

Krishna Mahavidyalaya, Rethare Bk.

Department of Mathematics

Departmental Activities (2017-18 to 2021-22)

Year	Activity No.	Date	No. of Beneficiaries	Name of Activity	Topic/Title	Name of Teacher
2021-22	1	22/12/2021	31	Celebration of Birth Anniversary	Srinivas Ramanujan	Mr. Patil H V & Mr. Tawade S. S.
	2	13/04/2022	30	One Day Seminar	Applications of Mathematics in Real World'	Mr. Patil H V & Mr. Kale M J
	3	02/12/2021 to 18/12/2021	18	Certificate Course	Certificate Course in Operation Research	Mr. Patil H V, Miss. Sawant R S, Mr. Kale M J & Mr. Tawade S. S.
2020-21	1	31/08/2020	423	One Day National e-Seminar	The Role of Mathematics & Computer Science in Artificial Intelligence (AI) and Machine Learning (ML)	Mr. Patil H V & Mr. Tawade S. S.
	2	17/12/2020	58	One Day e-Seminar under Lead College activity	Recent Trends in Fuzzy Mathematics	Mr. Patil H V & Mr. Tawade S. S.
	3	22/12/2020	24	Celebration of Birth Anniversary	Srinivas Ramanujan	Mr. Patil H V & Mr. Tawade S. S.
	4	05/03/2021	24	Quiz Competition on National Science Day	Quiz Competition	Mr. Patil H V & Mr. Tawade S. S.
2019-20	1	28/09/2019 to 12/10/2019	23	Students Seminar	Students Seminar	Mr. Patil H V & Mr. Kale M. J.
	2	10/01/2020, 21/01/2020 and 24/01/2020	77	Mathematical Quiz Competition 2020	Mathematical Quiz Competition 2020	Mr. Patil H V & Miss. Sawant R. S.
	3	15/01/2020 to 15/02/2020	28	Certificate Course in Mathematical Software	Scilab	Mr. Patil H V & Miss. Sawant R. S.
2018-19	1	07/02/2019	21	Certificate Course in Mathematical Software	Scilab	Mr. Patil H V & Miss. Sawant R. S.
2017-18	1	03/01/2018	90	One Day Workshop under Lead College activity	Ancient Mathematics	Mr. Patil H V & Mr. Kale M. J.


 Head of Dept. of Mathematics
 Krishna Mahavidyalaya Rethare Bk

Krishna Mahavidyalaya, Rethare Bk

IQAC 2021-2022**ACTIVITY REPORT
MATHEMETICS DEPARTMENT/ COMMITTEE/ FACULTY**

IQAC ACTIVITY No: 01

NAME OF THE ACTIVITY:			
DATE	FACULTY	DEPARTMENT/COMMITTEE	COORDINATOR NAME
22/12/2021	Mr. H.V. Patil & Mr.S.S.Tawade	Mathematics	Mr. H V Patil
TIME	VENUE	NUMBER OF PARTICIPANTS	NATURE: Outdoor/Indoor
11.00 a.m.to 01.00 p.m.	Department of Mathematics	31	Indoor
SUPPORT/ASSISTANCE:			

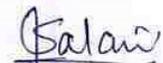
BRIEF INFORMATION ABOUT THE ACTIVITY (CRITERION NO. -):

TOPIC/SUBJECT OF THE ACTIVITY	Srinivas Ramanujan's Biography and his Research Contribution
OBJECTIVES	To Recall Biography and Research Contribution of Great Mathematician Ramanujan
METHODOLOGY	Photo Pooja and Speech
OUTCOMES	This activity helps the participants to improve their knowledge and involvement in Research activity

PROOFS & DOCUMENTS ATTACHED (Tick mark the proofs attached):

1. Notice & Letters	2. Student list	3. Activity report	4. Photos -	5. Feedback form -
6. Feedback analysis =	7. News clip with details -	8. Certificate -	9. Any other -	-

IQAC CELL ACTIVITY NUMBER:

NAME OF TEACHER & SIGNATURE	NAME OF HEAD/ COMMITTEE INCHARGE & SIGNATURE	PRINCIPAL PRINCIPALS SIGNATURE	IQAC COORDINATOR (SEAL & SIGNATURE)
			

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BK

PRINCIPAL
KRISHNA MAHAVIDYALAYA,
RETHARE (BK), TAL. KARAD, DIST. SATARA

IQAC, Coordinator,
KRISHNA MAHAVIDYALAYA,
Rethare Bk; Shivnagar - 415108
Tal. Karad, Dist. Satara

