Quality Circles

Presented By

“PIONEERS’’

Department of Civil Engineering
K.E. Society's
Rajarambapu Institute of Technology.
Rajaramnagar, Islampur, Dist. Sangli,
Maharashtra, India - 415414.

ACKNOWLEDGEMENT:

"We would like to express our special thanks of gratitude to our colleagues, Dean as well as our Director Dr. Mrs. S.S. Kulkarni for giving us this golden opportunity, while doing this wonderful project, which allowed us a lot of study and exploring how student learn and how we can improve our teaching method.

Also we would like to thank all of those who helped directly and indirectly during this Quality Circle activity."

Quality Circle

Name of Quality Circle: PIONEERS	
Department	: Civil Engineering
Date of Inauguration	:18th April, 2021
Inaugurated by	:Dr. P. D. Kumbhar
Designation	: H.O.D. Civil Engineering
Day of Meeting	: Weekly
Time of Meeting	: 4.00 p.m.
Place of Meeting	: Online Meeting on MS Teams Platform

Name	Emp. No.	Work Exp.(Years)	Designation
Dr. P.D.Kumbhar	E00018	30	HOD/Facilitator
Dr. N. T. Suryawanshi	E01084	20	Chairman
Mr. D. B. Kulkarni	E00012	35	Vice -Chairman
Mr. S. R. Deshmukh	E00364	25	Member
Mr. M. M. Maske	E00809	12	Member
Mr. S .K. More	E00823	6	Member

MEETING RECORDS

ATTENDANCE RECORD OF QUALITY CIRCLE MEMBERS (2020-21)

Meeting No →	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Member ↓	**18/04**	**25/04**	**10/05**	**12/05**	**25/05**	**29/05**	**30/05**	**03/06**	**07/06**	**05/07**	**12/07**	**16/07**
Dr. N. T. Suryawanshi	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Mr. D. B. Kulkarni	*P*	*P*	*A*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Mr. S. R. Deshmukh	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*A*	*P*
Mr. M. M. Maske	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Mr. S .K. More	*P*	*P*	*A*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*

P=PRESENT *A=ABSENT*

1)TITLE OF CASE STUDY:

Difficulties in Setting Open Ended Questions

***2)BRIEF HISTORY OF ORGANIZATION* :-**

Name **:** Rajarambapu Institute of Technology, Rajaramnagar

Address **:** A/P Sakhrale, Tal-Walwa, Dist: Sangli.

Phone/fax/Email **:**(02342)220329, Fax-02342220989

Email :san_ritech@sancharnet.in ,

Website: www.ritindia.edu

***3)BRIEF HISTORY OF QUALITY CIRCLE*:-**

Group Name **:** PIONEERS

Department / Section **:** Civil Engineering

Department Facilitator : Dr. P. D. Kumbhar

Department coordinator **:** Dr. N. T. Suryawanshi

Name of the Members **:**

Prof. D. B. Kulkarni
Prof. S. R. Deshmukh
Prof. M. M. Maske
Prof. S. K. More

When Quality Circle started **:** 09/04/2021

Meeting Priority- Weekly / Fortnightly/ Monthly **:** Fortnightly

Duration of meeting: One Hour /Two Hours/ More than that **:** Two Hour

***4) PROBLEM SOLVING PROCESS CONTENTS* :-**

A] LIST OF PROBLEM IDENTIFIED

Sr. No.	Problem Statement
1	Center of Excellence on NDT services.
2	To prepare a documentary film / video (for durations of 10 min, 15 min, 30 min) on all the labs and other facilities provided by our department for the overall development.
3	To develop guidelines / set up a process which will help in enhancing faculty publications (in reputed journals) /patent.
4	To develop a small experimental set up to cater the needs of the current curriculum.
5	To prepare modules of virtual lab pertaining to any stream of civil engg.
6	Development of concrete mix design software.
7	Effective delivery of online practical sessions.
8	Difficulty in setting open ended questions for theory & numerical based courses.
9	Lack of interest in students for opting ED and URE track options.
10	Effective improvement in students' attentiveness.
11	Lack of students' response to QA sessions.
12	Lack of students' interest in participating in the competition within and outside the Institute.
13	Poor participation of students in extracurricular activities.
14	Lack of hands-on experience for using NDT equipment for faculty and staff.
15	Lack of hands-on experience for using Total station equipment of faculty and staff.
16	Effective monitoring system for continuous improvement in TL process.

17	Effective documentation of academic activities of the department.
18	Credibility/reliability for conducting online examinations.
19	Effective maintenance of the institute lawn.
20	Effective management of water in sanitary blocks of the institute.
21	Structural audit of buildings on campus.
22	Leakages in the building.
23	Composting using solid waste on campus.
24	Lack of latest layout of RIT campus.
25	Rain water harvesting and waste water management in RIT campus.
26	Improvement in online teaching delivery of analytical courses by using ICT tools.
27	Effective strategies to improve the placement of UG and PG students.
28	How to increase students' success in competitive exams.
29	Designing the layout of the fire fighting system for RIT Campus.
30	Effective utilisation of smart boards
31	Development of a virtual laboratory.
32	To develop an Excel sheet program for Mix design.
33	Writing the proposals to fetch the grants from various funding agencies.
34	Complexities in Timetable due to Covid situation

35	Impact of sewage disposal on the ground water quality
36	Strengthening of substrata to avoid settlement of foundation
37	Efficient concrete mix design for M60 grade concrete
38	Analysis of laterally loaded piles
39	Analysis and design of laterally loaded pile rafts
40	Interference effect of footings
41	Soil reinforcement using soil nails
42	Pull out capacity of piles
43	Soil-pile interaction under static loading
44	No retention of students with the companies selected through campus placement drive
45	water disinfection system(chlorination of water
46	Up gradation of existing water treatment plant
47	Saline water conversion to potable by geosynthetic material
48	Use of earthen heat for natural ventilation

49	Temperature control in the building by natural sources
50	Strengthening of beams by using epoxy resins
51	Use of bamboo as proper reinforcing materials
52	Use of fibers to achieve flexural strength of beam without using reinforcement

B] PROBLEM SELECTION

In the first few meetings of Quality Circle we discussed the various problems. Due to the pandemic situation it was decided to choose problems that will support the online teaching learning process. Examination is an important task to assess students' knowledge and develop skills. But unfortunately due to this pandemic situation students are not serious about their studies. The examinations are conducted online mode; students easily get the answers through google search for closed ended questions. The setting of questions (Theory as well as MCQs) should be in such a way that students will not easily find the solution by surfing. The student should develop their higher order thinking skills hence it is necessary to increase difficulty level by asking open ended questions in the examination system. With this motto though we arrived with a probable list of 50 problems, we filtered 5 problems based on the present need in the teaching learning process. We have selected the problems by rating method. For this we have created Google doc and taken rating to select problems from the QC committee members. While taking rating to the problems we keep two things in mind,

