বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্

সেকশন/গ্রুপ...A (Section-A)....

ইনভিজিলেটরের স্বাক্ষর

মোট পৃষ্ঠা সংখ্যা........7........টি

BSc in CSE-17, Final Exam (Fall) Dec-2020 পরীক্ষা(Examination), 20 20

বিষয় (Subj): Computer Graphics   পত্র/কোর্স নং (Paper/Course No): CSE - 413

পত্র/কোর্সের নাম (Paper/Course Name): CSE-17   কেন্দ্র (Center): MIST

রেজিঃ নম্বর (Regn No): 13140170018   শিক্ষাবর্ষ (Session): 2019-2020

রোল নম্বর (Roll No): 201714018   তারিখ (Date): 20-12-2020

INSTRUCTIONS FOR EXAMINEE

পরীক্ষক কর্তৃক পূরণীয়

প্রশ্ন নম্বর	প্রদত্ত নম্বর
১	
২	
৩	
৪	
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মোট	

1. Examinees are forbidden to write their names either on outer cover page or anywhere of the answer scripts. In case of violation, the answer script will not be evaluated.

2. Examinees must mention their roll and registration number along with session on the outer cover page of the answer scripts clearly. Otherwise, answer scripts may not be evaluated.

3. Students will write his examination roll number on the top left corner and section-A/B on the top right corner of each page. All pages must be numbered chronologically at the bottom center in x of y format. (for example: 1 of 21)

4. All rough works should be done in the same paper used as answer scripts. Answer scripts should be submitted intact. Papers used for rough work should be pen through by the examinees.

5. In no case, an examinee will be allowed to start the examination half an hour after the commencement of examination.

6. Examinees must abide by the instructions of chief invigilator if there are no definite instructions on any subject/matter.

7. No examinee will be allowed to leave the examination session until an hour has elapsed from the commencement of examination.

8. Legal action will be taken against the examinees those are caught for copying and found guilty for any breach of discipline as per rule.

পরীক্ষকের স্বাক্ষর

নিরীক্ষকের স্বাক্ষর

Continued......

INSTRUCTIONS FOR EXAMINEE

9. Smoking is strictly prohibited during examination.

10. The Camera of the examinee MUST always be ON during the examination and answer script submission. If Camera is OFF then that online examination will be treated as CANCELLED.

11. The answer scripts submitted beyond specified time will be treated as CANCELLED.

12. The examinee has to share his/her computer screen to the invigilator throughout the examination time.

13. The focus of the camera should be such that the invigilator(s) can see the script and examinee with his/her surroundings.

14. The examinee will send his/her scanned examination script in PDF format to the following e-mail addresses:

    (a)   e-mail address of subject invigilator/examiner.

    (b)   Central Database Scheme (coursecode@mist.ac.bd)

            Example: EECE433@mist.ac.bd

15. The examinee has to preserve the original answer script of every examination and be ready to submit whenever asked for.

16. Answer script should be the A4 size papers with a cover page provided by Department. Examinee has to fill up his/her necessary details on the cover page. Section A and section B must be clearly marked on the cover page like. ⎡ **Section A** ⎤ or ⎡ **Section B** ⎤

17. Examination duration for each subject will be two hours (section-A for one hour + section B for One hour). In between students will get 20 minutes time to submit the answer script of section A and 10 minutes time to issue the question for section B . After completion of 01 hour examination time for section B, students will get 20 minutes to submit the answer script of section B.

18. After completion of written examination (online/physical), viva will be conducted by the respective faculty of that subject.
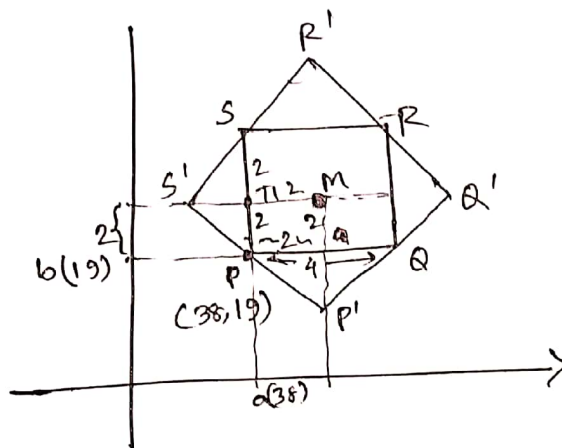
Section-A

Ans. to the ques. no.-01(a)

$a = 18 + 20 = 38$ (my student Id: 201714018)

$b = 17 + 2 = 19$

Given figure:

Figure:1

So, calculating!