KrishnaMahavidyalaya, RethareBk

Department of Mathematics

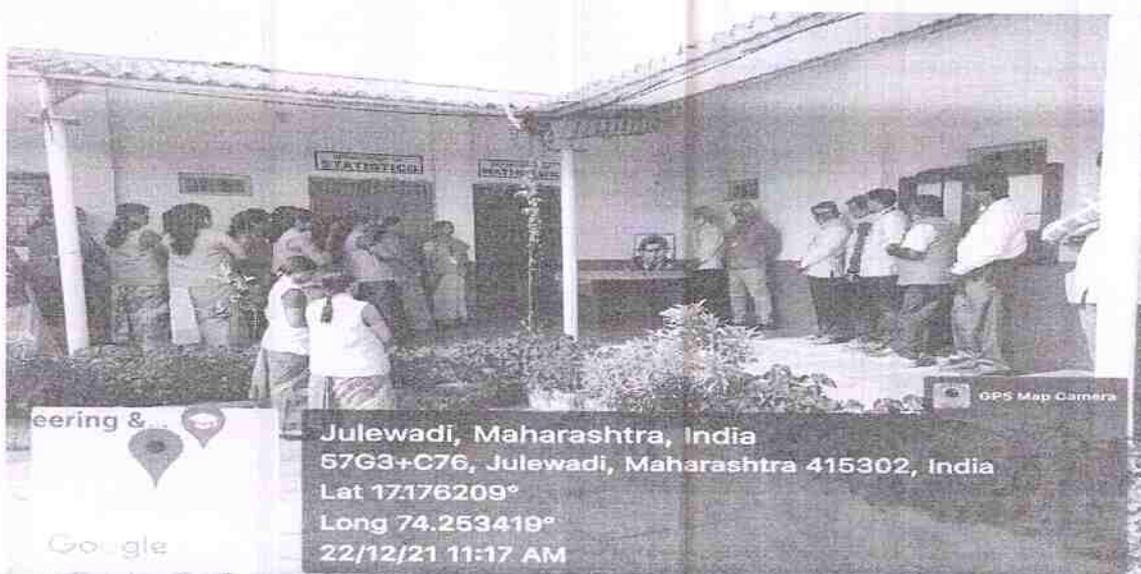
Birth Anniversary of Great Mathematician SrinivasRamanujan 2021 - 22

Report

Department of Mathematics and Statistics has celebrated Birth Anniversary of Great Mathematician SrinivasRamanujan on 22nd December 2021 at 11.00 a.m. in the senior wing. Total 30 faculty members are participated in this Celebration.

The main objective behind the celebration is to raise awareness among the people about the importance of mathematics for the development of humanity and to recall biography and recognize works of Srinivas Ramanujan. Also to Spread mathematics learning and understanding among the students and encourage making strides in the field of mathematics.

Dr. C B Salunkhe, Principal of Krishna Mahavidyalaya, Rethare Bk shared his views on Great Mathematician Srinivas Ramanujan and also Mr. H V Patil talks on significant contributions of works of Ramanujan to mathematics and to spread mathematics learning and understanding. Vote of thanks given by Mr. Tawade S S. This event of celebration helps to recognize and remember works of Ramanujan and encourage the student's interest in mathematics.



[Signature]
Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Shetakari Shikshan Prasarak Mandal
Krishna Mahavidyalaya, Rethare Bk.
Department of Mathematics

- NOTICE -

Date: 21/12/2021

All Faculty members are hereby informed that Department of Mathematics and IQAC is going to celebrate Birth Anniversary of Srinivas Ramanujan on 22nd December 2021 at 11.00 a.m. in the senior wing.

All are requested to attend the programme.

Venue: Department of Mathematics (Senior wing)

Mr. Patil H. V.

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Dr. C. B. Salunkhe

Principal
Krishna Mahavidyalaya Rethare Bk
Tal. Karad: 415 108 (MS)

Sr. No.	Name of the faculty	Signature	Sr. No.	Name of the faculty	Signature
1.	Patil H.V.		19	Dr. Rajhans s.m	
2.	Dr. Mane D.N.			Delvekar S.T.	
3.	Mr. Tavade S.S.		20.	Sawant S.H.	
4.	B.S. Mane		21.	Smt. Sande A.B.	
5.	Kamble V.L.		22.	Miss Jadhav V.S.	
6.	Dr. Kurane P.M.		23.	Miss Kumbhar M.M.	
7.	Dr. Kamble M.V.		24.	Miss. Patil I.R.	
8.	Mrs. Desai R.S.		25.	Shri. Ransing V.S.	
9.	Dr. S.H. Jadhav		26	Mr. Bansode B.V	
10.	Dr. Dalavi. D.S		27.	Mr. Thorat A.A.	
11.	Mr. Chavan C.Y.		28)	Mrs. S. V. supgade	
12.	Mr. Gaikwad Mr		29	Mr. Bansode b.L	
13.	Dr. Bhalane P.D				
14.	Dr. Sonwane V.K.				
15.	Ms. Patil V.S.				
16.	Miss Kencar. D. B				
17.	Miss Jadhav S.M.				
18.	Pawar. M.S				

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Shetakari Shikshan Prasarak Mandal
Krishna Mahavidyalaya, Rethare Bk.
Department of Mathematics

Date: 22/12/2021

The following Faculty members are participated in the celebration of Birth Anniversary of Srinivas Ramanujan on 22nd December 2021 at 11.00 a.m. in the senior wing organized by Department of Mathematics.