1. Importance of problem the view of present pandemic conditions

2. The need of examination reform as per the national education policy

Identified problems through Brainstorming at a glance

Sr. No.	Problems Identified
1.	Effective documentation of academic activities of the department
2.	Complexities in Timetable due to Covid situation
3.	To develop Excel sheet program for Mix design
4. [1	Difficulties in setting open ended questions
5.	Writing the proposals to fetch the grants from various funding agencies

PROBLEM SELECTION

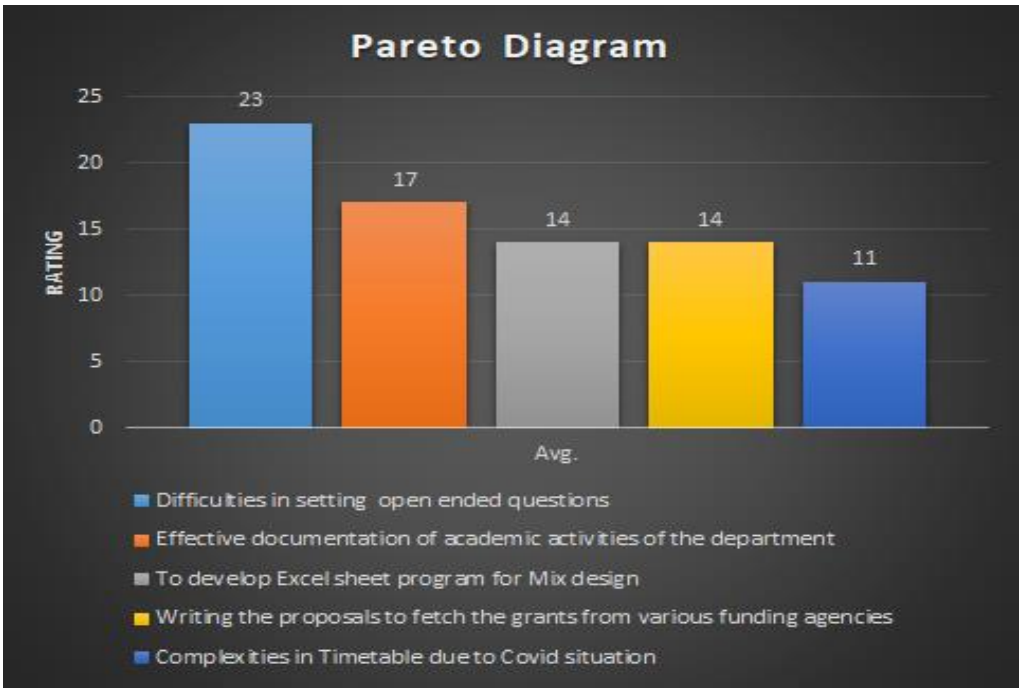
Table 1 Problem Selected through rating method

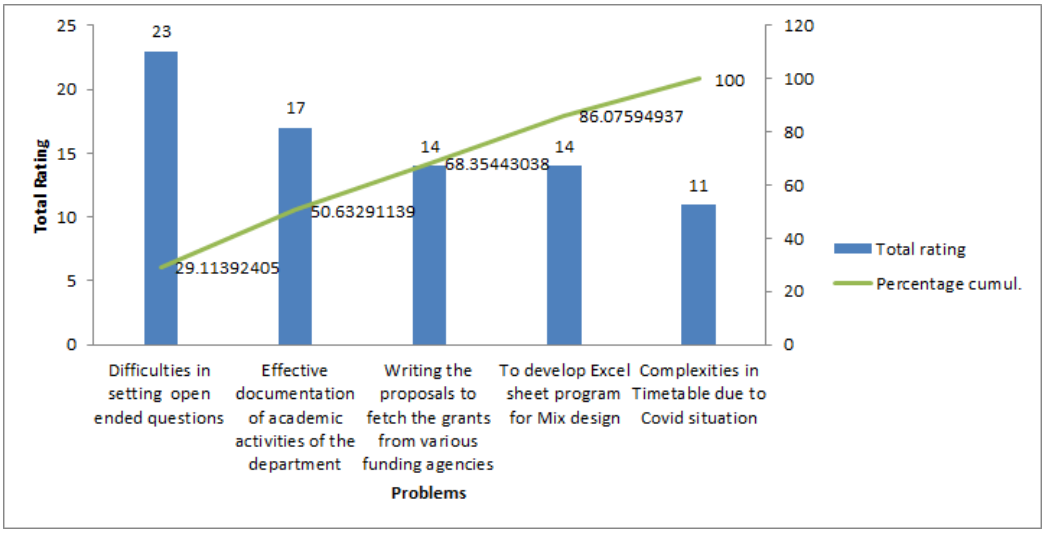
Sr. No.	Problem	NTS (5)	DBK (5)	SRD (5)	MMM (5)	SKM (5)
[2]1	Effective documentation of academic activities of the department	3	4	3	3	4
2	To develop Excel sheet program for Mix design	3	2	2	4	3
3	Complexities in Timetable due to Covid situation	2	3	1	4	1
4	Difficulties in setting open ended questions	4	4	5	5	5
5	Writing the proposals to fetch the grants from various funding agencies	3	2	4	3	2

All QC members rate the problems by keeping the above mentioned two points in mind. And we select the maximum rated problem.

B.1 PARETO DIAGRAM

The Figure shows the pareto diagram, representing the weightage of each identified problem. It shows that the problem **Difficulties in Setting Open Ended Questions** has a maximum rating as compared to other problems.





C) PROBLEM DEFINITION

C.1 Definition of problem:

Due to the COVID-19 pandemic situation the education system has been changed from traditional teaching learning to the online teaching learning system. The role of teachers has changed. The delivery method has been changed from chalk and board method to virtual mode. The interaction of teachers with students is also through virtual mode. There are many challenges that teachers and students are facing with this new mode of education system.