$P = (38, 19)$

$Q = (42, 19) \longrightarrow (38+4)$

$R = (42, 23) \longrightarrow (19+4)$

$S = (38, 23)$

$T_1 = (38, 21)$
$\quad\quad\quad \hookrightarrow (19+2)$

$M = (40, 21)$
$\quad\quad\quad\quad \hookrightarrow (19+2)$
$\overline{8\sqrt{6\,9} = 2a^2} \quad \hookrightarrow (38+2)$

(i) Ans: To transform PQRS to P'Q'R'S the order/sequence of the operations are:

(1) Translate M to origin.

(2) Scale PQRS to twice $(S_{2,2})$

(3) Rotate PQRS to $45°$ $(R_{45°})$

(4) Traslate back from origin to M.

$x^2 + x^2 = 4^2$
$\Rightarrow 2x^2 = 16$
$\Rightarrow x^2 = 8$
$\Rightarrow x = 2\sqrt{2}$
So, $2x = 8$

So,
P'Q'R'S'=
8 un

(ii) Composite matrix :

$$\begin{bmatrix} 1 & 0 & 40 \\ 0 & 1 & 21 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -40 \\ 0 & 1 & -21 \\ 0 & 0 & 1 \end{bmatrix}$$

[$\theta = 45°$ and calculating!

$$= \begin{bmatrix} 1 & 0 & 40 \\ 0 & 1 & 21 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & -40 \\ 0 & 1 & -21 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 40 \\ 0 & 1 & 21 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 & 0 & -80 \\ 0 & 2 & -42 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 40 \\ 0 & 1 & 21 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \frac{2}{\sqrt{2}} & -\frac{2}{\sqrt{2}} & \left(\frac{-80}{\sqrt{2}}+\frac{42}{\sqrt{2}}\right) \\ \frac{2}{\sqrt{2}} & \frac{2}{\sqrt{2}} & \left(\frac{-80}{\sqrt{2}}+\frac{-42}{\sqrt{2}}\right) \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{2}{\sqrt{2}} & \frac{-2}{\sqrt{2}} & \left(\frac{-80}{\sqrt{2}}+\frac{42}{\sqrt{2}}\right)+40 \\ \frac{2}{\sqrt{2}} & \frac{2}{\sqrt{2}} & \left(\frac{-80}{\sqrt{2}}+\frac{-42}{\sqrt{2}}\right)+21 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} \frac{2}{\sqrt{2}} & -\sqrt{2} & 40-19\sqrt{2} \\ \sqrt{2} & \sqrt{2} & 21-61\sqrt{2} \\ 0 & 0 & 1 \end{bmatrix}$$

(An)

(iii) Ans! So, All the Coordinates will be!

$$\begin{bmatrix} P'_x & Q'_x & R' \\ P'_y & Q'_y & \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} P'_x & Q'_x & R'_x & S'_x \\ P'_y & Q'_y & R'_y & S'_y \\ 1 & 1 & 1 & 1 \end{bmatrix} = \begin{bmatrix} \sqrt{2} & -\sqrt{2} & 40-19\sqrt{2} \\ \sqrt{2} & \sqrt{2} & 21-61\sqrt{2} \\ 0 & 0 & 1 \end{bmatrix} \times$$

$$\begin{bmatrix} 38 & 42 & 42 & 38 \\ 19 & 19 & 23 & 23 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 40 & 40+4\sqrt{2} & 40 & 40-4\sqrt{2} \\ 21-4\sqrt{2} & 21 & 21+4\sqrt{2} & 21 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

