IUT 1st Admission Test(SBL)

Math Examination(TYPE A)

< Multiple choice Types > There is only one correct answer for each question. Mark your choice on the OMR answer sheet.

○ The points for each question are listed next to the question number.

○ You can use the right side of each page for your memo.

1. [3 points]
Find $(1+\sqrt{2})^4+(1-\sqrt{2})^4$.

① 30 ② 32 ③ 34 ④ 36 ⑤ 38

2. [3 points]
When $a+b+c=1$, $a^2+b^2+c^2=5$ and $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=3$, find abc.

① $\frac{2}{3}$ ② $\frac{4}{3}$ ③ 0 ④ $-\frac{2}{3}$ ⑤ $-\frac{4}{3}$

3. [3 points]
When α and β are the solutions of $x^2+5x+2=0$, find $\alpha^3+\alpha\beta+\beta^3$.

① -91 ② -93 ③ -95 ④ -97 ⑤ -99

4. [3 points]
When $t-\frac{1}{t}=2\sqrt{3}$ and $t>0$, find $t^3+\frac{1}{t^3}$.

① 50 ② 52 ③ 54 ④ 56 ⑤ 58

5. [3 points]
Find $\sum_{n=1}^{10}\frac{1}{n^2+4n+3}$.

① $\frac{31}{104}$ ② $\frac{33}{104}$ ③ $\frac{35}{104}$ ④ $\frac{37}{104}$ ⑤ $\frac{39}{104}$

6. [3 points]
When (a_1, b_1) and (a_2, b_2) are solutions of

$$\begin{cases} x^2+y^2=2 \\ 2x+y=1 \end{cases},$$

find $a_1+b_1+a_2+b_2$.

① $-\frac{4}{5}$ ② $-\frac{2}{5}$ ③ 0 ④ $\frac{3}{5}$ ⑤ $\frac{6}{5}$

7. [3 points]
Simplify
$\log_3(\sqrt{2}+\sqrt{8}+\sqrt{9})+\log_3(\sqrt{2}+\sqrt{8}-\sqrt{9})$.

① 2 ② 3 ③ $\sqrt{2}$ ④ $\sqrt{3}$ ⑤ $\sqrt{2}+\sqrt{3}$

8. [3 points]

Find the sum of all solutions of

$4^{x}-5\cdot 2^{x}+2=-8\cdot 2^{-x}$.

① 1 ② 3 ③ 5 ④ 7 ⑤ 9

9. [3 points]

Simplify $\left(3^{\log_{\sqrt{3}}8}\right)-\left(\frac{1}{2}\right)^{\log_4\left(\frac{1}{81}\right)}$.

① 51 ② 53 ③ 55 ④ 57 ⑤ 59

10. [3 points]

When $2^{x}=\frac{1}{\sqrt{3}}$ and $4^{y}=27$, find $\frac{y}{x}$.

① -1 ② -3 ③ -5 ④ -7 ⑤ -9

11. [3 points]

When $a=\sqrt{3}+i$ and $b=\sqrt{3}-i$, find $\frac{a^3-b^3}{ab}$.

① $2i$ ② $4i$ ③ $6i$ ④ $8i$ ⑤ $10i$

12. [3 points]

Compute $tg\frac{\pi}{8}$, where $tg\theta=\frac{\sin\theta}{\cos\theta}$.

① $-1+\sqrt{2}$ ② $-\frac{1}{2}+\sqrt{2}$ ③ $-\frac{1}{\sqrt{2}}+\sqrt{2}$
④ $-\frac{1}{3}+\sqrt{2}$ ⑤ $-\frac{1}{\sqrt{3}}+\sqrt{2}$

13. [3 points]

Find the sum of all solutions of

$3\cos 2x+2\cos x-1=0$, $(0\le x\le 2\pi)$.

① π ② $\frac{3}{2}\pi$ ③ 2π ④ $\frac{5}{2}\pi$ ⑤ 3π

14. [3 points]

Find the sum of all solutions of

$\sqrt{3}\sin x-\cos x=\sqrt{3}$, $(0\le x\le 2\pi)$.