One of the challenges in front of teachers is examination patterns. As we know that we can not follow the regular examination pattern through online virtual mode because there are chances of malpractices during examination by the students. Though multiple choice questions or proctored exams are some options but there are some restrictions on question paper setting. If we want to increase the thinking ability of students, subjective questions are the better option. So, we have to ask such open-ended questions to the students, so that we can check the individual thinking ability of the students. As a part of question paper setting, the usual practice of most of the teachers is to set the close-ended questions, therefore our 'Quality Circle Group' has decided to address the problem "**Difficulties in Setting Open Ended Questions".** To solve this problem, we have suggested different methods of designing open ended questions.

Use of Open ended questions in examinations will enhance the students capabilities.The abilities developed in the students are listed below-

1. Students will be able to determine their own resolution strategies that are considered most appropriate.
2. Students will think about a variety of possible answers that satisfied the known conditions in the questions
3. Students will think of various answers that meet the conditions/requirements contained in the questions.
4. Students will communicate their understanding and improve their mathematical thinking skills
5. This strategy can stimulate students to generate new possible solutions. So those students not only receive the basic concept from the teacher or memorize a formula, but also understand the concept more deeply in the other representations.
6. Students will be stimulated to use their higher thinking skill to identify the error and explain why that happens, so these type questions will stimulate the student to give a varied answer

C.2 Problem statement

"**Difficulties in Setting Open Ended Questions".**

D)PROBLEM ANALYSIS

D.1 Analysis of problem

The various causes of difficulty in setting open ended questions were discussed in the group. The causes are identified and categorized in four groups viz. Student related , Faculty related , Process related and Miscellaneous.

E) IDENTIFICATION OF CAUSES

E.1 Listing of causes

1. Lack of experience in setting open ended questions, Difficulty in creating situation
2. Lack of training, Inadequate Literature availability,
3. General tendency to avoid change in regular practices
4. Rigid examination QP framework is the constraint
5. Fear of reducing the results
6. Lack of awareness in the students and faculty
7. Higher skills required to set and assess Open ended QP
8. No common practice at institute level to set Open ended QP
9. Assessment of open ended questions is complicated process
10. Assessment and evaluation of open ended questions is time consuming

E.2 Classification of causes

i) Student related:

a. Higher order thinking (Critical):

   As a usual practice in the examination system, approximately all set questions are close ended and students are very much familiar with them. In many of the close-ended questions the pattern of answer or steps are common and predetermined, so if students know these patterns or steps it is very easy for students to complete the answer without any difficulty. But in open ended questions students need to think in all the directions to get the answer. Students' perspective is very much important to answer the close-ended questions and for that higher order thinking or critical thinking is very important.

b. Tendency to avoid open ended question:

Generally students start with the familiar or similar type of questions that they had studied before the exam. But as we have discussed, to answer the open ended question critical thinking is required or students need to have all the basic knowledge regarding the subject. There is no common or fixed answer for the open ended questions. Therefore students try to solve regular practice questions first and avoid solving open ended questions.

c. Resistance to change

Students are more familiar with the closed ended question from schooling level. They only know to answer a question in typical fixed format i.e. a single solution. They prefer straightforward questions. Due to this they are not able to think critically. As in open ended questions the solutions may be multiple and they have to think critically , students may offer resistance to change from closed ended pattern to open ended pattern.

ii) Faculty related:

a. Lack of awareness:

There is a sudden impact of COVID-19 situation on teaching learning process and examination pattern also. So, teachers, students and academic parts are unaware about this situation and suddenly they need to change the classroom delivery to online virtual mode, traditional examination pattern to online examination for assessment to the students. So, teachers and students are unaware about the open ended examination pattern regarding setting open ended question papers.

b. Lack of training:

As an usual practice, in all the institutions teachers set the close ended questions. So, a lot of awareness is created regarding setting open ended questions. But such training programs, workshops and literature are not that much available with respect to setting open ended questions. So, due to lack of training, experience and availability of literature teachers are facing a lot of difficulties during setting open ended questions.

c. Lack of experience :

As in the regular practices from schools to the colleges the teachers and students are well familiar with the rigid framework system having restricted time bound. Due to

that they have a lot of experience of this rigid framework system, but due to COVID-19 situation there is sudden change in the teaching learning process and in the examination pattern. To adopt this system and frame the open ended questions, teachers have very less experience compared to the close ended questions as this is not a regular practice.

d. Fear of reducing marks:

In the traditional way of examination pattern, teachers know about the difficulty level of questions and probable response from the students. So, teachers are having the tentative idea of probable results of students. But in the case of open ended examination patterns, there are a number of ways for solving the open ended questions and the difficulty level of open ended questions are higher compared to the closed ended questions. So, some sort of fear regarding the results of students in the minds of teachers while setting the open ended questions.

iii) Process related

a. Rigid question paper framework

In the traditional examination pattern, the question paper format is fixed for all the courses and teachers need to set the questions as per the guidelines provided by the examination center. In the case of close ended questions, it is very to set the questions as per the framework provided by the examination center, but it is quite difficult to frame the open ended questions in the given framework. There are some restrictions regarding the scope of the questions, marks allotted and time given to the students to solve the questions.

b. Duration of examination

The duration of examination is fixed in case of rigid examination framework and some time is allotted to the students to write the answers for the given close ended questions. But in case of open ended questions, the time required to solve the questions may be different depending upon the students perspective and number of answers for one single open ended question.

c. Time consuming Assessment

For an open ended question there might be a number of answers for one single question and therefore during the assessment of the number of students teachers need to go through different answers for a single question. Hence time required to assess the answer books might be more compared to the close ended questions.

