माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

मु.उ.पु. 40 पृष्ठ

कार्यालयीन उपयोग के लिए

निम्न रिक्तियों की सही प्रविष्टि परीक्षार्थी द्वारा की जाए।

परीक्षा के नाम की सील

1. विषय कोड 150 परीक्षा का विषय Mathematic

2. परीक्षा का माध्यम English परीक्षा की दिनांक 24-03-09

केन्द्र क्रमांक की सील

2009 केन्द्र क्र. - 212023

3. परीक्षार्थी प्रश्न पत्र का पूर्ण कोड नम्बर (सेट A, B, C या D) अनिवार्यतः भरें — कोड U-2045 सेट C

पर्यवेक्षक/केन्द्राध्यक्ष का प्रमाणीकरण

प्रमाणित किया जाता है कि परीक्षार्थी द्वारा निम्नानुसार पूरक उत्तरपुस्तिका ली गई है :–

क :– संख्या शब्दों में Two अंकों में 2

ख :– परीक्षार्थी की बैठक व्यवस्था कक्ष क्रमांक 04 में है।

ग :– उत्तर पुस्तिका पर प्रश्न–पत्र का कोड नम्बर एवं सेट सही लिखा है।

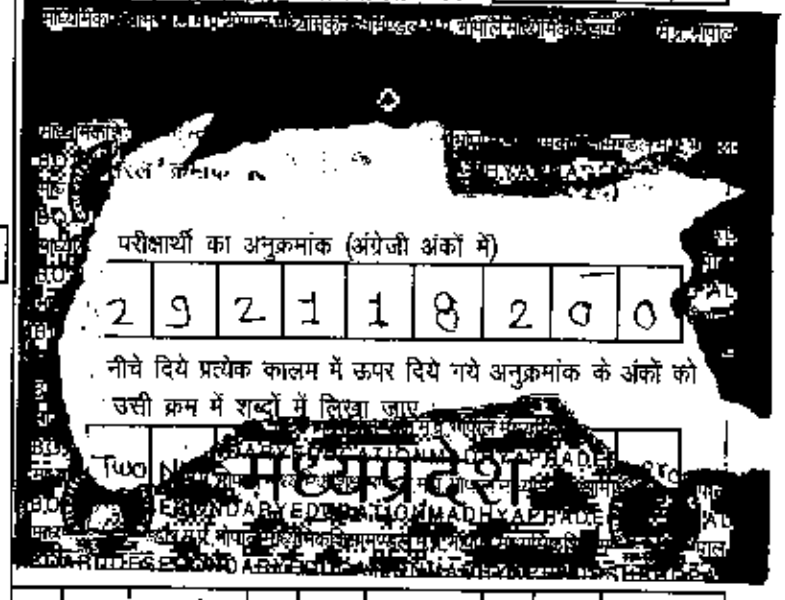
हस्ताक्षर (पर्यवेक्षक)

नाम ... पद ...

पता/संस्था ...

परीक्षार्थी द्वारा ली गई सभी पूरक उत्तर पुस्तिकायें, मुख्य उत्तर पुस्तिका के साथ संलग्न हैं।

हस्ताक्षर केन्द्राध्यक्ष



प्रश्न	प्राप्तांक
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परीक्षार्थी, परीक्षक से अपेक्षा है कि वे पृष्ठ भाग पर दिये गये निर्देशों का यथेष्ट पालन सुनिश्चित करेंगे।

प्रमाणित किया जाता है कि उपरोक्तानुसार संलग्न पूरक उत्तर पुस्तिकाओं चस्पा स्थिति में यथावत् रखते हुए ही उत्तरपुस्तिका का मूल्यांकन किया गया पुस्तिका के अन्दर के अंक एवं कवर पृष्ठ पर दर्शाये अंक एक समान है।

हस्ताक्षर (परीक्षक) 24-03-09

परीक्षक क्रमांक

हस्ताक्षर (उपमुख्य परीक्षक)

दिनांक

हस्ताक्षर (मुख्य परीक्षक)

