frac{\sin \theta}{q}$. Then, $\frac{p}{\sec 2\theta} + \frac{q}{\operatorname{cosec} 2\theta}$ is
- (A) p (B) q
(C) pq (D) $\frac{p}{q}$

Space for rough work

FIITJEE Talent Reward Exam-2014

for student presently in
Class 10

PAPER-2

ANSWER KEYS

SECTION – I (PCM) (COMPREHENSION PASSAGE)		SECTION – II (PCM)			
Q. No	Answer	Q. No	Answer	Q. No	Answer
1.	C	25.	C	49.	B
2.	C	26.	D	50.	D
3.	B	27.	A	51.	B
4.	D	28.	A	52.	C
5.	B	29.	A	53.	C
6.	B	30.	B	54.	D
7.	C	31.	B	55.	A
8.	A	32.	A	56.	B
9.	B	33.	D	57.	B
10.	A	34.	B	58.	D
11.	C	35.	D	59.	C
12.	D	36.	A	60.	B
13.	D	37.	D	61.	B
14.	A	38.	D	62.	A
15.	C	39.	C	63.	A
16.	B	40.	D		
17.	C	41.	C		
18.	A	42.	A		
19.	D	43.	C		
20.	C	44.	C		
21.	C	45.	D		
22.	A	46.	C		
23.	B	47.	B		
24.	D	48.	C		