Sr. No.	Name of the faculty	Signature	Sr. No.	Name of the faculty	Signature
1.	Patil H.V.		28.	Mr. Bansode B.V	
2.	Dr. Mame D.N.		29.	Mr. Theoret A.A.	
3.	Dr. Balutle C.B.		30.	Mrs. S.V. Supugade	
4.	B.S. Mane		31.	Mr. Bansode D.L	
5.	Kamble V.L.				
6.	Dr. Kurane.M.R.				
7.	Dr. Kamble M.V.				
8.	Mrs. Desai R.S.				
9.	Dr. Jadhav S.H.				
10.	Mr. Tawade S.S				
11.	Dr. Dalavi D.S				
12.	Mr. Chauhan C.Y.				
13.	Mr. Gaikwad. M.R				
14.	Dr. Bhalane P.D				
15.	Dr. Sanwane V.K.				
16.	Mrs. Patil V.S.				
17.	Miss Kondat. D.B				
18.	Miss Jadhav S.M.				
19.	Pawar. M.S				
20.	Dr. Rajbans S.M				
21.	Telvan S.T.				
22.	Miss Jadhav V.S.				
23.	Miss Kumbhar M.M.				
24.	Miss. Patil I. R.				
25.	Sawant S.H.				
26.	Smt. Sande A.B.				
27.	Shri. Ransing V.S.				

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BB

Krishna Mahavidyalaya, Rethare Bk

IQAC 2021-2022**ACTIVITY REPORT
MATHEMETICS DEPARTMENT/ COMMITTEE/ FACULTY**

IQAC ACTIVITY No: 02

NAME OF THE ACTIVITY:			
DATE	FACULTY	DEPARTMENT/COMMITTEE	COORDINATOR NAME
13/04/2022	Mr. H. V. Patil & Mr. M. J. Kale	Mathematics	Mr. Kale M. J.
TIME	VENUE	NUMBER OF PARTICIPANTS	NATURE: Outdoor/Indoor
11.00 a.m. to 01.00 p.m.	Department of Mathematics	30	Indoor
SUPPORT/ASSISTANCE:			

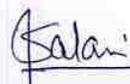
BRIEF INFORMATION ABOUT THE ACTIVITY (CRITERION NO. -):

TOPIC/SUBJECT OF THE ACTIVITY	One Day Seminar on Applications of Mathematics in Real World
OBJECTIVES	To Know the importance of Mathematics in real world and also applications in different fields.
METHODOLOGY	Speech
OUTCOMES	This seminar helps the students in improving subject knowledge and creation of interest in subject.

PROOFS & DOCUMENTS ATTACHED (Tick mark the proofs attached):

1. Notice & Letters	2. Student list	3. Activity report	4. Photos -	5. Feedback form -
6. Feedback analysis =	7. News clip with details -	8. Certificate -	9. Any other -	-

IQAC CELL ACTIVITY NUMBER:

NAME OF TEACHER & SIGNATURE	NAME OF HEAD/ COMMITTEE INCHARGE & SIGNATURE	VICE- PRINCIPALS SIGNATURE	IQAC COORDINATOR (SEAL & SIGNATURE)
			

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BK

PRINCIPAL
KRISHNA MAHAVIDYALAYA,
RETHARE (BK), TAL. KARAD,
DIST. SATARA

IQAC, Coordinator,
KRISHNA MAHAVIDYALAYA,
RETHARE Bk; Shivnagar - 415108
Tal. Karad, Dist. Satara

Krishna Mahavidyalaya, Rehtare Bk.

Department of Mathematics

One day seminar on

'Applications of Mathematics in Real World'

13th April 2022

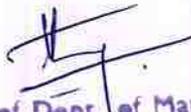
Report

Department of mathematics has organized a one day seminar on **"Applications of Mathematics in Real World"** on Wednesday 13th April 2022.

The main aim of this seminar is to know the importance of Mathematics in real world, recent trends and applications of Mathematics. So it will create interest among students in Mathematics. We invited Prof. Humane P. P. Assistant Professor, Department of Mathematics, Government College of Engineering, Karad as a resource person .

She delivered valuable and informative lecture on different applications as well as recent trends in mathematics. Her lecture was very informative and fruitful to our students. Total Thirty(30) participants are benefited by this seminar.

Prof. H. V. Patil introduced this seminar and Principal Dr. Salunkhe. C.B. was President of this seminar, Anchoring was done by Prof. Mrs. R. S. Sawant and Vote of thanks by Prof. M.J.Kale. Seminar was very informative and fruitful to all.


Head of Dept. of Mathematics
Krishna Mahavidyalaya Rehtare Bk.

11-04-2022

Krishna Mahavidyalaya, Rethare Bk

Department of Mathematics

Notice

All B Sc Mathematics Students are informed that Department of Mathematics is organizing One Day Seminar on "Application of Mathematics in Real World" on 13-04-2022 at 11.30 a. m. in the department. All are requested to attend the seminar

Schedule of the Seminar

Time	Topic	Name of Faculty
11.00 to 11.15	Introduction of Seminar	Mr. H V Patil
11.15 to 11.30	Welcome and Introduction of Resource Person	Mr. Kale M J
11.30 to 12.30	Speech of Resource Person	Mrs. Humane P P
12.30 to 1.00	Presidential Speech	Dr. Prin. Salunkhe C B
1.00 to 1.15	Vote of Thanks	Mr. Kale M J


Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Department of Mathematics

One day seminar on 'Applications of Mathematics in real world' organized by Department of Mathematics on 13-04-2022 at 11:30 am in department.

