

MPPET 2013 ANSWER KEY & SOLUTIONS

MATHS

S.NO	Question	Answer	DETAIL SOLUTION
1	If $\sin A + \sin B = a$ and...	$\frac{b^2 - a^2}{a^2 + b^2}$	
2	The value of $\tan 15^\circ$	4	
3	The general value of θ ...	$n\pi - (-1)^n \frac{\pi}{6}, n \in \mathbb{I}$	
4	In a triangle ABC if	$\sqrt{3}$ unit	
5	The value of $\tan \left(\frac{1}{2} \cos^{-1} \frac{\sqrt{5}}{3} \right)$	$\frac{3 - \sqrt{5}}{2}$	
6	An aeroplane is hori.	$2 \left(\frac{\sqrt{3} - 1}{\sqrt{3}} \right) \text{ km}$	
7	Equation of a line which passes through	$X \sec \theta + y \operatorname{cosec} \theta = a$	
8	The equation of pair of straight lines	$bx^2 - 2hxy + ay^2 = 0$	
9	The value of 'a' for which the lines..	-3	
10	For two circle, if the distance between their....	3	
11	If $Y = x + a$ is tangent to the parabola	2	
12	If the line $ax + 4y = 36$ is tangent to the	$\pm 2\sqrt{5}$	

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13	Angle between tangents drawn....	$\frac{\pi}{2}$	
14	The angle between the asymptotes of the	$2 \tan^{-1} \left(\frac{b}{a} \right)$	
15	If the foci the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1 \dots$	7	
16	The locus of the middle point	$x^2 + y^2 = 8$	
17	Centre of the conic	(1,2)	
18	Direction ratio's of the line	$b_1c_2 - c_1b_2, c_1a_2, a_1b_1 - b_1a_2$	
19	The co-ordinates of a point in the...	(0,0,0)	
20	The yz plane divides the line segment	2 : 3	
21	If the plane $x + ay + z = 5$ has....	1	
22	If the sum of squares of distance of a point from	$x^2 + y^2 + z^2 = p^2$	
23	Distance of the plane	4/3	
24	Angle between the lines	$\cos^{-1} \left(\frac{8}{9} \right)$	
25	If a and b are unit...	$\sin \frac{\theta}{2} = \frac{1}{2} a - b $	
26	The unit vector which is	$\frac{-3i + 5j + 11k}{\sqrt{155}}$	
27	If $\vec{op} = x_1\vec{i} + y_1\vec{j} + z_1\vec{k} \dots$	$\frac{x_2 - x_1}{PQ}, \frac{y_2 - y_1}{PQ}, \frac{z_2 - z_1}{PQ}$	

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28	Direction of a reciprocal vector...	None of these	
29	The moment of force	$\hat{i} - 2\hat{j} + \hat{k}$	
30	If $\vec{a} = \vec{b} + \vec{c}$, then ..	0	
31	A force $\vec{F} = 2\hat{i} - 3\hat{j} + \hat{k}$ is acting at a point ..	4 units	
32	If a and b are the position vector...	2	
33	If $\log_{0.2}(x-1) < \log_{0.4}(x-1)$, then...	$x \in (1, 2)$	
34	Domain and Range are....	Identity function	
35	If $f(x) = \frac{1+x}{1-x}$, then the value...	$-\frac{1}{x}$	
36	The value of	e^2	
37	If the function $f(x) = \dots$	$a = 1, b = 3$	
38	For what value of m, the function....	$m > 1$	
39	If $x^2 + y^2 = t = \frac{1}{t}, x^4 + y^4 = \dots$	$\frac{1}{x^3 y}$	
40	If $(\cos x)^y = (\sin y)^x$, then	$\frac{\log_e(\sin y) + \tan x}{\log_e(\cos x) - x \cot y}$	
41	If a particle is moving in a straight...	$2 < t < 5$	
42	The function $3 \sin x - 4 \sin \dots$	$= \frac{\pi}{6} < x < \frac{\pi}{6}$	