① $\frac{\pi}{2}$ ② $\frac{2\pi}{3}$ ③ $\frac{5\pi}{6}$ ④ π ⑤ $\frac{4\pi}{3}$

15. [3 points]

When $A=\begin{pmatrix}4&3\\3&2\end{pmatrix}$, $B=\begin{pmatrix}1&2\\-1&1\end{pmatrix}$, and

$A^{-1}B^2=\begin{pmatrix}a&b\\c&d\end{pmatrix}$, find $a+b+c+d$.

① -6 ② -3 ③ 0 ④ 3 ⑤ 6

16. [3 points]

When $A = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ and $A^{100} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$,

find $a+b+c+d$.

① 202 ② 204 ③ 206 ④ 208 ⑤ 210

17. [3 points]

Find $\lim_{x \to 0} \dfrac{x^3 + 2\sin x\,(1-\cos x)}{x\,(1-\cos x)}$.

① 2 ② 4 ③ 6 ④ 8 ⑤ 10

18. [3 points]

Find $\lim_{x \to \infty} \left(\sqrt{x^3+3} - \sqrt{x^3 + 3x\sqrt{x} + 4} \right)$.

① $-\dfrac{1}{2}$ ② -1 ③ $-\dfrac{3}{2}$ ④ -2 ⑤ $-\dfrac{5}{2}$

19. [3 points]

When $y = ax + b$ is the tangent line to $f(x) = \dfrac{\sqrt{x+4}}{2x+1}$ at $x = 0$, find $a+b$.

① $-\dfrac{1}{4}$ ② $-\dfrac{3}{4}$ ③ $-\dfrac{5}{4}$ ④ $-\dfrac{7}{4}$ ⑤ $-\dfrac{9}{4}$

20. [3 points]

Let M and m be the maximum and minimum values of $f(x) = \dfrac{1}{3}x^3 + x^2 - 3x + 1$, $(-3 \le x \le 3)$, respectively. Find $M + m$.

① $\dfrac{20}{3}$ ② $\dfrac{22}{3}$ ③ 8 ④ $\dfrac{26}{3}$ ⑤ $\dfrac{28}{3}$

21. [4 points]

Find the minimum value of

$f(x) = 3\sin^2 x - 4\sin x \cos x + 2$.

① -2 ② -1 ③ 0 ④ 1 ⑤ 2

22. [4 points]

When $\omega = \dfrac{1-\sqrt{3}\,i}{2}$, find $\sum_{n=0}^{14} \omega^n$.

① 0 ② 1 ③ $\sqrt{3}\,i$

④ $1-\sqrt{3}\,i$ ⑤ $\dfrac{1-\sqrt{3}\,i}{2}$

23. [4 points]

When $f(x) = \sqrt[3]{(3x+2)^4 - 8}$, find $f'(0)$.

① 2 ② 4 ③ 6 ④ 8 ⑤ 10

24. [4 points]
When a continuous function $f:[0,\infty)\to\mathbb{R}$ satisfies $\int_0^x f(t^2)\,dt = x\sqrt{2x^2+1}$, find $f(4)$.

① $\frac{11}{3}$ ② $\frac{13}{3}$ ③ $\frac{14}{3}$ ④ $\frac{16}{3}$ ⑤ $\frac{17}{3}$

25. [4 points]
Find the minimum value of $f(x)=x^4+2x^3+4x^2-6x+2$.

① $\frac{1}{16}$ ② $\frac{3}{16}$ ③ $\frac{5}{16}$ ④ $\frac{7}{16}$ ⑤ $\frac{9}{16}$

26. [4 points]
Find $\int_1^4 \frac{x^2-2}{\sqrt{x}}\,dx$.

① $\frac{42}{5}$ ② $\frac{44}{5}$ ③ $\frac{46}{5}$ ④ $\frac{48}{5}$ ⑤ 10

27. [4 points]
Find $\int_0^1 \frac{1}{(2x+1)^3}\,dx$.