Sr. No.	Name of students	class	signature
1.	Shikargar fardin Hajaratadi	B.Sc. I	<u>Shikargar</u>
2.	Hadmode Aniket Prakash	B.Sc I	<u>Hadmode</u>
3)	Pawar sairaj Shivaji	B.SCI	<u>Pawar</u>
4)	Mane Ashish Popat	B.Sc II	<u>Ashish</u>
5]	sutar Prathmesh Popat	B.SCI	<u>Sutar</u>
6)	salunkhe siddhesh Ankush.	B.Sc II	<u>siddhesh</u>
7]	Salunkhe Pratik Prakash	B.SCI	<u>P. Salunkhe</u>
8)	Shinde Akash Shivaji	B.SCI	<u>shinde</u>
9)	Salave Rahul Sanjay.	B.Sc. II	<u>Salave</u>
10)	Patil Atul Ashok	B.Sc. II	<u>Patil</u>
11)	patel Wasim kadir	B.Sc. II	<u>Patel</u>
12)	Zele Ritesh Dattatray	BSC. II	<u>Zele</u>
13)	Om Shivaji Chavan	BSC. II	<u>Om</u>
14)	Bhosale pooja somnath.	B.Sc. I.	<u>Bhosale</u>
15]	Jagtap Prayanka subhash	B.SCI	<u>Jagtap</u>
16]	bakale Vaishnavi Hanmant.	B.SCI	<u>Bakale</u>
17]	Doiphode yuvraj kisan	B.Sc II	<u>Doiphode</u>
18)	Patil Gourav Sunil	B.Sc II	<u>Gourav</u>
19]	Nadaf Ashraf Iqbal	B.Sc II	<u>Nadaf</u>
20)	Disale Aniket Shankar	B.Sc-I	<u>Disale</u>
21)	Mohite Nikita Vilas	B.Sc-II	<u>Mohite</u>
22)	salunkhe shruti Shashikant	B.Sc-I	<u>Salunkhe</u>
23)	chavan pratiksha kiran.	BSC. I	<u>Chavan</u>
24)	Chavan kajal Rajesh	BSC-I	<u>Chavan</u>

25) Mane Harshad Vijay

B.Sc. II

Mane

26) H. V. Patil

Ass. Professor

H. V. Patil

27) M. J. Kale

Asst. Prof

M. J. Kale

28) R. S. Sawant

~~Asst. Prof~~ Ass. Prof

R. S. Sawant

29) V. U. Chavan

Asst. Prof

V. U. Chavan

30) S. S. Tawade

Asst. Prof

S. S. Tawade

H. V. Patil



संहती कार्यसाधिका । शिलं परं भूषणम्
Shetkari Shikshan Prasarak Mandal's

KRISHNA MAHAVIDYALAYA, RETHARE BK.

Shivnagar, Tal. Karad, Dist. Satara, 415 108 (M.S.). Phone : 02164-266346, Fax : 02164-266347
Email : kmr_sspm@yahoo.co.in Website : www.krishnamahavidyalaya.com

NAAC 'B+' Grade (CGPA 2.65)



Founder : Hon. Jaywantrao Bhosale

President : Dr. Suresh Jaywantrao Bhosale

Principal : Dr. Salunkhe C. B. M.Sc., Ph. D.

Ref. No. : KMR/ 52/1040/2021-22

Date : 13.04.2022

Letter of Appreciation

To,
Prof. P.P. Humane
Assistant Professor,
Government College of Engineering, Karad

Respected Madam,

I wanted to take a moment to thank for participating as a **Recourse Person** in one day seminar on '**Applications of Mathematics in Real World**' organized by Department of Mathematics on Wednesday, 13/04/2022.

Thank you for supporting and encouragement you provided during the seminar your whole hearted co-operation!

Thanking you!

Mr. H.V. Patil

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BK

Principal

Dr. C.B. Salunkhe

PRINCIPAL
KRISHNA MAHAVIDYALAYA
RETHARE (BK.), TAL. KARAD



संहती कार्यसाधिका । शिलं परं भूषणम्
Shetkari Shikshan Prasarak Mandal's

KRISHNA MAHAVIDYALAYA, RETHARE BK.

Shivnagar, Tal. Karad, Dist. Satara, 415 108 (M.S.). Phone : 02164-266346, Fax : 02164-266347

Email : kmr_sspm@yahoo.co.in Website : www.krishnamahavidyalaya.com

NAAC 'B+' Grade (CGPA 2.65)



Founder : Hon. Jaywantrao Bhosale

President : Dr. Suresh Jaywantrao Bhosale

Principal : Dr. Salunkhe C. B. M.Sc., Ph. D.