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43	The height of a cylinder of maximum.....	$\frac{2a}{\sqrt{3}}$ units	
44	For the function	$2 \pm \frac{1}{\sqrt{3}}$	
45	$\int \sqrt{e^x - 1} dx$ is equal to...	$2[e^x - 1 + \cot^{-1} \sqrt{e^x - 1}] + c$ or $2[e^x - 1 - \tan^{-1} \sqrt{e^x - 1}] + c$	
46	$\int \frac{1}{5 + 4 \cos x} dx$ is equal to.....	$\frac{2}{3} \tan^{-1} \left(\frac{\tan(x/2)}{3} \right) + C$	
47	$\int \frac{x^2 + 1}{x^4 + x^2 + 1} dx$ is equal to....	$\frac{1}{\sqrt{3}} \tan^{-1} \left(\frac{x^2 - 1}{\sqrt{3}x} \right) + c$	
48	The value of	$\frac{4}{e}$	
49	Value of $\int_{-1}^1 e^{ x } dx$ is ...	$2(e - 1)$	
50	The value of $\int_0^{2\pi} \frac{x \sin^{2n} x}{\sin^{2n} x + \cos^{2n} x} dx$	π^2	
51	If $\int \frac{x \tan^{-1} x}{\sqrt{1 + x^2}} dx = ...$	$A = 1, b = -1$	
52	$\int \left[\frac{e^{5 \log_e x} - e^{4 \log_e x}}{e^{3 \log_e x} - e^{2 \log_e x}} \right] dx$ is equal to .	$\frac{x^3}{3} + c$	
53	The area bounded by the curve $y = 4x(x-1)(x-2)$	2sq. units	
54	The area bounded by the curve $y = x - 1$ and $- x + 1$ is ...	2 sq. units	

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55	The differential equation of rectangular hyperbola...	$x \frac{dy}{dx} + y = 0$	
56	The differential equation of family of circles ...	$\left[1 + \left(\frac{dy}{dx} \right)^2 \right]^3 = a^2 \left[\frac{d^2y}{dx^2} \right]^2$	
57	Degree of the differential equation $\left(\frac{d^2y}{dx^2} \right)^{3/2} + x^2 \left(\frac{dy}{dx} \right) = e^x$ is	3	
58	The order of the differential equation $\frac{d^2y}{dx^2} - 5 \left(\frac{dy}{dx} \right)^{7/2} = \sin x$, ..	2	
59	Solution of the differential equation $\frac{dy}{dx} = (4x + y + 1)^2$	$\frac{1}{2} \tan^{-1} \left(\frac{4x + y + 1}{2} \right) = x + c$	
60	Solution of the differential equation $e^{-x+y} \frac{dy}{dx} = 1$..	$e^y = e^x + c$	
61	Solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \sin \left(\frac{y}{x} \right)$ is ..	$\tan \left(\frac{y}{2x} \right) = cx$	
62	Solution of the differential equation $\frac{dy}{dx} = \frac{x + y + 1}{2x + 2y + 3}$..	$6y - 3x + \log(3x + 3y + 4) = c$	
63	Integrating factor of the differential equation $x \dots$	$\log x$	

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64	A bag contain 3 white....	5 : 9	
65	A, B and C are parti.....	257/320	
66	In a single throw of two....	5/9	
67	A and B are independent event...	1/3	
68	The number of minimum series..	2	
69	The standard deviation of th..		No option is correct
70	If the correlation coefficient is zero..	Perpendicular	
71	The order of convergence of.	2	
72	First approximate solution of	2.05	
73	Using false position method, the...	(2, 3)	
74	Using Bisection method the...	[0 , 1]	
75	In Simpson's 1/3 rule the ...	Even	
76	For the following data :	5.05	
77	In Trapezoidal rule the..	Straight line	
78	Which one of the following represent the Simpson's...	$\int_{x_0}^{x_0+nh} ydx \square$ $h \left[\frac{1}{3}(y_0 + y_n) + \frac{4}{3}(y_1 + y_3 + \dots + y_{n-1}) + \frac{2}{3}(y_2 + y_4 + \dots + y_{n-2}) \right]$	
79	The objective function of a Linear	A polynomial	

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	Programming...		
80	The main parts of linear...	2	
81	The optimal solution of the linear...	$X = 20, y = 30$	
82	In solving the linear programming problem...	Convex set of feasible solution	
83	The smallest positive integer..	4	
84	If $\frac{2z_1}{3z_2}$ is purely number	1	
85	If complex number z_1, z_2 and o are..	0	
86	The amplitude of	$\frac{\pi}{6}$	
87	$\log_3 2, \log_6 2$	HP	
88	If a, b, c are Harmonic ...	$\frac{3}{b^2} - \frac{2}{ab}$	
89	If x be real, then the maximum value..	41	
90	If α, β are the roots....	1	
91	${}^{47}C_4 +$	${}^{52}C_4$	
92	Total number of ways in which	35	
93	The middle term in the	252	
94	If $\log_5(3x - 1) < 1$, then...	$\left(\frac{1}{3}, 2\right)$	
95	If $ax^3 + bx^2 + cx + d = \dots$	-1	