, So, P' $(40, 21-4\sqrt{2})$
Q' $(40+4\sqrt{2}, 21)$
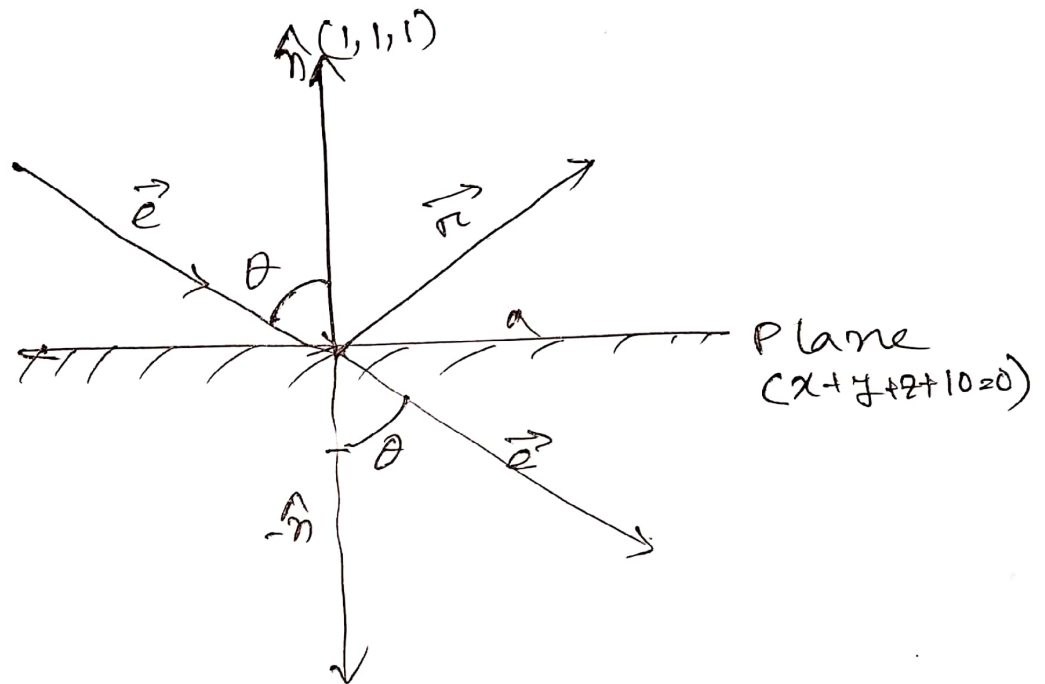R' $(40, 21+4\sqrt{2})$
S' $(40-4\sqrt{2}, 21)$ Ans)

<u>Ans. to the ques. no. ~01(b)</u>

Plane $\Rightarrow$ $x+y+z+10=0$

$\vec{e} = \hat{i} + \hat{j}$. $\hookrightarrow$ $\hat{n} = (1,1,1)$ [normal to plane]

<u>Fig!</u>

We know that,

$$\vec{r} = \vec{e} - 2(\vec{e}\cdot\hat{n})\,\hat{n}$$

$$= (1,1) - 2\{(1\cdot1)(1\cdot1)\}\,\hat{n}$$

$$= (1,1) - 2\{(1,1)(1,1)\}$$

$$= (1,1) - 2\{(1,1)$$

$$= \hspace{1cm} (1-2,\; 1-2)$$

$$= (-1,-1)$$

So, $\vec{r} = -\hat{i} - \hat{j}$.   which gives direction of r.

Angle = $90°$ An   P.T.O.

~~Ans. to the ques. no. - 02(a)~~

Ans. to the ques. no. - 02(a)

My Id = 201714018 (which is even)

So, top then Left.

Using, Sutherland-Hodgeman
polygon clipping Algo!
with TOP!

Edge	Intersect	Output	Remark
AB	—	B	in—in
BC	—	C	in—in
CD	—	D	in—in
DE	to t_1	T_1	in—out
EF	—	—	out—out
FG	t_2	G, T_2	out—in
GH	t_3	T_3	in—out
HI	t_4	—	out—out
IA	—	—	out—out

~~BC DT₁ G t₂ G T₃~~   B C D T₁ T₂ G T₃

~~BC DG~~

with left:

Edge	Interx	Output	Remaks
BC	—	L	~~old~~ in-im
AD	—	D	im - i3
D T_1			in - .
$T_1 T_2$			
$T_2 G$			
$G T_3 G T_3$			
$T_3 B$			

L T_2 T_3 G

disadvantages of this algo:

① we need to traverse same edge
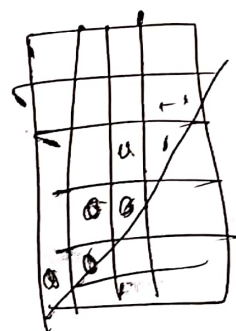   many times. which is inefficient.

Ans. to the ques. no-02(c)

The possible distortions that may
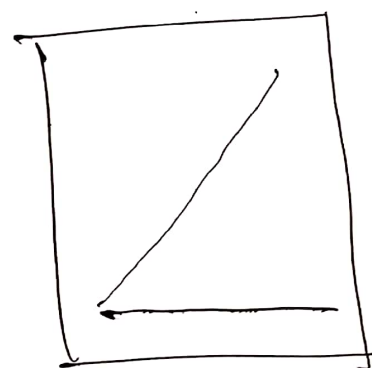happen due to rasterization are!
(Aliasing)

① Stair Case!

For primitave (line, curve)
this happens this is known
as Stair case Aliasing effect

fig; Stair Cas

② Unequal Brightness!
For tailted lines B. they
are dimmer than
horizontal and vertical

fig: Unequal
Brightnes

③ Picket-!
this happens for not
Aligned properly.

Fig: Picket
Aliasin

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