Ref. No. : KMR/1039/2021-22

Date : 09/04/2022

To,

Prof. P.P. Humane

Assistant Professor,

Government College of Engineering, Karad

Subject: One day seminar on Applications of Mathematics in Real World.

Respected Madam,

It gives us great pleasure to invite you as a **Resource person** in one day seminar on 'Applications of Mathematics in Real World' organized by Department of Mathematics on Wednesday, 13/04/2022.

Your Acceptance will be highly appreciated.
Expecting your whole hearted co-operation!

Thanking you!

Mr. H. V. Patil

Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BK

Principal

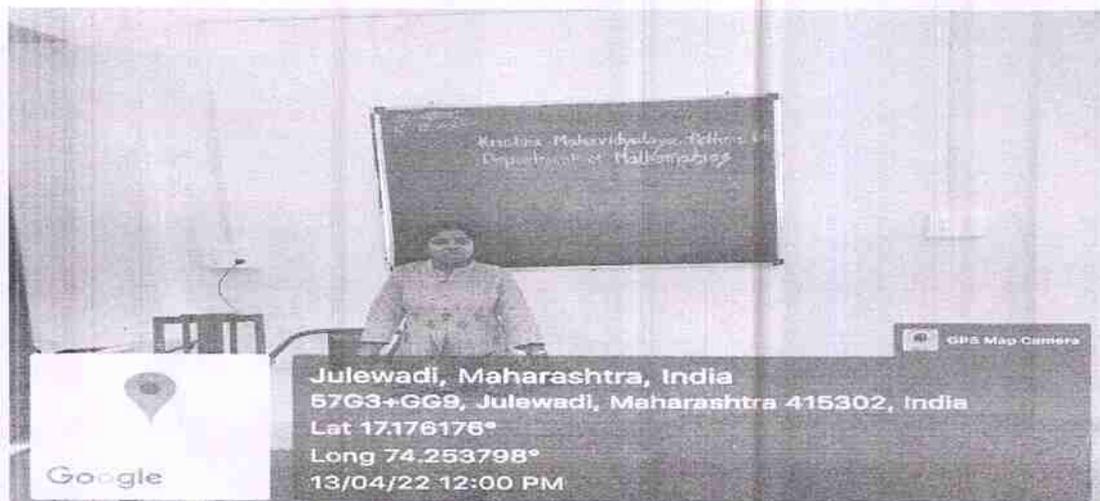
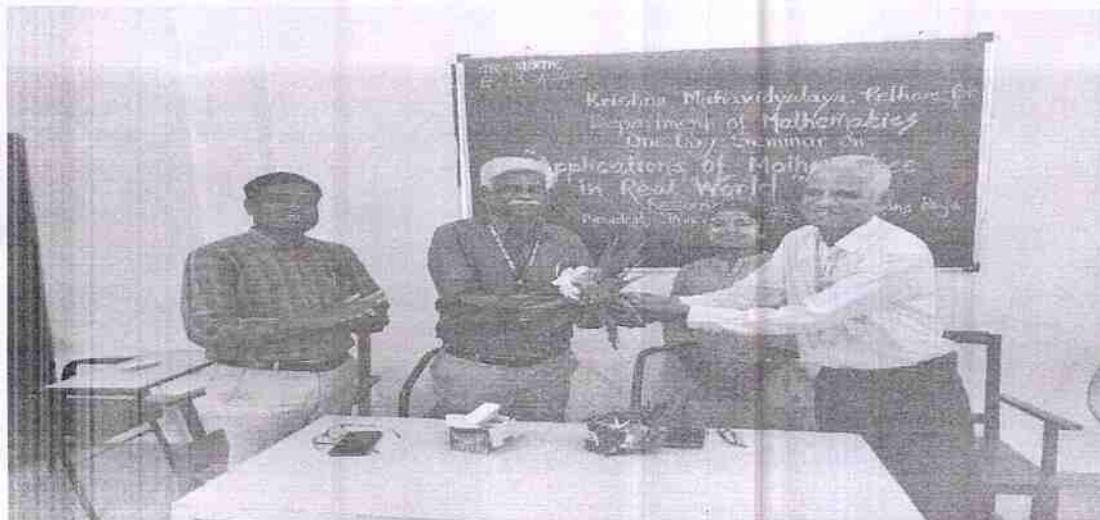
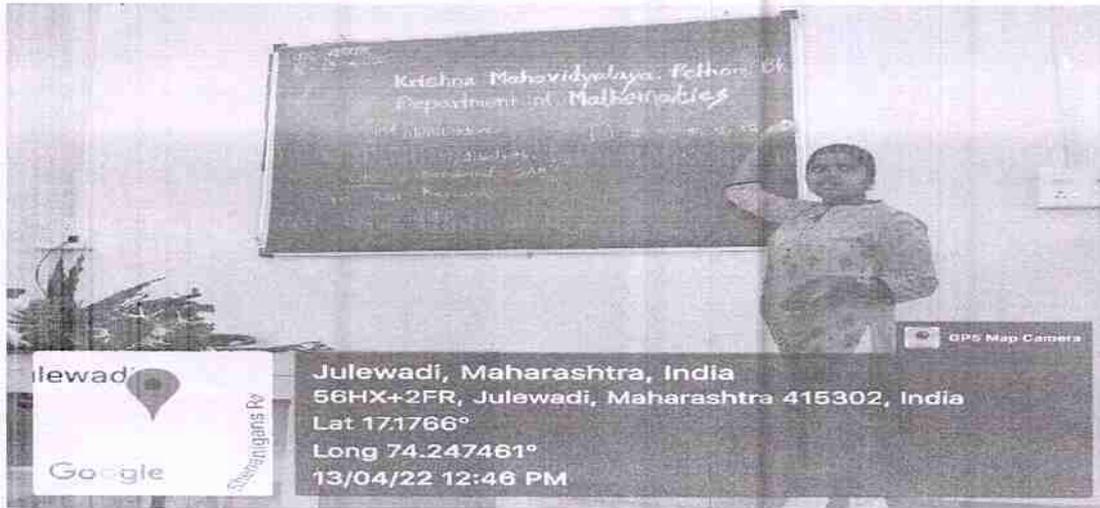
Dr. C.B. Salunkhe