① $\frac{2}{9}$ ② $\frac{4}{9}$ ③ $\frac{2}{3}$ ④ $\frac{8}{9}$ ⑤ $\frac{10}{9}$

28. [4 points]
Find $\lim_{n\to\infty}\sum_{k=1}^{n}\frac{k^2+2kn-n^2}{n^3}$.

① 1 ② $\frac{1}{2}$ ③ $\frac{1}{3}$ ④ $\frac{1}{4}$ ⑤ $\frac{1}{5}$

29. [4 points]
When $\int_0^1 f(2x)\,dx = 3$ and $\int_0^3 f(x)\,dx = 18$, find $\int_2^3 f(x)\,dx$.

① 12 ② 14 ③ 16 ④ 18 ⑤ 20

30. [4 points]
Find the area of the region enclosed by $y=3x^3+2x^2+x+5$ and $y=3x^3+x^2+4x+3$.

① $\frac{1}{2}$ ② $\frac{1}{3}$ ③ $\frac{1}{4}$ ④ $\frac{1}{5}$ ⑤ $\frac{1}{6}$

2023 IUT 1st SBL Answer Sheets

Type A

No.	1	2	3	4	5	6	7	8	9	10
Ans.	③	④	②	②	③	⑤	①	②	③	②
No.	11	12	13	14	15	16	17	18	19	20
Ans.	②	①	⑤	⑤	⑤	①	②	③	④	⑤
No.	21	22	23	24	25	26	27	28	29	30
Ans.	④	④	④	⑤	③	①	①	③	①	⑤

2023 IUT Admission Test (SOCIE)

Math Examination (A TYPE)

<Multiple choice Types> There is only one correct answer per each question. Mark your answer choice on the OMR answer sheet.

○ For each correct answer, you will get the points indicated next to each question number.

○ No penalty point is applied to an incorrect answer.

1. [2 points]
Simplify $\log_2 25 \times \log_3 16 \times \log_{125} 27$.

① 2 ② 4 ③ 6
④ 8 ⑤ 10

2. [2 points]
Evaluate $\sum_{n=2}^{10} \frac{1}{n^2-1}$.

① $\frac{6}{11}$ ② $\frac{3}{5}$ ③ $\frac{36}{55}$ ④ $\frac{39}{55}$ ⑤ $\frac{42}{55}$

3. [2 points]
When α, β, γ are solutions of $x^3-4x^2-3x+1=0$, find $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}$.

① 1 ② 2 ③ 3 ④ 4 ⑤ 5

4. [2 points]
When three points $(1,2)$, $(2,5)$, $(0,a)$ are on a line, find the constant a.

① -2 ② -1 ③ 0 ④ 1 ⑤ 2

5. [2 points]
When $\omega = \frac{-1+\sqrt{3}i}{2}$, evaluate $\sum_{n=1}^{20} \omega^n$.

① -1 ② $-i$ ③ 0
④ 1 ⑤ i

6. [2 points]
When $e^{2x}=5$, find $\frac{e^{3x}-e^{-3x}}{e^x-e^{-x}}$.

① $\frac{23}{5}$ ② 5 ③ $\frac{27}{5}$ ④ $\frac{29}{5}$ ⑤ $\frac{31}{5}$

7. [3 points]
When $3\cos 2\theta+3=16\sin\theta$, find $\sin\theta$.

① $\frac{1}{6}$ ② $\frac{1}{3}$ ③ $\frac{1}{2}$ ④ $\frac{2}{3}$ ⑤ $\frac{5}{6}$

8. [3 points]

Find the sum of all integer solutions of

$$x^4 - 5x^3 - x^2 + 5x < 0.$$

① 1 ② 3 ③ 5 ④ 7 ⑤ 9

9. [3 points]

When a sequence $\{a_n\}_{n=1}^{\infty}$ satisfies

$$\sum_{k=1}^{n} k a_k = n^2 + 3n,$$

find a_{10}

① 2 ② $\frac{11}{5}$ ③ $\frac{12}{5}$ ④ $\frac{13}{5}$ ⑤ $\frac{14}{5}$

10. [3 points]

When $A = \begin{pmatrix} 1 & 2 \\ -1 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 4 \\ 4 & 2 \end{pmatrix}$, find the sum of all entries of $A^{-1}B$.