iv) Miscellaneous

a. Not a common Practice

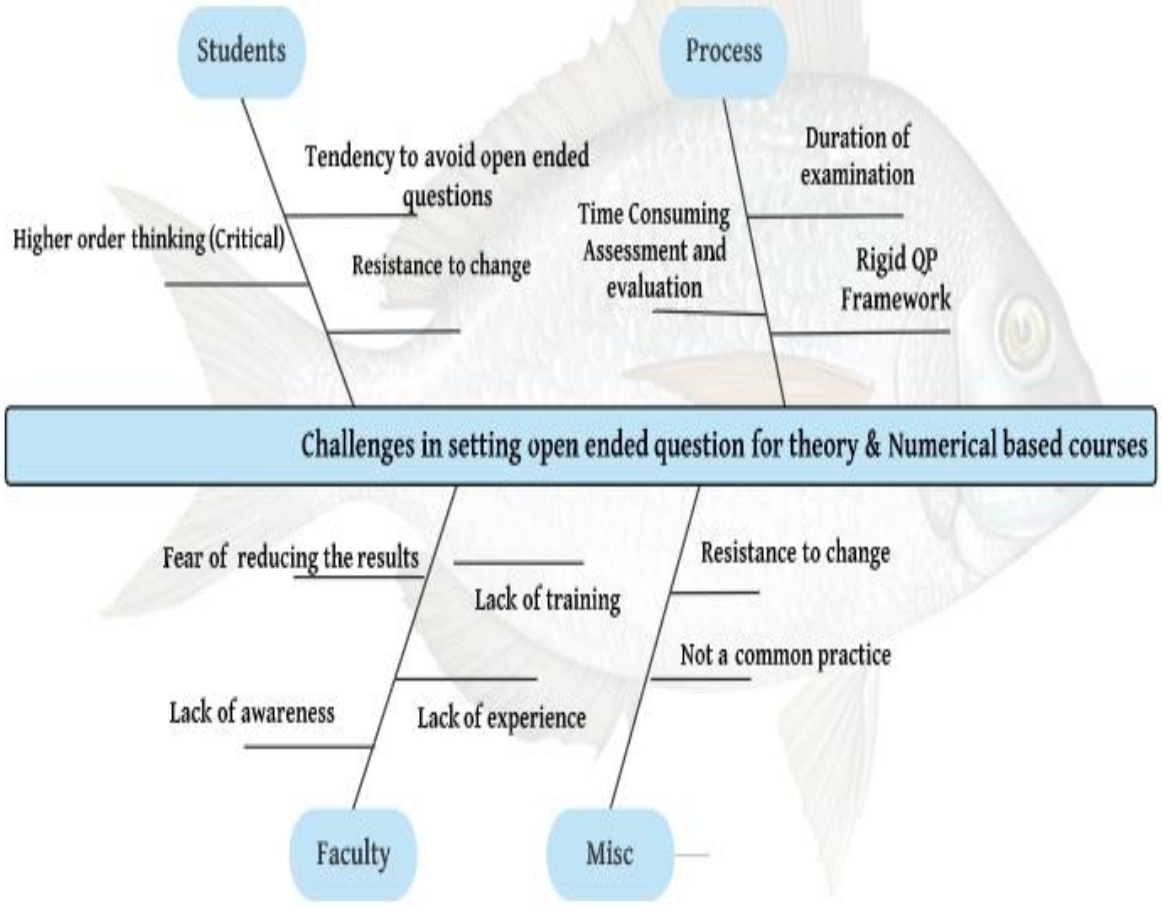
Setting the open ended questions is not a regular practice in our examination system. So, we need to inculcate such practices not only during the examination time but also during the delivery. Teachers have to ask such open-ended questions to the students during the classroom activities, so that they also get familiar with this open-ended question system .

b. Resistance to change

In the traditional teaching learning process, generally 90% questions asked in the examinations are the close ended questions. Usually teachers set the questions in such a way that there is a common or fixed answer to the questions asked. Now due to COVID-19 situation, it is primarily avoided by the teachers to ask the close-ended question, because there are chances of malpractices. Therefore, teachers are setting open ended questions in such a way that students should understand and think while answering and here students may offer resistance while solving such questions.

F) ROOT CAUSE ANALYSIS

E.3 Fishbone diagram



G) DEVELOPMENT OF SOLUTION

After studying the causes and effects (Fishbone diag.), It was decided to develop solutions to address various causes. They are as follows-

1. Training from experts, Faculty industry exposure, Guidelines
2. Motivation, use OEQ in ISE to increase familiarity
3. Freedom to decide weightage and pattern to set paper
4. Freedom to decide Duration
5. Include in delivery, Motivate through counseling, use OEQ in ISE to increase familiarity
6. Have to invest time for overall development of students, Adequate time should be given for the assessment

Out of the listed solutions we decided to conduct the training workshop to our faculties. During the workshop, we decided to conduct a pre and post workshop diagnostic quiz.

Faculties will be asked to prepare open ended questions before the workshop. After that workshop will be conducted and the guidelines used to set open ended questions will be discussed with the faculties. They will be asked to prepare open ended questions after the post workshop. The Pre and post workshop OEQ set by the faculties will peer reviewed and analyzed the results.

Guidelines designed to set an open ended questions are as follows-

(1) Modifying closed-ended questions is done by changing the information asked in closed-ended questions into known information in open-ended questions.

Example of OEQ:

The organization carries a JCB machine that is 2 year old. If the new JCB machines are available in the market with advanced features, Will you replace the old machine with a new one? Apply any method of replacement analysis and suggest whether to replace old by new or not? Use the data given below-

Cost of existing JCB = Rs.35, 00000/-Cost of new JCB = Rs.50, 00000/- and Annual depreciation for both equipment is 40 % of book value. Annual O & M cost of existing JCB is 20,00000 and increased by Rs.70,000 per year and Annual O & M cost of new JCB is 20,00000 and increased by Rs.50,000 per year.

(2) Working backwards, it is done by thinking about the answers to open-ended questions, then thinking about the strategy to get the answers and writing them in the form of questions.

Example of OEQ:

To increase the workability of a concrete mixture at a given water cement ratio, either,

1. Change in the cement content,

2. Change in the aggregate grading,

3. Using an admixture.

Which one of the above options or combination of options would you recommend and why?

Is it desirable to produce concrete mixtures of a higher consistency than necessary?

(3) Making a question to determine "who is correct?" This question asks student's opinions and their own reasoning processes.

Example of OEQ:

To construct the sub base cum drainage layer it was decided to use well graded gravel. The two types of rollers are available at site viz .smooth wheel roller and sheep foot roller. As per your opinion which roller is suitable for the compaction of the said sub base? Justify & explain working with construction techniques involved.

(4) Using the problem-posing principle, it is done by modifying the questions that have been answered using the "what-if-not?" strategy.

(5) Role Play: **Give a role to the student, to solve a probable real life problem in the industry. Do not directly provide them**

Example of OEQ:

There is a call for tender for construction of a stadium in your city, your company is willing to enter in a tendering system hence your boss asks you to prepare the necessary documents which are required for tendering work.