दिनांक

Q 1

(A) (i) $A = 1$, $B = \frac{1}{\lambda}$

(B) (iv) $(1+x^3)^{-1/2}$ ✓

(C) (ii) $4\ cm/sec^2$ ✓

(D) (iii) Perfect positive correlation. ✓

(E) (i) $-\frac{4}{7}, -\frac{11}{7}$ ✓

Q 2

(A) (iii) $\sqrt{26}$ ✓

(B) (ii) $x+y+z = 6$ ✓

(C) (ii) $5\sqrt{2}$ ✓

(D) (iii) -7 ✓

(E) (ii) $-\frac{5}{7}x^{-12/7}$ ✓

10

④ [ ] + [ ] = ___
प्र... क कुल अंक

Q 3

(A) (ii) $e^{\log x}$ ✓

(B) (iii) $2\log(x-2) - \log(x-1)$

(C) (iii) $1/3$ ✓

(D) (iv) None ~~of these~~ (i) ~~Parabola~~

(E) (ii) Parabola. ✓

Q (4)

(a) Equation of sphere with centre (a, 1, -1) and radius 2 → $x^2+y^2+z^2-2y+2z = 2$ ✓

(b) Normal form of equation to the plane → $x\cos\alpha + y\cos\beta + z\cos\gamma = p$ ✓

(c) If O is the origin and P is (3, -4), express $\overrightarrow{OP}$ in terms of $\vec{i}$ and $\vec{j}$, value of $\overrightarrow{OP}$ → 5 ✓

[ ]
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(D) Unit vector parallel to $(\hat{i}+\hat{j})$ → $\frac{\hat{i}}{\sqrt{2}} + \frac{\hat{j}}{\sqrt{2}}$ ✓

(E) In Simpson's rule $\int_1^7 \frac{dx}{x}$ is → $\simeq 1.958$ ✓

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Q(5)

(i) Differential coefficient of $\sin^{-1}x$ is

$\frac{1}{\sqrt{1-x^2}}$ ✓

(ii) Value of $\int \frac{1}{x} \cos\sqrt{x}\, dx$ is →

$\sin^{-1}x \cdot \ln x - \int \frac{1}{\sqrt{1-x^2}} + C$

(iii) Value of $\int \frac{dx}{1-x^2}$ is -

$\frac{1}{2} \log \left|\frac{1+x}{1-x}\right|$ ✓

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(iv) Value of 0.2314 E05 x 0.3061 E01 is 0.0708315 E06

(v) Value of 0.6712 E10 ÷ 2643 E04 is 0.2539 E07

Q 6 (in last pages)

Sol Let $\frac{x+3}{(x+2)(x^2-9)} = \frac{(x+3)}{(x+2)(x+3)(x-3)}$

Let $\frac{(x+3)}{(x+2)(x+3)(x-3)} = \frac{A}{(x+2)} + \frac{B}{(x+3)} + \frac{C}{(x-3)}$

$\Rightarrow x+3 = A(x+3)(x-3) + B(x+2)(x-3) + C(x+2)(x+3)$ — (1)

Put $x = -2$, we get

$-2+3 = -5A + 0 + 0$

$A = \frac{-1}{5}$

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Putting $x = 3$, we get

$$6 = 30C$$

$$\Rightarrow C = \frac{1}{5}$$

Last page

Putting the value of A, C in eq (1) and $x \neq 0$, we get

$$3 = \frac{+9}{5} + 6B + \frac{1 \times 6}{5}$$

$$\Rightarrow 15 = 9 - 30B + 6$$

$$15 = 15 - 30B$$

$$\Rightarrow B = 0$$

Solution

Put all these value in eq (1), we have

$$\frac{x+3}{(x+2)(x^2-9)} = \frac{-1}{5(x+2)} + \frac{1}{5(x-3)}$$

$$\frac{x+3}{(x+2)(x^2-9)} = \frac{1}{5}\left[\frac{1}{x-3} - \frac{1}{x+2}\right] \times \left(\frac{x+3}{x+3}\right)$$

Ans

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Sol- (7)- To prove -

$$\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13} = \sin^{-1}\frac{56}{65} \quad \text{---(1)}$$

Let $\sin^{-1}\frac{3}{5} = \alpha$ ---(11)

$\Rightarrow \sin\alpha = 3/5 \quad \Rightarrow \cos\alpha = \sqrt{1-\left(\frac{3}{5}\right)^2} = \frac{4}{5}$

and $\cos^{-1}\frac{12}{13} = \beta \Rightarrow \cos\beta = \frac{12}{13}$ ---(111)

$\Rightarrow \sin\beta = \frac{5}{13}$

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$= \frac{3}{5} \times \frac{12}{13} + \frac{5}{13} \times \frac{4}{5}$