① -3 ② $-\frac{3}{2}$ ③ 0

④ $\frac{3}{2}$ ⑤ 3

11. [3 points]

When α, β are solutions of $(e^x - 2)(e^x - 4) = 1$, find $\alpha + \beta$.

① 0 ② ln3 ③ ln5 ④ ln7 ⑤ ln9

12. [3 points]

Compute $\lim_{x \to 0} \frac{e^x + e^{-x} - 2}{x^2}$.

① 1 ② $\frac{3}{2}$ ③ 2 ④ $\frac{5}{2}$ ⑤ 3

13. [4 points]

When $f(x) = x^3 + 3x^2 - 6x + 1$ and $g(x) = f(\sin \pi x + x)$, find $g'(1)$.

① $-3\pi - 3$ ② $-3\pi + 3$ ③ 0

④ $3\pi - 3$ ⑤ $3\pi + 3$

14. [4 points]

When θ is the angle between the z-axis and the plane $x + 2y + 3z = 2$, find $\cos\theta$.

① $\frac{\sqrt{50}}{14}$ ② $\frac{\sqrt{15}}{7}$ ③ $\frac{\sqrt{70}}{14}$

④ $\frac{\sqrt{20}}{7}$ ⑤ $\frac{\sqrt{90}}{14}$

15. [4 points]

Evaluate $\int_0^1 \frac{x}{(x^2+1)^2}\,dx$.

① $\frac{1}{8}$ ② $\frac{1}{4}$ ③ $\frac{3}{8}$ ④ $\frac{1}{2}$ ⑤ $\frac{5}{8}$

16. [4 points]

Evaluate $\int_0^{\pi} x \sin x \, dx$.

① π ② $\frac{3}{2}\pi$ ③ 2π ④ $\frac{5}{2}\pi$ ⑤ 3π

17. [4 points]

When $\int_0^1 f(x)\,dx = 2$ and $\int_0^3 f(x)\,dx = 5$,

find $\lim_{n\to\infty} \frac{1}{n}\sum_{k=1}^{n} f\left(1+\frac{2k}{n}\right)$.

① $\frac{3}{2}$ ② 2 ③ $\frac{5}{2}$ ④ 3 ⑤ $\frac{7}{2}$

18. [5 points]

Find the distance between the line $y=x+2$ and the curve $y=x-x^2$.

① $\frac{\sqrt{2}}{4}$ ② $\frac{\sqrt{2}}{2}$ ③ $\frac{3\sqrt{2}}{4}$

④ $\sqrt{2}$ ⑤ $\frac{5\sqrt{2}}{4}$

19. [5 points]

Find the area of the triangle with three vertices $(1,2,3)$, $(1,1,1)$, $(2,2,1)$.

① $\frac{1}{2}$ ② 1 ③ $\frac{3}{2}$

④ 2 ⑤ $\frac{5}{2}$

20. [5 points]

Find the area between two curves:

$$y=x^3+2x,\ y=x^2+3x-1.$$

① $\frac{1}{3}$ ② $\frac{2}{3}$ ③ 1

④ $\frac{4}{3}$ ⑤ $\frac{5}{3}$

21. [5 points]

When $f(x)=e^x+x$ and g is the inverse function of f, find $\int_1^{e+1} g(x)dx$.