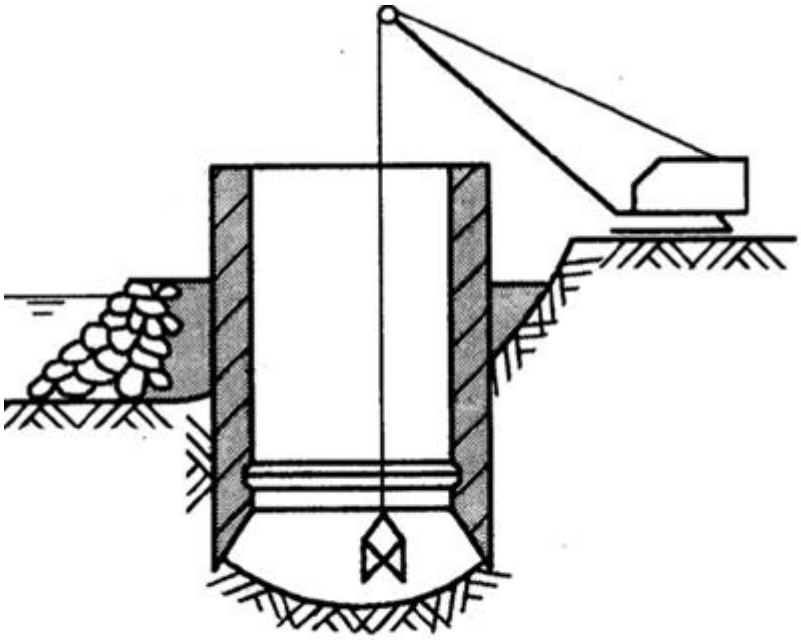
(6) Provide real life data and situation: This will introduce the students to real life situations that might be faced by the engineers during their career pertaining to the course.

Example OEQ:

During the sinking operation of an open caisson it was found that a large boulder was underlying one side of the caisson base as shown in the figure 1.

Predict whether any problems would be encountered during the sinking process.

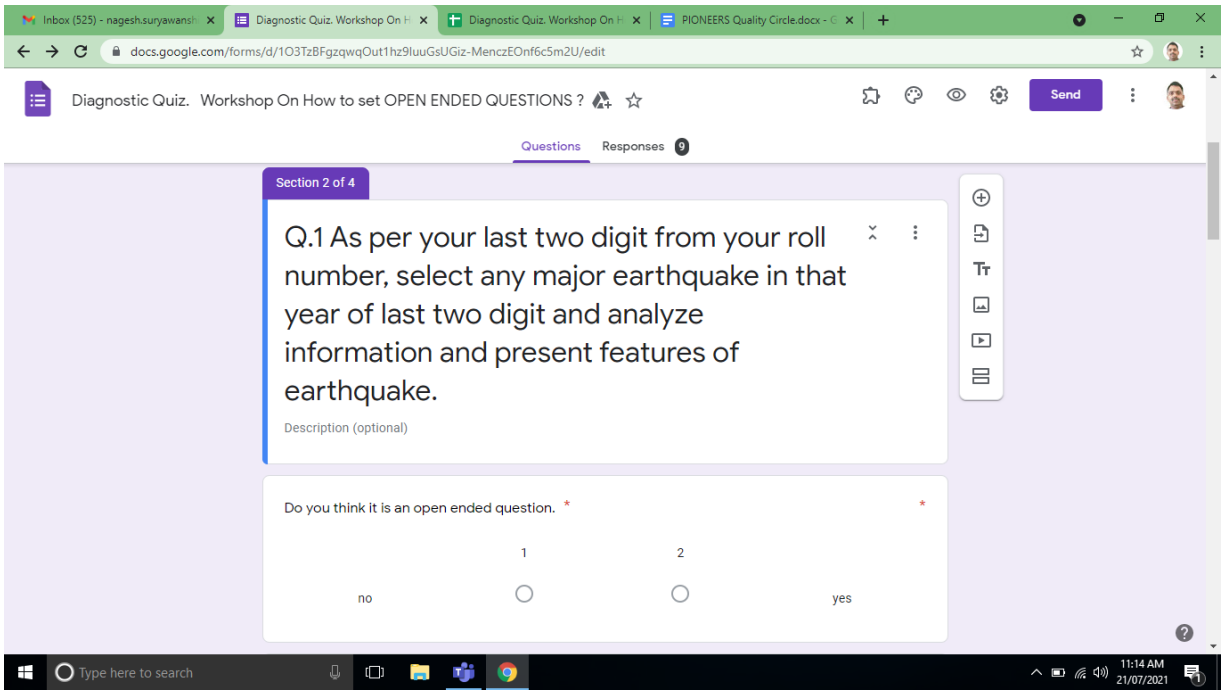
2. Suggest remedial technique/s for making sure that the caisson sinking operation would be conducted properly without any problems.

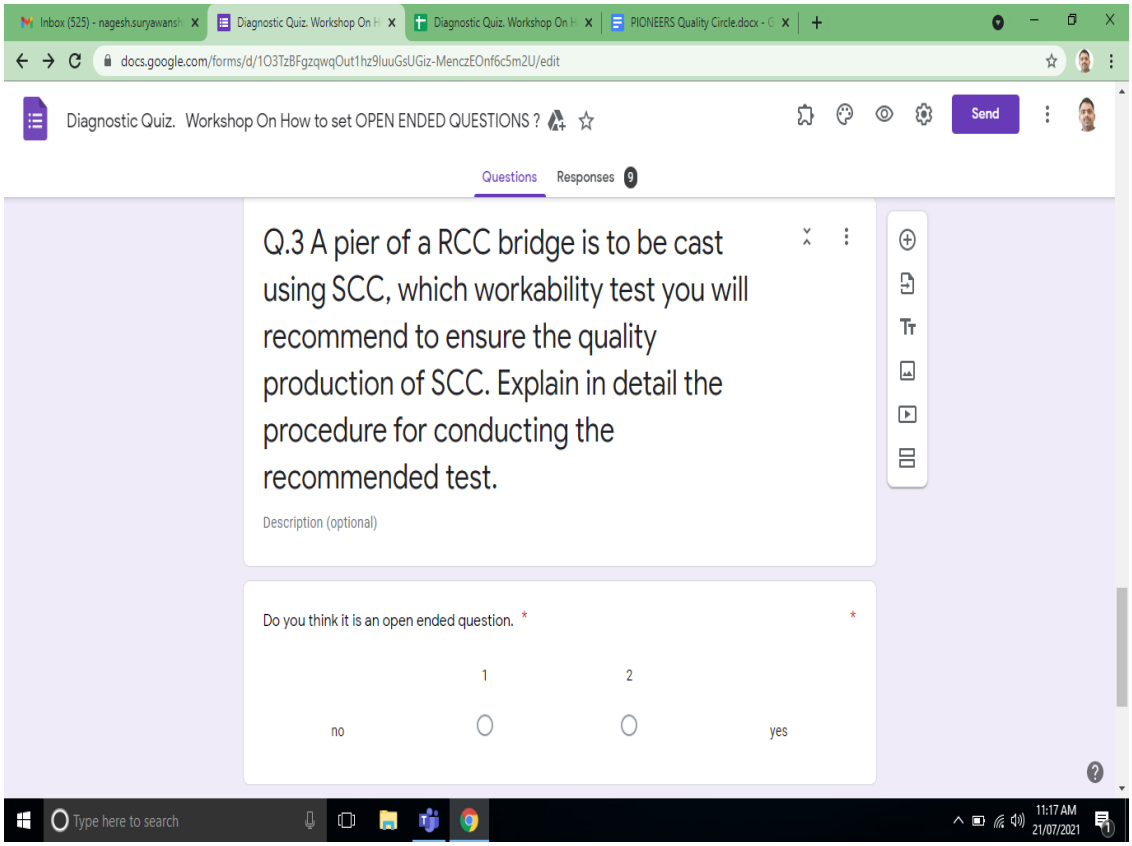


H) TRAIL IMPLEMENTATION:

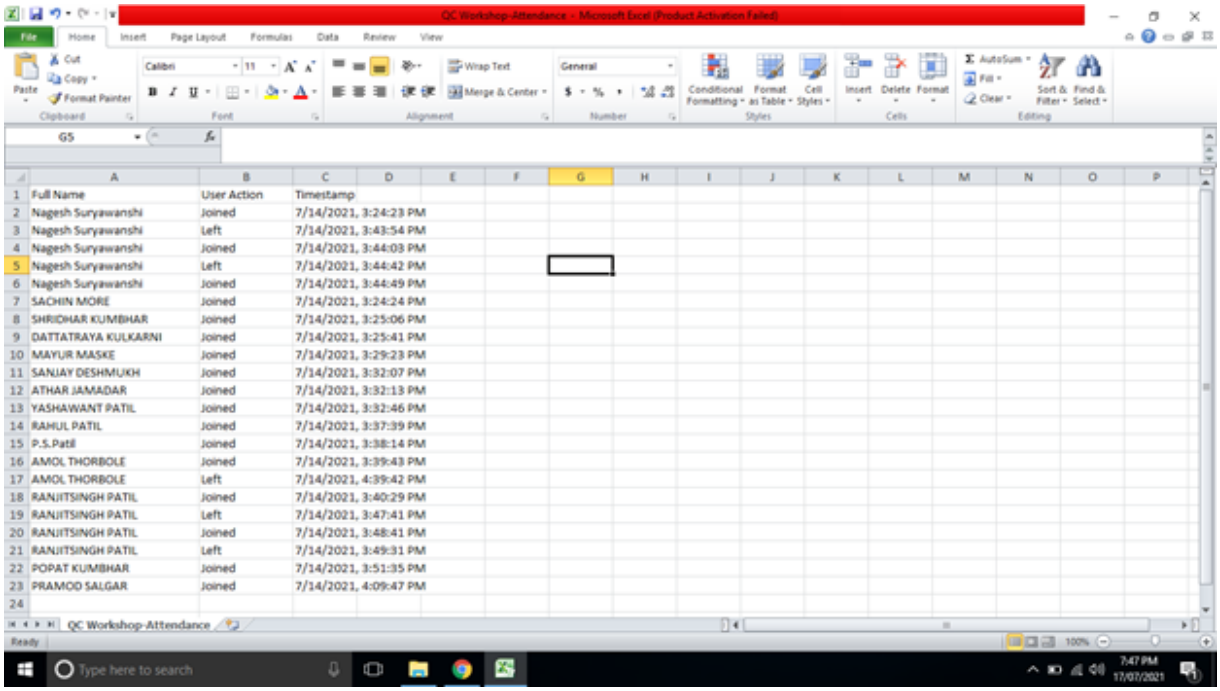
Awareness workshop conducted to the faculties of department of Civil engineering . Faculties were explained about the benefits of open ended questions and one diagnostic quiz was conducted online through Google form to check their understanding about Open ended questions. After that the guidelines ,methods of setting open ended questions were explained with the help of examples. After the discussion on guidelines the faculties were asked to peer review the questions set by them in a diagnostic quiz.The details about the diagnostic quiz and Peer review process (PRE and POST) is shown below.

Diagnostic Quiz form:





QC Workshop Attendance:

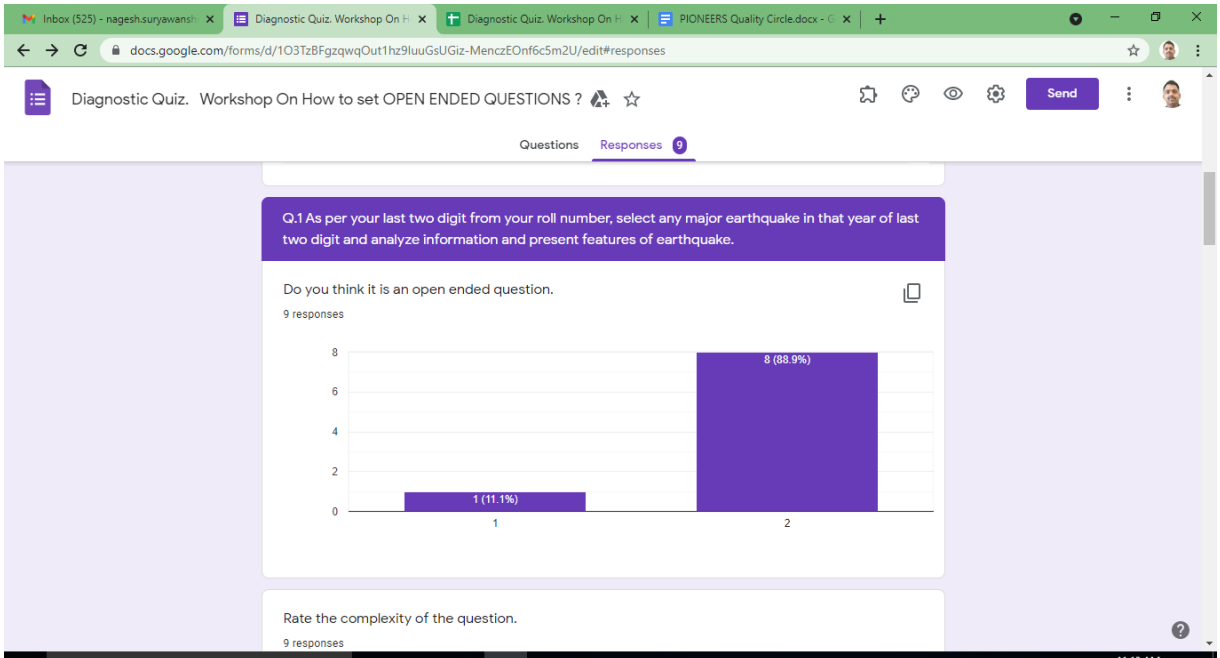


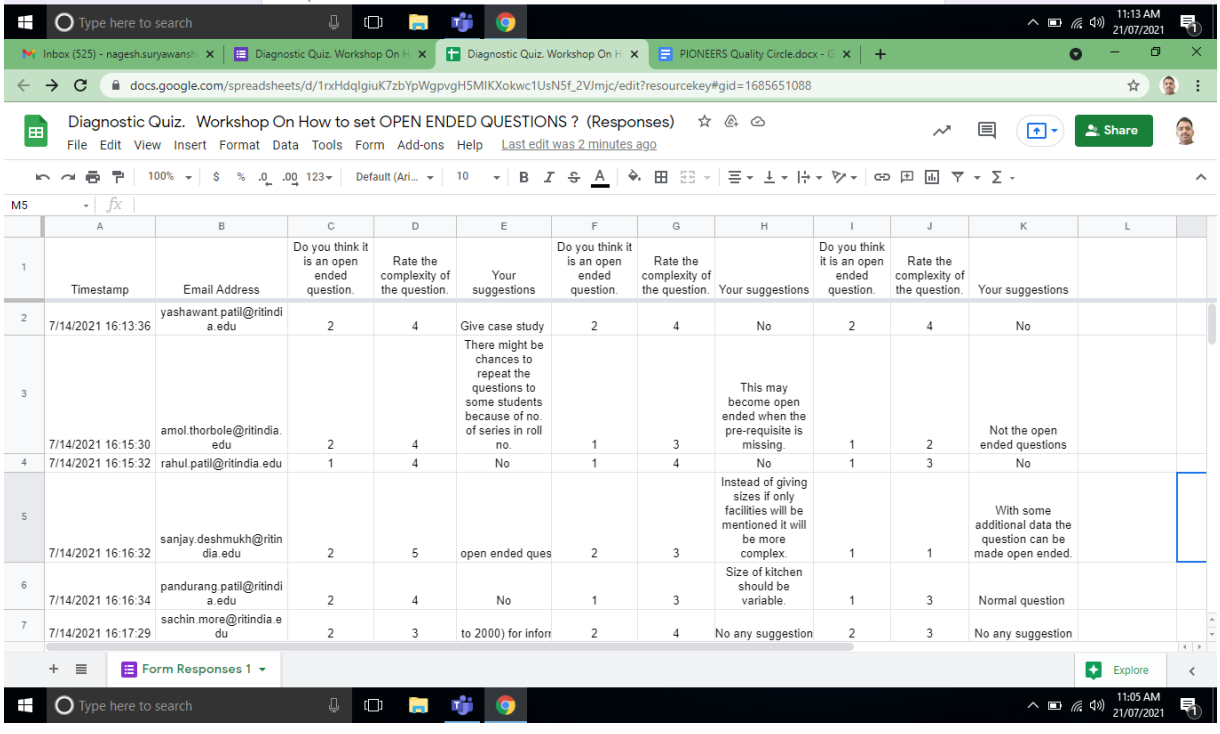
	A	B	C
1	Full Name	User Action	Timestamp
2	Nagesh Suryawanshi	Joined	7/14/2021, 3:24:23 PM
3	Nagesh Suryawanshi	Left	7/14/2021, 3:43:54 PM
4	Nagesh Suryawanshi	Joined	7/14/2021, 3:44:03 PM
5	Nagesh Suryawanshi	Left	7/14/2021, 3:44:42 PM
6	Nagesh Suryawanshi	Joined	7/14/2021, 3:44:49 PM
7	SACHIN MORE	Joined	7/14/2021, 3:24:24 PM
8	SHRIDHAR KUMBHAR	Joined	7/14/2021, 3:25:06 PM
9	DATTATRAYA KULKARNI	Joined	7/14/2021, 3:25:41 PM
10	MAYUR MASKE	Joined	7/14/2021, 3:29:23 PM
11	SANJAY DESHMUKH	Joined	7/14/2021, 3:32:07 PM
12	ATHAR JAMADAR	Joined	7/14/2021, 3:32:13 PM
13	YASHAWANT PATIL	Joined	7/14/2021, 3:32:46 PM
14	RAHUL PATIL	Joined	7/14/2021, 3:37:39 PM
15	P.S.Patil	Joined	7/14/2021, 3:38:14 PM
16	AMOL THORBOLE	Joined	7/14/2021, 3:39:43 PM
17	AMOL THORBOLE	Left	7/14/2021, 4:39:42 PM
18	RANJITSINGH PATIL	Joined	7/14/2021, 3:40:29 PM
19	RANJITSINGH PATIL	Left	7/14/2021, 3:47:41 PM
20	RANJITSINGH PATIL	Joined	7/14/2021, 3:48:41 PM
21	RANJITSINGH PATIL	Left	7/14/2021, 3:49:31 PM
22	POPAT KUMBHAR	Joined	7/14/2021, 3:51:35 PM
23	PRAMOD SALGAR	Joined	7/14/2021, 4:09:47 PM
24			

I] EVALUATION:

Peer Review of Diagnostic Quiz (Pre workshop):

Diagnostic quiz was conducted to check the knowledge of faculties about to set open ended questions. As part of the activity they were asked to submit the open ended questions of the course they taught. Total 9 responses received, after evaluation by peer review process it was found that the questions set by them are not an open ended question.90 % faculties is of opinion that the questions set are not open ended type.