$= \frac{36}{65} + \frac{20}{65}$

$\sin(\alpha+\beta) = \frac{56}{65}$

$\Rightarrow \alpha+\beta = \sin^{-1}\frac{56}{65}$

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from eq (ii) and (iii), we have

$$\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{12}{13} = \sin^{-1}\frac{56}{65}.$$

Q(8) $\frac{d}{dx}\left(\frac{e^x + e^{-x}}{e^x - e^{-x}}\right) =$

$$= \frac{(e^x - e^{-x})\frac{d}{dx}(e^x + e^{-x}) - (e^x + e^{-x})\frac{d}{dx}(e^x - e^{-x})}{(e^x - e^{-x})^2}$$

$$= \frac{(e^x - e^{-x})(e^x - e^{-x}) - (e^x + e^{-x})(e^x + e^{-x})}{(e^x - e^{-x})^2}$$

$$= \frac{e^{2x} + e^{-2x} - 2 - (e^{2x} + e^{-2x} + 2)}{(e^x + e^{-x})^2}$$

$$= \frac{-4}{(e^x + e^{-x})^2} \quad \text{Ans.}$$

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Sol- (9) Given- To prove - $(2y-1)\frac{dy}{dx} = \cos x$

$$y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \infty}}}$$

Proof: It can be written as :-

$$y = \sqrt{\sin x + y}$$

on squaring both sides,

$$y^2 = \sin x + y$$

$$\Rightarrow y^2 - y = \sin x$$

on differentiating both sides, we get-

$$2y\frac{dy}{dx} - \frac{dy}{dx} = \cos x$$

$$\Rightarrow \frac{dy}{dx}(2y-1) = \cos x$$

— hence proved.

Sol (10) Given equation of motion by ball

$\Rightarrow s = 490t - 4.9t^2$

Its velocity be :-

$\frac{ds}{dt} = 490 - 9.8t$

At highest point velocity becomes zero, because it has retarding i.e. deceleration.

$\therefore 490 - 9.8t = 0$

$\Rightarrow t = \frac{490}{9.8}$

$= \frac{4900}{98}$

$= 100$

$t^2 = 50$

at $t = 50$

$\Rightarrow$ distance covered in 50 sec. by the ball is

$S = 490t - 4.9t^2$

$= 490 \times 50 - 4.9 \times 2500$

$= 24500 - 12250$

$S = 12250$ units Ans.

Sol (11) Given $cov(x,y) = -2.25$

$Var(x) = 6.25$

$Var(y) = 20.25$

We know that,

Coefficient of correlation (r)

$$r = \frac{cov(x,y)}{\sqrt{Var(x) \cdot Var(y)}}$$

$$= \frac{-2.25}{\sqrt{6.25 \times 20.25}}$$

$$= \frac{-2.25}{\sqrt{126.5625}} = \frac{-2.25}{\pm 12}$$

$\therefore$ Var(x) and ~~(Var)~~ Var(y) are both of +ve sign then coefficient correlation is also +ve

$\Rightarrow r = \pm 2.25$

± 12.1

$\Rightarrow r = 0.186$

Hence coefficient of correlation is $r = 0.186$

and It is positive correlation.

Sol (12)

Given line of aggression of y on x is

$2y - x - 50 = 0$

i.e $y = \frac{1}{2}x + \frac{50}{2}$

$\Rightarrow y = \frac{1}{2}x + 25$

$\Rightarrow b_{yx} = \frac{1}{2} = r\frac{\sigma_y}{\sigma_x}$

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And that of x on y

$\Rightarrow 2x = 3y - 10$

$\Rightarrow x = \frac{3}{2}y - 10$

$\Rightarrow b_{xy} = r\frac{\sigma_x}{\sigma_y} = \frac{3}{2}$

Hence, the correlation coefficient (r)

$r\frac{\sigma_x}{\sigma_y} \times r\frac{\sigma_y}{\sigma_x} = b_{yx} \times b_{xy}$

$\Rightarrow r^2 = b_{yx} \times b_{xy}$

$r^2 = \frac{3}{2} \times \frac{1}{2}$

$\Rightarrow \boxed{r = \frac{\sqrt{3}}{2}}$ Ans

And the means for variable x and y :-

(i) — $2y - x - 50 = 0 \Rightarrow x = 2y - 50$

(ii) — $3y - 2x - 10 = 0$

Put the value of x from eq^{n} (i) to eqn (ii), we get

$3y - 2(2y - 50) - 10 = 0$

$3y - 4y + 100 - 10 = 0$

$\Rightarrow y = 90$

and put value of y in eq (i)

$x = 180 - 50$

$\Rightarrow x = 130$

Hence the required means for variable, $x \Rightarrow \bar{x} = 130$

and for variable $y \Rightarrow \bar{y} = 90$ Ans.