① $\frac{1}{2}$ ② $\frac{3}{4}$ ③ 1

④ $\frac{5}{4}$ ⑤ $\frac{3}{2}$

2023 IUT Admission Test(SOCIE) Answers & solutions

-Type A

1	2	3	4	5	6	7
④	③	③	②	①	⑤	②
8	9	10	11	12	13	14
⑤	②	⑤	④	①	②	③
15	16	17	18	19	20	21
②	①	①	④	③	④	⑤

-Type B

1	2	3	4	5	6	7
③	④	③	⑤	②	①	②
8	9	10	11	12	13	14
②	⑤	①	⑤	④	②	②
15	16	17	18	19	20	21
③	①	①	④	④	③	⑤

-Type C

1	2	3	4	5	6	7
①	⑤	④	③	③	②	④
8	9	10	11	12	13	14
①	②	⑤	②	⑤	①	①
15	16	17	18	19	20	21
②	③	②	④	⑤	④	③

-Type D

1	2	3	4	5	6	7
③	④	②	③	⑤	①	⑤
8	9	10	11	12	13	14
②	⑤	②	①	④	③	②
15	16	17	18	19	20	21
①	②	①	③	④	⑤	④

Solutions of SOCIE, type A

1. $\log_2 25 \times \log_3 16 \times \log_{125} 27 = \dfrac{2\log 5}{\log 2} \times \dfrac{4\log 2}{\log 3} \times \dfrac{3\log 3}{3\log 5} = 8.$

2. $\displaystyle\sum_{n=2}^{10} \frac{1}{n^2-1} = \frac{1}{2}\sum_{n=2}^{10}\left(\frac{1}{n-1} - \frac{1}{n+1}\right) = \frac{1}{2}\left(1 + \frac{1}{2} - \frac{1}{10} - \frac{1}{11}\right) = \frac{36}{55}.$

3. $\dfrac{1}{\alpha} + \dfrac{1}{\beta} + \dfrac{1}{\gamma} = \dfrac{\alpha\beta + \beta\gamma + \gamma\alpha}{\alpha\beta\gamma} = 3.$

4. Since $\dfrac{5-2}{2-1} = \dfrac{a-2}{0-1}$, we have $a = -1$.

5. Since $1 + \omega + \omega^2 = 0$, we have $\displaystyle\sum_{n=1}^{20} \omega^n = \omega + \omega^2 = -1$.

6. $\dfrac{e^{3x} - e^{-3x}}{e^x - e^{-x}} = \dfrac{e^{6x} - 1}{e^{2x}(e^{2x} - 1)} = \dfrac{5^3 - 1}{5 \times 4} = \dfrac{31}{5}.$

7. Since $3(1 - 2\sin^2\theta) + 3 = 16\sin\theta$, we get $(3\sin\theta - 1)(\sin\theta + 3) = 0$, hence $\sin\theta = \dfrac{1}{3}$.

8. Since $x^4 - 5x^3 - x^2 + 5x = x(x-1)(x+1)(x-5) < 0$, we get $-1 < x < 0$, $1 < x < 5$, hence the sum of integer solutions is 9.

9. Since $10a_{10} = 10^2 + 3 \times 10 - (9^2 + 3 \times 9) = 22$, we have $a_{10} = \dfrac{11}{5}$.

10. $A^{-1}B = \dfrac{1}{4}\begin{pmatrix} 2 & -2 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} 2 & 4 \\ 4 & 2 \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ \frac{3}{2} & \frac{3}{2} \end{pmatrix}.$

Therefore the sum of all the elements of $A^{-1}B$ is 3.

11. Since $(e^x - 2)(e^x - 4) - 1 = (e^x - e^\alpha)(e^x - e^\beta)$, we get $e^{\alpha+\beta} = 7$ so that $\alpha + \beta = \ln 7$.

12. By L'hospital theorem, we get $\displaystyle\lim_{x\to 0} \frac{e^x + e^{-x} - 2}{x^2} = \lim_{x\to 0} \frac{e^x - e^{-x}}{2x} = \lim_{x\to 0} \frac{e^x + e^{-x}}{2} = 1.$

13. Since $g'(x) = f'(\sin\pi x + x) \times (\pi\cos\pi x + 1)$, we get $g'(1) = f'(1) \times (-\pi + 1) = -3\pi + 3$.

14. Since $\sin\theta = \dfrac{(1,2,3) \cdot (0,0,1)}{|(1,2,3)| \times |(0,0,1)|} = \dfrac{3}{\sqrt{14}}$, we get $\cos\theta = \sqrt{1 - \left(\dfrac{3}{\sqrt{14}}\right)^2} = \dfrac{\sqrt{70}}{14}$.