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96	If the system of equation....	2	
97	For a square matrix A =	Skew symmetric matrix	
98	If the value of a third order determinant ..	256	
99	The range of the trigonometric function $\sec x$...	$R - (-1,1)$	
100	The value of $\frac{\cos(90^\circ + \theta) \dots}{\sec(360^\circ - \theta) \dots}$	-1	

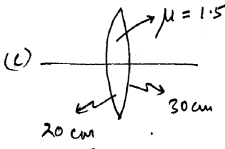
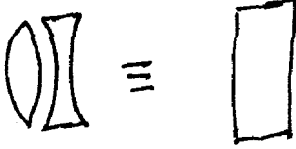
PHYSICS

S.NO.	Question	Answer	DETAIL SOLUTION
101	A piece of ice.....	Will not change	
102	Difference between the internal and external.....	$\frac{2T}{r}$	$P_2 - P_1 = \frac{2T}{R}$
103	Two identical solid spheres...	$\rho^2 r^4$	$F = \frac{GM_1 M_2}{(R)^2} = \frac{G \left(\rho \frac{4}{3} \pi r^3 \right) \left(\rho \frac{4}{3} \pi r^3 \right)}{(2\pi)^2}$

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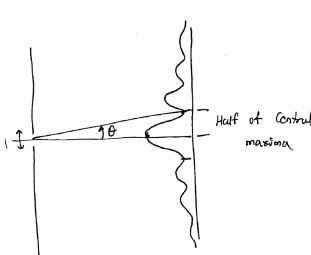
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104	An ideal gas has pressure	$P = \frac{2}{3}E$	$PV = \frac{1}{3}\eta mv_{rms}^2$ $pV = \frac{2}{3}\left(\frac{1}{2}\eta mv_{rms}^2\right)$
105	An iron needle floats on the....	Surface tension	
106	Work done in an isothermal....	On both the temperature and volume expansion ratio	$W = nRT \ln\left(\frac{V_2}{V_1}\right)$
107	The ratio of the coefficient of thermal....	5 : 3	$R = \frac{L}{KA}$ $R = \text{same} ; L = \text{same} \therefore \frac{l_1}{l_2} = \frac{k_1}{k_2} = \frac{5}{3}$
108	The refractive index of the material of a con.....	24 cm	 $\frac{1}{f} = (\frac{\mu-1}{1}) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$ $= \frac{1.5-1}{1} \cdot \left(\frac{1}{20} + \frac{1}{30} \right)$ $\frac{1}{f} = 0.5 \cdot \left(\frac{30+20}{600} \right)$ $f = \frac{600}{80 \times 0.5} = \frac{120}{5}$ $f = 24 \text{ cm}$
109	Two thin lenses are kept in contact....	30 cm	
110	A convex and a concave lens of.....	erect and of same size as the object	 $\frac{1}{f_{eff}} = \frac{1}{f_1} + \frac{1}{f_2}$ $= \frac{1}{(+10)} + \frac{1}{(-10)} = 0$ <p>⇒ Combination will behave as a glass slab image will be erect and of the same size as the object</p>

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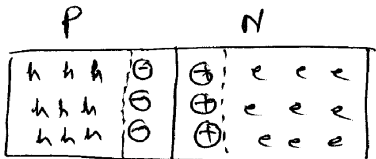
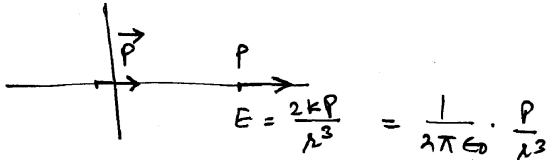
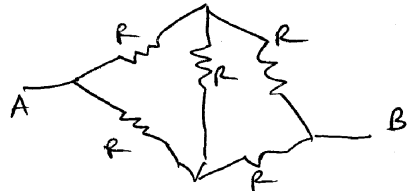
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111	the focal length of a convex	$\left(\frac{n-1}{n}\right)f$	$m = \frac{9}{4} = n \Rightarrow v = nu$ And $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ $\frac{1}{(nu)} - \frac{1}{u} = \frac{1}{f}$ $\left(\frac{n-1}{n}\right)f$ $u = \frac{f(n-1)}{n}$
112	the magnifying power of com.....	4	$m = m_o m_e$ $m_e = \frac{m}{m_o} = \frac{32}{8} = 4$
113	in young's experiment the	$I = 4 I_o$	$I = I_1 + I_2 + \sqrt{I_1 I_2} \cos \phi$ At central fringe $I_{\max} = 4I$ In problem $I = I_o$
114	in an experiment of diffraction....	increase	$\beta = \frac{2\lambda D}{d}$ $B \propto \frac{1}{d}$ If d decreased β increase
115	in the diffraction of light of ...	$\frac{\lambda}{d}$	 <p>Half of Central maxima</p> $d \sin \theta = n\lambda$ $d \sin \theta = \lambda$ (for 1 st min) $\Rightarrow \theta = \frac{\lambda}{d}$ Angular width of central