Sol (13) Given two lines are

$$L_1 : \frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$$

$$L_2 : \frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$$

If these lines will intersect each other then we can say that these two lines are coplanar.

And, when these lines intersects each other then the distance between them will be zero.

Hence if $\begin{vmatrix} x_2-x_1 & y_2-y_1 & z_2-z_1 \\ l_1 & m_1 & n_1 \\ l_2 & m_2 & n_2 \end{vmatrix} = 0$ — (1)

then only these lines will be coplanar.

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Here, $x_1 = 1, \quad x_2 = 2$

$y_1 = 2, \quad y_2 = 3$

$z_1 = 3, \quad z_2 = 4$

$l_1 = 2 \quad m_1 = 3 \quad n_1 = 4$

$l_2 = 3 \quad m_2 = 4 \quad n_2 = 5$

From eqn (1), put these values in it, we have :-

$$\begin{vmatrix} 2-1 & 3-2 & 4-3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} = 0$$

$$= \begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} = 0$$

$$= 1(15-16) - 1(10-12) + 1(8-9) = 0$$

$$= -1 + 2 - 1 = 0$$

$$0 = 0$$

— hence proved.

Sol- (14) We have $|\bar{a}| = 2$

$|\bar{b}| = 3$

$\bar{a} \cdot \bar{b} = 3$

To find the angle between $\bar{a}$ and $\bar{b}$, we know that

$$\bar{a} \cdot \bar{b} = |\bar{a}||\bar{b}| \cos\theta$$

where θ is the angle between them i.e. $\bar{a}$ and $\bar{b}$,

we have from given information

$$3 = 2 \times 3 \cos\theta$$

$$\Rightarrow \cos\theta = \frac{1}{2}$$

$$\Rightarrow \cos\theta = \cos\frac{\pi}{3}$$

$$\Rightarrow \boxed{\theta = \frac{\pi}{3}}$$

Hence angle between $\bar{a}$ and $\bar{b}$ is $\pi/3$ Ans.

So (15)

Given $f(x) = \frac{x^2-1}{x^2+1}$

To prove $f\left(\frac{1}{x}\right) = -f(x)$

Proof $f\left(\frac{1}{x}\right) = \frac{\frac{1}{x^2}-1}{\frac{1}{x^2}+1}$

$= \frac{\frac{1-x^2}{x^2}}{\frac{1+x^2}{x^2}}$

$f\left(\frac{1}{x}\right) = \frac{1-x^2}{1+x^2}$

$\Rightarrow -f\left(\frac{1}{x}\right) = -\left(\frac{x^2-1}{1+x^2}\right)$ — (1)

and $f(x) = \frac{x^2-1}{x^2+1}$ — (11)

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From eqn (1) and eqn (11), we get

$$f\left(\frac{1}{x}\right) = -f(x)$$

∴ hence proved

Sol (16) $I = \int \sin^{-1}x \cdot 1 \cdot dx$

Let $\sin^{-1}x$ = I, 1 = II

$$I = x\sin^{-1}x - \int \frac{x}{\sqrt{1-x^2}}\,dx$$

$= x\sin^{-1}$ ∴ we know

$\int u \cdot v\,dx$ (I, II)

$= u\int v\,dx - \int\left(\frac{du}{dx}\cdot\int v\,dx\right)dx$

where u and v are functions of x

$\Rightarrow I = x\sin^{-1}x - \int \frac{x}{\sqrt{1-x^2}}\,dx$

$= x\sin^{-1}x + \frac{1}{2}\int \frac{(-x).2}{\sqrt{1-x^2}}\,dx$ — (1)

Let $1-x^2 = t^2 \Rightarrow t = \sqrt{1-x^2}$

$\Rightarrow$ on differentiating both sides,

$-2x\,dx = 2t\,dt$

$-2x\,dx = 2t\,dt$

$\Rightarrow -x\,dx = t\,dt$ — (11)

From eqn (1) and (11)

$I = x\sin^{-1}x + \int \frac{t\,dt}{t}$

$= x\sin^{-1}x + \int dt$

$= x\sin^{-1}x + t \quad \{\because t = \sqrt{1-x^2}\}$

$I = x\sin^{-1}x + \sqrt{1-x^2} + c$ Ans,

where c is an arbitrary constant.