15. $\displaystyle\int_0^1 \frac{x}{(x^2+1)^2}\,dx = \left[-\frac{1}{2(x^2+1)}\right]_0^1 = \frac{1}{4}.$

16. By integration by parts, we get

$$\int_0^{\pi} x\sin x\, dx = -x\cos x\Big|_0^{\pi} + \int_0^{\pi}\cos x dx = \pi.$$

17. $\displaystyle\lim_{n\to\infty}\frac{1}{n}\sum_{k=1}^{n} f\left(1+\frac{2k}{n}\right) = \frac{1}{2}\int_1^3 f(x)dx = \frac{5-2}{2} = \frac{3}{2}.$

18. Since $y=x$ is tangent to $y=x-x^2$, the distance between $y=x-x^2$ and $y=x+2$ is equal to the distance between $y=x$ and $y=x+2$. Therefore the distance is $\sqrt{2}$.

19. Let $a=(1,2,3)-(1,1,1)=(0,1,2)$, $b=(2,2,1)-(1,1,1)=(1,1,0)$. Then the area of the triangle is

$\displaystyle\frac{1}{2}\sqrt{|a|^2|b|^2-(a\cdot b)^2} = \frac{1}{2}\sqrt{5\times 2-1} = \frac{3}{2}.$

20. Since $x^3+2x-(x^2+3x-1)=(x+1)(x-1)^2$, the area between two curves $y=x^3+2x$, $y=x^2+3x-1$ is

$\displaystyle\int_{-1}^{1}(x+1)(x-1)^2 dx = 2\int_0^1(-x^2+1)dx = \frac{4}{3}.$

21. Let $t=g(x)$. Then $\displaystyle\int_1^{e+1} g(x)dx = \int_0^1 tf'(t)dt = tf(t)\Big|_0^1 - \int_0^1 f(t)dt = e+1-(e-\frac{1}{2}) = \frac{3}{2}.$

2023 IUT Admission Test(SOCIE)

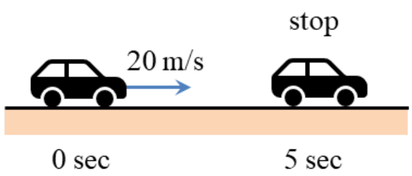
Physics Examination(A TYPE)

<Multiple choice Types> There is only one correct answer per each question. Mark your answer choice on the OMR answer sheet.

○ For each correct answer, you will get the points indicated next to each question number.

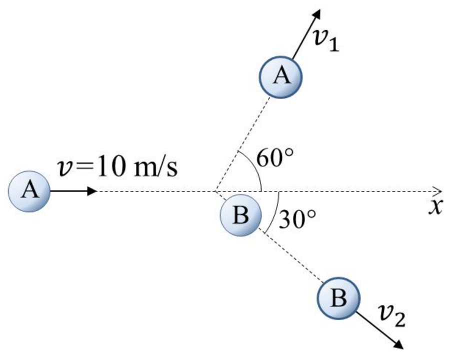
○ No penalty point is applied to an incorrect answer.

1. [3 points]
As shown in the figure below, a car running at a speed of 20 m/s in the east direction stopped after 5 seconds. What is the average acceleration during 5 seconds?



① 4 m/s^2 to the west ② 2 m/s^2 to the west
③ 4 m/s^2 to the east ④ 2 m/s^2 to the east
⑤ 2 m/s^2 to the south

2. [5 points]
As shown in the figure below, a ball A moving at a speed of $v = 10$ m/s in the $x-$direction on a horizontal plane collides elastically with a ball B of the same mass that is at rest. After the collision, the speeds of A and B are v_1 and v_2, respectively, and the directions of motion of A and B form an angle of 60° and 30° with the $x-$axis, respectively. Find the speeds v_1 and v_2 after the collision.