PRINCIPAL
KRISHNA MAHAVIDYALAYA
RETHARE (BK.), TAL. KARAD

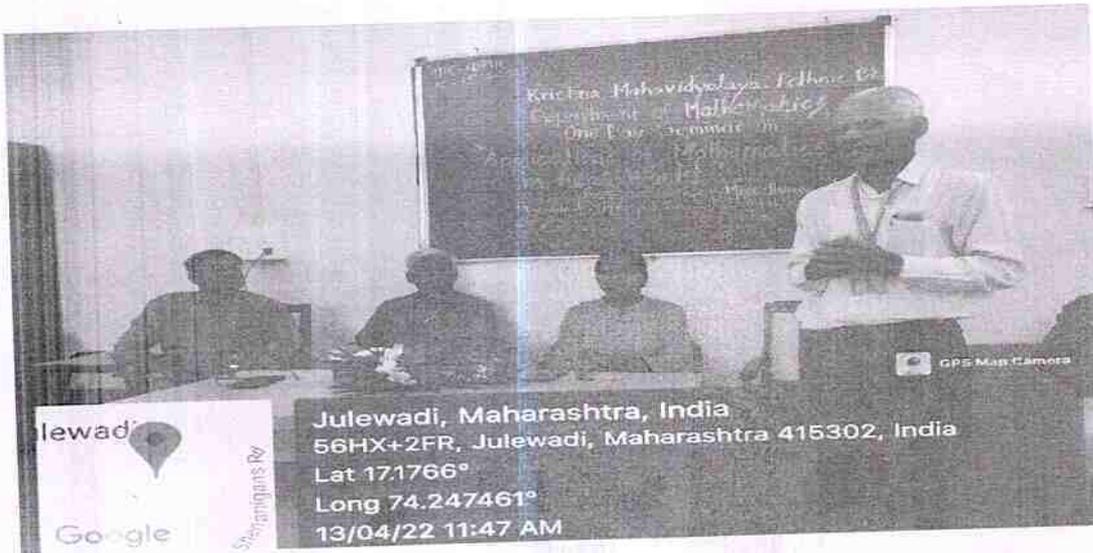
One day seminar on "Applications of Mathematics in Real World".

Date: 13/04/2022

Resource Person: Prof. Miss. Humane P. P.



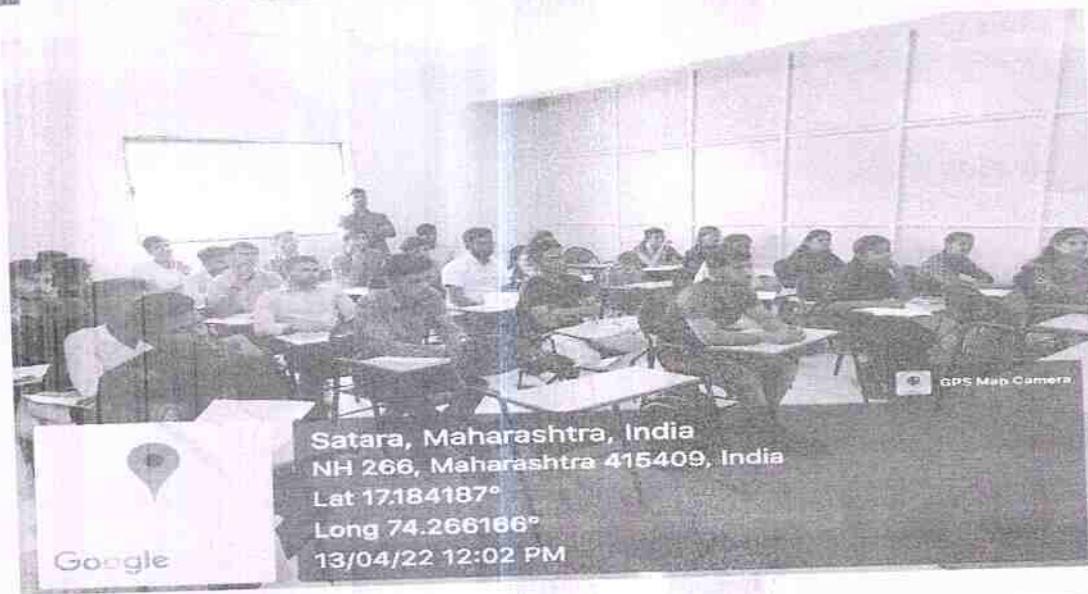

Head of Dept. of Mathematics
Krishna Mahavidyalaya Pethare B.