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Hence $\int \sin^{-1} x \, dx = x \sin^{-1} x + \sqrt{1-x^2} + C$

Ans.

Sol (17) $I = \int_0^{\pi/2} \frac{\sin^n x}{\sin^n x + \cos^n x} \, dx$ — (1)

$\Rightarrow I = \int_0^{\pi/2} \frac{\sin^n\left(\frac{\pi}{2} - x\right)}{\sin^n\left(\frac{\pi}{2} - x\right) + \cos^n\left(\frac{\pi}{2} - x\right)} \, dx$

$\left\{ \because \int_a^b f(x)\,dx = \int_a^b f(a+b-x)\,dx \right.$

$\Rightarrow I = \int_0^{\pi/2} \frac{\cos^n x}{\cos^n x + \sin^n x}$ — (II)

$\left\{ \because \sin\left(\frac{\pi}{2} - x\right) = \cos x \right.$
$\left. \cos\left(\frac{\pi}{2} - x\right) = \sin x \right\}$

By adding eqn (I) and (II), we get

$2I = \int_0^{\pi/2} \frac{\sin^n x + \cos^n x}{\sin^n x + \cos^n x} \, dx$

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$$\Rightarrow 2I = \int_0^{\pi/2} dx$$

$$2I = \frac{\pi}{2}$$

$$\Rightarrow \boxed{I = \frac{\pi}{4}} \quad \text{Ans.}$$

Hence $\int_0^{\pi/2} \frac{\sin^n x}{\sin^n x + \cos^n x}\, dx = \frac{\pi}{4}$ Proved.

Sol (18) $x + y\frac{dy}{dx} = 2y$

$$\Rightarrow \frac{x}{y} + \frac{dy}{dx} = 2$$

$$\frac{dy}{dx} = 2 - \frac{x}{y} \quad \text{---(1)}$$

Let $\frac{x}{y} = t \Rightarrow x = ty$

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$$y = \frac{x}{t} \quad \text{— (II)}$$

$$\frac{dy}{dx} = \frac{1}{t} - \frac{x}{t^2}\frac{dt}{dx} \quad \text{— (III)}$$

From eqn (I), (II) and (III), we have

$$\frac{1}{t} - \frac{x}{t^2}\frac{dt}{dx} = 2 - \frac{x}{t}$$

$$\Rightarrow \frac{1}{t} - 2 + \frac{x}{t} = \frac{x}{t^2}\frac{dt}{dx}$$

$$\Rightarrow \frac{1 - 2t + t^2}{t} = \frac{x}{t^2}\frac{dt}{dx}$$

$$\Rightarrow \frac{dx}{x} = \frac{dt}{t(t^2 + (-2t))}$$

$$\Rightarrow \frac{dx}{x} = \frac{dt}{t(t-1)^2} \quad \text{— (IV)}$$

on partial fraction of

Let $\frac{1}{t(t-1)^2} = \frac{A}{t} + \frac{B}{t-1} + \frac{C}{(t-1)^2}$

$\Rightarrow 1 = A(t-1)^2 + Bt(t-1) + Ct$ ... (v)

put $t = 1$

$\Rightarrow 1 = C$

Now put $t = 0$

$\Rightarrow 1 = A$

Put all these in eq (v), we have and $t=2$

$1 = 1 + 2B + 2$

$\Rightarrow B = -1$

hence $\frac{1}{t(t-1)^2} = \frac{1}{t} - \frac{1}{t-1} + \frac{1}{(t-1)^2}$

Now put this partial fraction in (iv), we get.