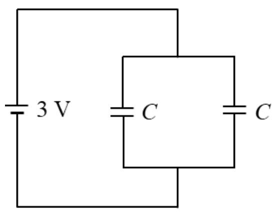


① $5\sqrt{3}$ m/s, 5 m/s ② 6 m/s, 8 m/s
③ 5 m/s, $5\sqrt{3}$ m/s ④ 8 m/s, 6 m/s
⑤ $2\sqrt{5}$ m/s, $4\sqrt{5}$ m/s

3. [3 points]
A certain amount of ideal gas changes from state A (volume 2×10^{-3} m^3, pressure 5×10^5 Pa, temperature 300 K) to state B (volume 1×10^{-3} m^3, pressure 2×10^5 Pa). What is the temperature of state B?

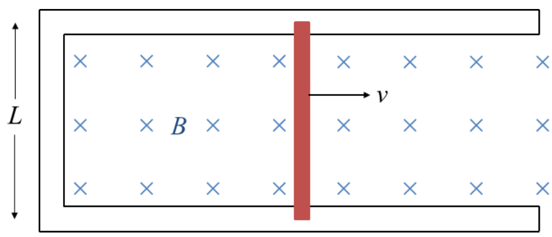
① 50 K ② 60 K ③ 80 K
④ 100 K ⑤ 120 K

4. [3 points]
As shown in the figure below, two capacitors with capacitance C of 1.5×10^{-6} F are connected in parallel and connected to a 3 V power supply. What is the total charge stored in the capacitors?



① 3 μC ② 5 μC ③ 6 μC
④ 8 μC ⑤ 9 μC

5. [4 points]
As shown in the figure below, a C-shaped conducting rail is placed vertically in a uniform magnetic field of $B = 0.40$ T and a rod with a length of $L = 0.30$ m is placed on top of it. The rod is forced to move at constant speed $v = 5.0$ m/s along horizontal rails. The rod and rails form a conducting loop. The rod has resistance 0.40 Ω ; the rest of the loop has negligible resistance. What is the magnitude of the force that must be applied to the rod to make it move at constant speed?



① 0.12 N ② 0.15 N ③ 0.16 N
④ 0.18 N ⑤ 0.20 N

6. [3 points]
There is a wave that oscillates 4 times per second. What is the speed of propagation of this wave if it travels 20 cm during one oscillation?

① 0.5 m/s ② 0.6 m/s ③ 0.8 m/s
④ 1.0 m/s ⑤ 1.2 m/s

7. [3 points]
When an object is placed 10 cm in front of a convex mirror, a virtual image 0.5 times the size of the object is created. What is the focal length of this convex mirror?

① 10 cm ② 12 cm ③ 15 cm
④ 20 cm ⑤ 25 cm

8. [3 points]
The temperature of the surface of the blackbody is doubled from T to $2T$. How many times will be the intensity of the energy (I) emitted from the black body and the wavelength (λ_{max}) at which the intensity of the emitted energy is maximized, respectively?

① 16 times, $\frac{1}{4}$ times ② 16 times, $\frac{1}{2}$ times
③ 8 times, $\frac{1}{4}$ times ④ 8 times, $\frac{1}{2}$ times
⑤ 4 times, $\frac{1}{4}$ times

9. [3 points]
Choose the correct pairing of phenomena that only waves can exhibit.

① reflection, refraction ② reflection, interference
③ refraction, interference ④ refraction, diffraction
⑤ interference, diffraction

2023 IUT Admission Test(SOCIE)

Physics Examination(A TYPE) Answers

<Multiple choice Types> There is only one correct answer per each question. Mark your answer choice on the OMR answer sheet.

○ For each correct answer, you will get the points indicated next to each question number.

○ No penalty point is applied to an incorrect answer.

Answers:

1. ①
2. ③
3. ②
4. ⑤
5. ④
6. ③
7. ①
8. ②
9. ⑤