Julewadi

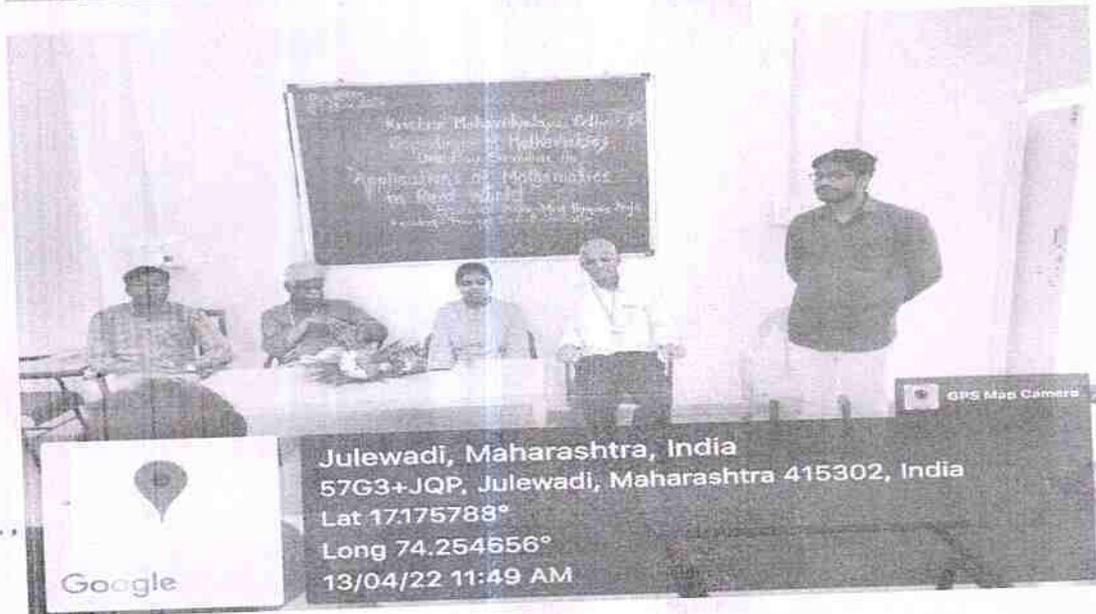
 Google

Julewadi, Maharashtra, India
 56HX+2FR, Julewadi, Maharashtra 415302, India
 Lat 17.1766°
 Long 74.247461°
 13/04/22 11:47 AM



Google

Satara, Maharashtra, India
 NH 266, Maharashtra 415409, India
 Lat 17.184187°
 Long 74.266166°
 13/04/22 12:02 PM