$\int \frac{dx}{x} = \left(\frac{1}{t} - \frac{1}{t-1} + \frac{1}{(t-1)^2} \right) dt$

on integrating both sides, we have

$$\int \frac{dx}{x} = \int \left[\frac{1}{t} - \frac{1}{t-1} + \frac{1}{(t-1)^2}\right] dt$$

$$\Rightarrow \ln x = \ln t - \ln(t-1) - \frac{2}{(t-1)^3} + c$$

$$\ln x = \ln\left(\frac{t}{t-1}\right) - \frac{2}{(t-1)^3} + c$$

from eqn (11)

$$y = \frac{x}{t} \quad \text{or} \quad t = \frac{x}{y}$$

$$\Rightarrow \ln x = \ln\left(\frac{\frac{x}{y}}{\frac{x-y}{y}}\right) - \frac{2}{\left(\frac{x-y}{y}\right)^3} + c$$

$$\Rightarrow \boxed{\ln x = \ln\left(\frac{x}{x-y}\right) - \frac{2y^3}{(x-y)^3} + c}$$

Ans.

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Sol - (19)

Let A be the prob. of obtaining sum of 9 and B be the prob. of obtaining sum of 11.

Pair when sum of 9 occurs = {(3,6), (4,5), (5,4), (6,3)}

$\Rightarrow P(A) = \frac{{}^4C_1}{36}$ $\because n(S) = 36$

i.e. ${}^6C_1 \cdot {}^6C_1 = 36 = n(S)$

$\Rightarrow P(A) = \frac{4}{36}$

$\Rightarrow P(A) = \frac{1}{9}$

and Pairs when sum of 11, occurs = {(5,6), (6,5)}

$\Rightarrow P(B) = \frac{2C_1}{36} = \frac{1}{18}$

B S E M P

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and hence $P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{9} + \frac{1}{18} - 0$

$= \frac{3}{18} = \frac{1}{6}$

The probability when a total of 9 or 11 occurs on the throwing of two dice in a single throw $= \frac{1}{6}$

and Therefore, the probability when not obtaining a total of 9 or 11 is

$1 - \frac{1}{6} = \frac{5}{6}$ Ans.

Hence the required probability

$= \frac{5}{6}$ Ans

Sol (20) The minimum possible radius of ~~any~~ a circle be zero, i.e. it became a point circle Hence its radius be zero.

Sorry

~~Let the~~

Sol - 20

To find the equation of the plane which contain the line

$$\frac{x}{l} = \frac{y}{m} = \frac{z}{n} \quad \text{— (1)}$$

We know general eqn of plane is $A(x-x_1)+B(y-y_1)+C(z-z_1)=0$

Let this be

$$A(x-0) + B(y-0) + C(z-0) = 0 \quad \text{— (II)}$$

∴ the line written above passes through origin and that line lies in the plane

Hence the eqn of plane be

B S E M P

$Ax + By + Cz = 0$ — (ii)

Now eqn of plane which contains lines

$\frac{x}{m} = \frac{y}{n} = \frac{z}{l}$ and $\frac{x}{n} = \frac{y}{l} = \frac{z}{m}$

(I) (II)

be :—

dr's of line (I) $\equiv mi + nj + lk$

and (II) $\equiv ni + lj + mk$

∴ ⊥ Perp. vector to both of these lines is

$$\begin{vmatrix} i & j & k \\ m & n & l \\ n & l & m \end{vmatrix}$$

$= i(m^2 - l^2) - j(m^2 - ln) + k(ml - n^2)$

$= a(mn - l^2)i + (ln - m^2)j + (lm - n^2)k$

$\therefore$ eqn of plane be.

$(mn - l^2)(x - 0) + (ln - m^2)(y - 0) + (lm - n^2)(z - 0) = 0$

$\Rightarrow (mn - l^2)x + (ln - m^2)y + (lm - n^2)z = 0$

$\therefore$ the required plane is $\perp$ to this plane, then

$A(mn - l^2) + B(ln - m^2) + C(lm - n^2) = 0$ — (iii)

Also $\because \frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ line lies in the plane then

$Al + Bm + Cn = 0$ — (iv).

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From eqn (III) and (IV)

$$lA + mB + nC = 0$$

$$(mn - l^2)A + (ln - m^2)B + (lm - n^2)C = 0$$

$$\frac{A}{lm^2 - mn - ln^2 + mn^2} = \frac{B}{mn^2 - l^2n - l^2m + ln^2} = \frac{C}{l^2n - lm^2 - m^2n + ml^2}$$

$$\frac{A}{m^2(n+l) - n^2(l+l) + mn(m-n)} = \frac{B}{n(n^2 - l^2) + ln(n-l)} = \frac{C}{n(l^2 - m^2) + ml(l-m)}$$

$$\frac{A}{l(m-n)(m+n) + mn(m-n)} = \frac{B}{n(n-l)(n+l) + ln(n-l)} = \frac{C}{n(l+m)(l-m) + ml}$$