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			$\text{Maxima} = \frac{2\lambda}{d}$ $\text{So half of angular width} = \frac{\lambda}{d}$
116	electrical resistance of a piece....	semi-conductor	$\rho = \rho_0 (1 + \alpha \Delta\theta)$ $\alpha = \text{is +ve for conductors}$ $\alpha = \text{is -ve for semi conductors}$
117	depletion layer at....	both positive and negative immobile charges	 <p>Depletion layers contains both positive and negative immobile charges</p>
118	electric field strength due to a ...	$E = \frac{1}{2\pi\epsilon_0} \frac{p}{r^3}$	 $E = \frac{2kp}{r^3} = \frac{1}{2\pi\epsilon_0} \cdot \frac{p}{r^3}$
119	stored electrostatic energy in ...	$u = \frac{Q^2}{2C}$	$u = \frac{Q^2}{2C}$
120	A parallal plate capacitor...	44 pF; 211.2pF	
121	each resistance in the given....	R	 <p>For balanced wheatstone bridge</p> $R_{AB} = R$

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122	a galvanometer of resistance...	$R = 480\Omega$	$V = i_g (R_g + R)$ $\Rightarrow 3 = 6 \times 10^{-3} (20 + R)$ $\Rightarrow R + 20 = 0.5 \text{ k}\Omega = 500\Omega$ $\Rightarrow R = 480\Omega$
123	open circuit potential	electromotive force	Open terminal voltage is called electro motive force
124	when a capacitor of	$Q(t) = Q_{\max} (1 - e^{-t/RC})$	$Q(t) = Q_{\max} (1 - e^{-t/RC})$
125	a heater is marked 500w...	30 paisa	<p>Consumed = $P \times t$</p> $= 500 \times 4 \times 3600$ $= 72 \times 10^5 \text{ Joule}$ Unit consumed = 2 kwh Cost = $2 \times 15 = 30 \text{ paisa}$
126	the magnetic field d...	$\frac{\mu_0}{4\pi} \frac{Id \vec{l} \times \vec{r}}{r^3}$	$\frac{\mu_0}{4\pi} \frac{Id \vec{l} \times \vec{r}}{r^3}$ Biot savarat law
127	in a voltameter masses ...	electro -chemical equivalent	$m = z \cdot q$ $z = \text{electro -chemical equivalent}$
128	force \vec{F} experienced by charge ...	$\vec{F} = q[\vec{E} + (\vec{v} \times \vec{B})]$	$\vec{F} = q[\vec{E} + (\vec{v} \times \vec{B})]$
129	the mangitude of electric	Charge of the particle	
130	Pick statement that is correct for a p-type semiconcutor	Density of minority carriers depends on temperature	
131	Pick mirror isobars from the following :	${}_7\text{N}^{15}, {}_8\text{O}^{15}$	${}_7\text{N}^{15}, {}_8\text{O}^{15}$
132	The speed of	1195.2 km/h	

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	sound in air is 332 m/s.....		
133	Dimensional formula for boltzman....	$[ML^2T^{-2}\theta^{-1}]$	$[ML^2T^{-2}\theta^{-1}]$
134	Select the pairs which have same....	Torque and wok	
135	Frequency f of oscillations of a mass....	$x = -\frac{1}{2}, y = \frac{1}{2}$	$x = -\frac{1}{2}, y = \frac{1}{2}$
136	A Force $\vec{F} = (5\vec{i} + 3\vec{j})$ newton.....	7 Joules	
137	A simple pendulum is hanging from the	$\theta = \tan^{-1}\left(\frac{a}{g}\right)$	
138	A motor car is moving on a straight horizontal road	50 m	50 m
139	A cylinder rolls up an inclined plane, reaches some....	Up the incline while ascending and descending	
140	A assuming that the coefficient of friction.....	20 m/s	$v = \sqrt{\mu rg} = 20\text{m/s}$
141	For a body moving in a horizontal.....	Kinetic energy	
142	For a geostationary satellite	$\pi/12$	$\omega = \frac{2\pi}{T} = \frac{2\pi}{24}$