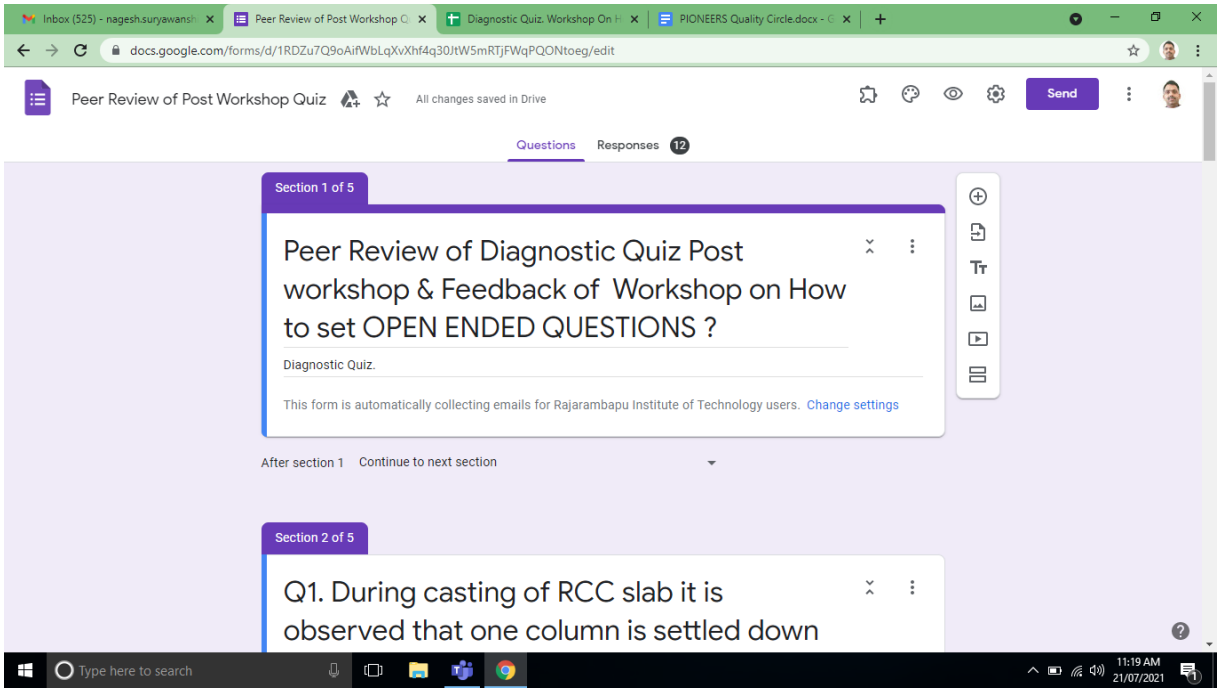


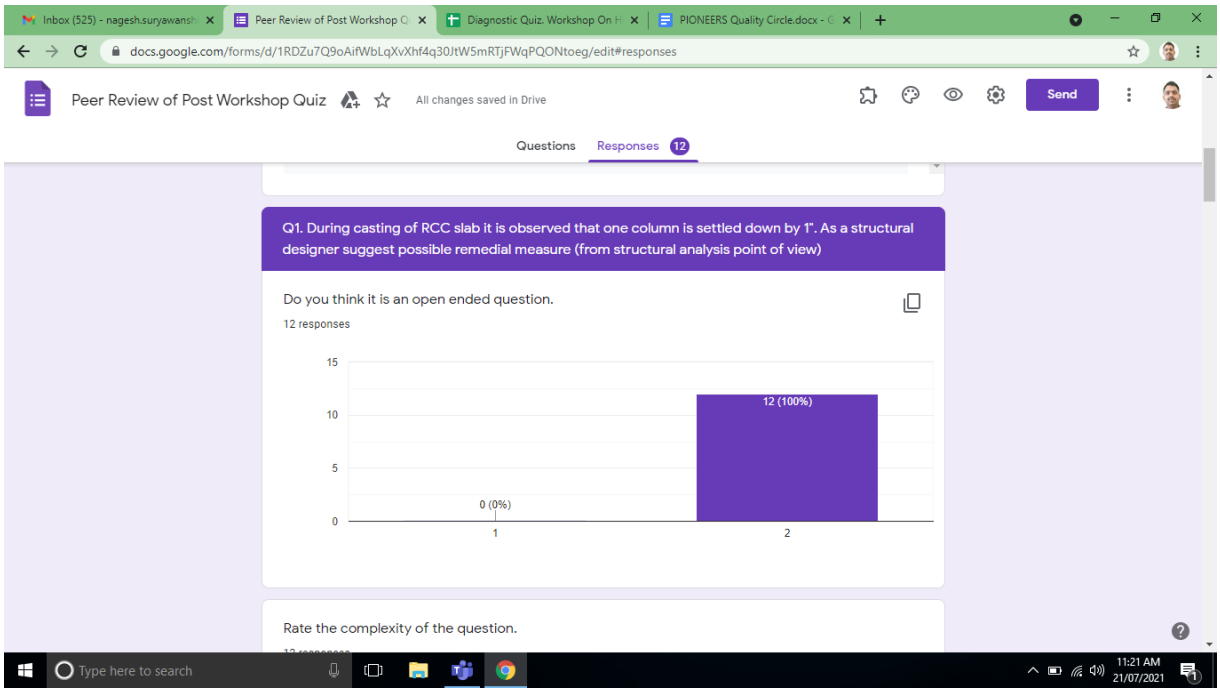


	Timestamp	Email Address	Do you think it is an open ended question.	Rate the complexity of the question.	Your suggestions	Do you think it is an open ended question.	Rate the complexity of the question.	Your suggestions	Do you think it is an open ended question.	Rate the complexity of the question.	Your suggestions
2	7/14/2021 16:13:36	yashawant.patil@ritindia.edu	2	4	Give case study	2	4	No	2	4	No
3	7/14/2021 16:15:30	amol.thorbole@ritindia.edu	2	4	There might be chances to repeat the questions to some students because of no. of series in roll no.	1	3	This may become open ended when the pre-requisite is missing.	1	2	Not the open ended questions
4	7/14/2021 16:15:32	rahul.patil@ritindia.edu	1	4	No	1	4	No	1	3	No
5	7/14/2021 16:16:32	sanjay.deshmukh@ritindia.edu	2	5	open ended ques	2	3	Instead of giving sizes if only facilities will be mentioned it will be more complex.	1	1	With some additional data the question can be made open ended.
6	7/14/2021 16:16:34	pandurang.patil@ritindia.edu	2	4	No	1	3	Size of kitchen should be variable.	1	3	Normal question
7	7/14/2021 16:17:29	sachin.more@ritindia.edu	2	3	to 2000) for infor	2	4	No any suggestion	2	3	No any suggestion

Peer review of diagnostic quiz (Post workshop):

In the workshop methods and guidelines of setting open ended questions were discussed with faculties. One Google form shared with them to submit the open ended question of their course. Evaluation was done by peer review process, and a total 12 responses were received. After evaluation of the responses it was observed that all the faculties are of opinion that the set questions are 100% open ended type.





J] CONCLUSION:

From the analysis and evaluation of the identified problem the following conclusions can be drawn

- Faculty members are motivated to design open ended questions.
- It is beneficial for students to face open ended questions.
- The teaching methodologies need to be modified so as to make the students familiar to face open ended questions.