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$$\Rightarrow \frac{A}{(m-n)(lm+mn+nl)}$$

$$= \frac{B}{(n-l)(lm+mn+nl)}$$

$$= \frac{C}{(l-m)(-lm+mn+nl)}$$

$$\Rightarrow \frac{A}{m-n} = \frac{B}{n-l} = \frac{C}{l-m}$$

$$= K \text{ (say)}$$

$\Rightarrow$ we have

$$A = K(m-n)$$
$$B = K(n-l)$$
$$C = K(l-m)$$

put all these values in eq (1), we have

$Ax + By + Cz = 0$

$\Rightarrow K(m-n)x + K(n-l)y + K(l-m)z = 0$

$\Rightarrow (m-n)x + (n-l)y + (l-m)z = 0$

— hence proved

Sol (21) Given $\bar{a} = 3i + 2j + 2k$

$\bar{b} = -i + 3j - k$

$\bar{c} = i + j + k$

We know :

$\bar{a} \times (\bar{b} \times \bar{c})$

$= (\bar{a} \cdot \bar{c})\bar{b} - (\bar{a} \cdot \bar{b})\bar{c}$ — (1)

$\bar{a} \cdot \bar{b} = (3i + 2j + 2k) \cdot (-i + 3j - k)$

$= -3 + 6 - 2$

$\bar{a} \cdot \bar{b} = 1$

and $\bar{a} \cdot \bar{c} = (3i + 2j + 2k) \cdot (i + j + k)$

$= 3 + 2 + 2$

$\bar{a} \cdot \bar{c} = 7$

Put these values in eq (1), we have

$7\bar{b} - \bar{c}$

$= 7(-i + 3j - k) - (i + j + k)$

$= (-7i + 21j - 7k) - (i + j + k)$

$\bar{a} \times (\bar{b} \times \bar{c}) = -8\hat{i} + 20\hat{j} - 8\hat{k}$ Ans

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hence $\vec{a} \times (\vec{b} \times \vec{c}) = -8\hat{i} + 20\hat{j} - 8\hat{k}$

Ans.

Q - (6)

$$\frac{x+3}{(x+2)(x^2-9)}$$

Let $\frac{x+3}{(x+2)(x^2-9)} = \frac{A}{x+2} + \frac{Bx+C}{x^2-9}$ — (1)

$\Rightarrow x+3 = A(x^2-9) + (Bx+C)(x+2)$

Put $x = 3$

$\Rightarrow -6/5 = 3B + C$

and Put $x = -3$

$0 = +3B + C$

$\Rightarrow 3B = C$

$\Rightarrow 2C = 6/5 \Rightarrow C = 3/5$

and $B = 1/5$

and Put $x = -2$, we have

$5 = -5A \Rightarrow A = -1$

hence put in eqn (1), all these values., we have

$$\frac{x+3}{(x+2)(x^2-9)} = \frac{-1}{x+2} + \frac{\frac{x}{5}+\frac{3}{5}}{x^2-9}$$

$$= -\frac{1}{x+2} + \frac{1}{5}\left(\frac{x+3}{x^2-9}\right)$$

required partial fraction

$$\frac{x+3}{(x+2)(x^2-9)} = \frac{-1}{x+2} + \frac{1}{5}\left(\frac{x+3}{x^2-9}\right)$$

Ans.

Rough

$$\frac{x+3}{(x+2)(x^2+9)} = \frac{A}{x+2} + \frac{Bx+C}{x^2+9}$$

$$= A(x^2-9) + (Bx+C)(x+2)$$

$$\int \frac{dx}{a\cos x + b\sin x}$$

$$\int \frac{\sec^2 x/2\, dx}{a(\cos^2 x/2 - \sin^2 x/2) + 2b \sin x/2 \cos x/2}$$

$$0.2314 \times 0.3061$$

$$\begin{array}{r} 2314 \\ 13884\times \\ 00000\times\times \\ 69420\times\times\times \\ \hline 0.0708314 \end{array}$$

$$0.6712 \times 0.2643$$

$$\begin{array}{r} 20136 \\ 268480\times \\ 4027200\times\times \\ 13424000\times\times\times \\ \hline 0.177398816 \end{array}$$