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143	A body is moving in a circular...,...	16 a	$a = \frac{v^2}{r}$ If velocity becomes 4 times than a will be 16 times
144	The circular motion if a particle	Periodic but not simple harmonic	For SHM $F \propto -x$
145	The moment of linear momentum...	Angular momentum	Angular momentum is momentum of linear momentum
146	The moment of inertia of a uniform...	$\frac{3}{2}MR^2$	$I = I_{cm} + MR^2$ $= \frac{1}{2}MR^2 + MR^2$
147	The equation of motion of a particle is.....	$\frac{2\pi}{\sqrt{b}}$	$a = -bx = -\omega^2x$ $\omega = \sqrt{b} = 2\pi/T$
148	The Young's modulus of steal is	60.0	$Y = 2.0 \times 10^{11} \frac{N}{M^2}, r_0 = 3 \text{ \AA}$ $K = Yr_0$
149	A wire is stretched by 5 mm when it is	2.5 mm	
150	A liquid rises in a capillary tube	Acute	

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CHEMISTRY

S.N O.	Question	Answer	DETTAIL SOLUTION
151	Which of the following is formed when.....	Orange solution of $\text{Na}_2\text{Cr}_2\text{O}_7$ is formed	
152	A compound contains		According to English CH_3NH_2 and no answer in hindi
153	A compound containing only carbon.....	An aldehyde	
154	The IUPAC name of the...	3,3 – dimethyl – 1 – bute	
155	Which of the isomerism is	Metamerism	
156	That which is not....	Gasoline	
157	The petrol of octane...	20% n – heptane + 80%	
158	Structure of diethyl ether....	Williamson's shythesis	
159	CH_3CHO gives....	PCl_5	
160	Which of the following acids cannot be...	Formic acid	
161	Chlorobenzene is prepared	Raschig Process	
162	Phenol $\xrightarrow[\Delta]{\text{Zn}}$ x.	Friedal-Craft;s reaction	
163	Which of the following reduces Tollens's reagent	Glucose	
164	Glucose converts into alcohol by action	Zymase	
165	Amino acids are formed	Proteins	
166	Which of the following called polyamide	Nylon	
167	Which of the following is an example ...	All of these	

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168	Which has maximum number of atoms ?	24 gms of $C_{(12)}$	
169	Which has the maximum number of unpaired...	Fe^{2+}	
170	Bond order in species is as the following :	$O_2^+ > O_2 > O_2^-$	
171	Which compound has electrovalent bond ?	NaBr	
172	Weight Of Urea required to prepare 200 ml	24 gm	
173	In Bragg's reaction $n\lambda = 2d\sin\theta$, n present	Order of reflection	
174	The differences between number of Neutrons	Tritium atom	
175	For the reaction $2NO_{(g)} + Cl_{2(g)} \rightleftharpoons 2NOCl_{(g)}$	$K_p = \frac{K_c}{RT}$	
176	$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$,	Increases if T is raised	
177	pH of water is 7.0 at $25^\circ C$. If water is ...	pH will be decreases	
178	In the reaction $H_2O + HCl \rightarrow H_3O^+ + Cl^-$	H_2O	
179	The enthalpies of combustion of carbon and carbon....	$-110.5 kJ\text{ mole}^{-1}$	
180	The quantity of K in a rate of expansion	Is independent of concentration of reactants	
181	The half life of radioactive sodium is 15.0 hours. How many ...	45	
182	Which of the following is not true for the reaction	Both Fe^{3+} and Fe^{2+} are called acid radicals	
183	In the reaction $Pb(s) + Cu^{2+}(aq) \rightarrow Pb^{2+}(aq) + Cu(s)$ which is...	$Pb(s)$	

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184	The phenomenon of negative	Inhibition	
185 is the gold number of hydrophilic colloid, then	Lower	
186	In metallurgy if iron when limestone	Slag	
187	Identify the least stable ion	Be^-	
188	Transition metals have general electronic	in option (c) there should be ns^{1-2} rather than ns^{12}	
189	Variable valency is a general feature of ...	d-block elements	
190	The amount of energy released when 10^6 atoms of iodine in....	3.06	
191	Sodium hydride when dissolved in water	Basic solution	
192	When zinc reacts with very dilute.....	NH_4NO_3	
193	A black sulphide when reacts with ozone becomes....	PbSO_4	
194	Strongest reducing agent is ...	I^-	
195	The formula of hematite is ...	Fe_2O_3	
196	Which of the following forms with an excess of CN^-	Ag^+	
197	The IUPAC name of $\text{Ni}(\text{CO})_4$ is	Tetracarbonylnickelate (O)	

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198	A 5 molar solution of H_2SO_4 acid is diluted from 1 litre to 10 litre...	1N	
199	Ferric ions form prussian blue coloured	$\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$	
200	The volume of water to be added to 100 ml of 0.5N H_2SO_4	400 ml	