$$20.25 \times 6.25$$

$$\begin{array}{r} 10125 \\ 40500\times \\ 121500\times\times \\ \hline 126.5625 \end{array}$$

$$\sqrt{50 + 50\cos\theta} = 25$$

$$50 - 50\cos\theta = 20$$

$$30 = 50\cos\theta - 28$$

$$\begin{array}{r} 2250 \\ 12100 \\ 225 \\ \hline 1210 \end{array}$$

$$2.16$$

$$2643\overline{)6712}$$

$$\begin{array}{r} 5286 \\ \hline 4260 \\ 2643 \\ \hline 1617 \end{array}$$

$$0.1816$$

$$1210\overline{)2250}$$

$$\begin{array}{r} 1210 \\ \hline 10400 \\ 9680 \\ \hline 7200 \\ 10890 \end{array}$$

$$6.25 \times 20.25$$

$$\begin{array}{r} 13215 \\ 2643 \\ \hline 215858 \end{array}$$

$$2.15858$$

$$\sqrt{50 + 50\cos\theta} = 12.1$$

$$\begin{array}{r} 1 \\ 12 \\ 2 \\ 141 \\ 1 \\ \hline 142 \end{array}$$

$$\begin{array}{r} 126.5625 \\ 1 \\ \times 26 \\ 24 \\ \hline 25 \\ 141 \\ \hline 11525 \end{array}$$

Rough

$\int \frac{1}{x} \cos\sqrt{x}\, dx$

$\sqrt{x} = t$

$\int \frac{dx}{a^2 - x^2}$

$\frac{1}{2a} \log \frac{a-x}{a+x}$

$= \frac{1}{2a} \left(\frac{a+x}{a-x}\right) \left[\frac{-(a+x) - (a-x)}{(a+x)^2}\right]$

$-a - x - a + x$

$\cos\sqrt{x} \cdot \ln x + \int \frac{\ln x}{\sqrt{1-x^2}}\, dx$

$\int \frac{dx}{a^2 - x^2}$

$\frac{1}{2a} \log \frac{a+x}{a-x}$

$\frac{1}{2a} \left(\frac{a-x}{a+x}\right) \left[\frac{(a-x) + (a+x)}{(a-x)^2}\right]$

4.9×2500

25×490

12250

$\frac{1}{2} \log \frac{1+x}{1-x}$

$\frac{1}{2} \left(\frac{1-x}{1+x}\right) \left((1-x) + (1+x)\right)$

250

22

225

$\frac{490 \times 50}{24500}$ — 12250

$\int 12250$

$I = \int$

$\int_0^{\pi/2} \sin^2 x \cos x \, dx$ (40) $\sin x = t$, $\cos x \, dx = dt$ | याग पूर्व पृष्ठ + | पृष्ठ 40 के अंक = | कुल अंक

Rough

$\int_0^1 t^2 \, dt$

$\left[\frac{t^3}{3}\right]_0^1$

$\frac{1}{3}$

$\frac{x}{(x-1)(x-2)} = \frac{A}{(x-1)} + \frac{B}{(x-2)}$

$A(x-2) + B(x-1) = x$

$B = 2$

$A = -1$

$2x - 5 = A(x-3) + B(x-2)$

$1 = B$

$|\vec{a}| = |\vec{b}| = \sqrt{25 + 25 + 50\cos\theta}$

$\theta = \cot^{-1} x$

$\cot\theta = x$

$\sqrt{1 - x^2}$

$\therefore 1 = A$

$\cot^2\theta = \operatorname{cosec}^2\theta - 1$

$\operatorname{cosec}\theta = \sqrt{1 + \cot^2\theta}$

$\int \frac{2\,dx}{x-2} - \int \frac{dx}{x-1}$

$\frac{1}{\sin\theta}$

$\sin\theta = \frac{1}{\sqrt{1+x^2}}$

$\cos 135$

$1 - 2\sin^2\theta$

$4x + 3y + 7 = 0$

$2\ln(x-2) - \ln(x-1)$

$3x + 4y + 8 = 0$

$y = \frac{-4x - 7}{3}$

$\frac{3x - 16x - 28 + 24}{3} = 0$

$-7x - 4 = 0$

$x = \frac{-4}{7}$

$y = \frac{16 - 44}{21}$

$y = -\frac{11}{3}$

$= \frac{-33}{21} = -\frac{11}{7}$

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