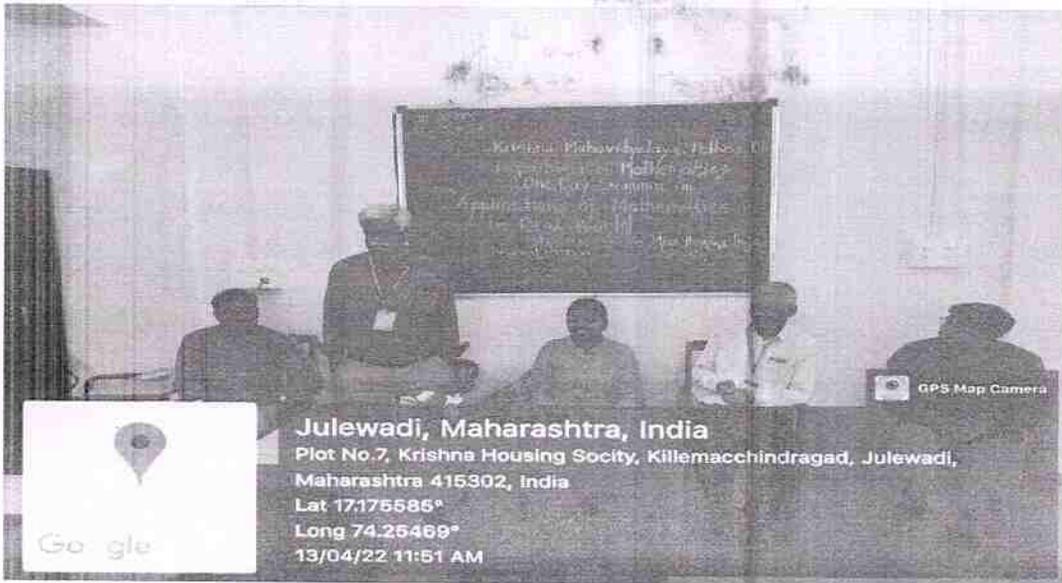


Google

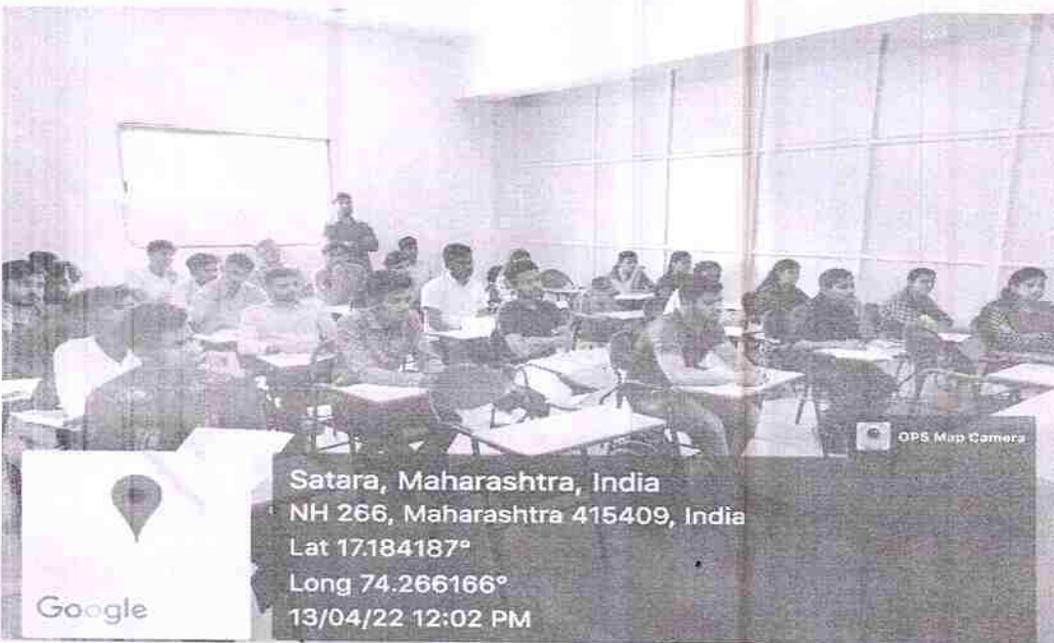
Julewadi, Maharashtra, India
 57G3+JQP, Julewadi, Maharashtra 415302, India
 Lat 17.175788°
 Long 74.254656°
 13/04/22 11:49 AM

...
 ...
 ...

Head of Dept. of Mathematics
 Krishna Mahavidyalaya Kethare Bt



Julewadi, Maharashtra, India
Plot No.7, Krishna Housing Society, Killemacchindragad, Julewadi,
Maharashtra 415302, India
Lat 17.175586°
Long 74.26489°
13/04/22 11:51 AM



Satara, Maharashtra, India
NH 266, Maharashtra 415409, India
Lat 17.184187°
Long 74.266166°
13/04/22 12:02 PM

[Handwritten Signature]
Head of Dept. of Mathematics
Krisna Mahavidyalaya's Rechare Ba

Krishna Mahavidyalaya, Rethare Bk

IQAC 2021-2022

ACTIVITY REPORT
MATHEMETICS DEPARTMENT/ COMMITTEE/ FACULTY

IQAC ACTIVITY No: 03

NAME OF THE ACTIVITY: Certificate Course in Operation Research			
DATE	FACULTY	DEPARTMENT/COMMITTEE	COORDINATOR NAME
02/12/2021 to 18/12/2021	Mr. H. V. Patil , Mr. M. J. Kale Miss Sawant R S, Mr. Tawade S S & Miss Sawant R S	Mathematics	Mr. . H. V. Patil
TIME	VENUE	NUMBER OF PARTICIPANTS	NATURE:
09.00 a.m. to 11.00 a.m.	Department of Mathematics	18	Outdoor/Indoor Indoor
SUPPORT/ASSISTANCE:			

BRIEF INFORMATION ABOUT THE ACTIVITY (CRITERION NO. -):

TOPIC/SUBJECT OF THE ACTIVITY	Certificate Course in Operation Research
OBJECTIVES	Student should able to find the optimum or best solution for decision making kept in mind with limited resources
METHODOLOGY	Lectures and tests
OUTCOMES	This course helps the students to understand to takes the decision for solving problems involving the operations of the system to give a solution that is in the best interest of the organization.

PROOFS & DOCUMENTS ATTACHED (Tick mark the proofs attached):

1. Notice & Letters	2. Student list	3. Activity report	4. Photos -	5. Feedback form -
6. Feedback analysis =	7. News clip with details -	8. Certificate -	9. Any other -	

IQAC CELL ACTIVITY NUMBER:

NAME OF TEACHER & SIGNATURE	NAME OF HEAD/ COMMITTEE INCHARGE & SIGNATURE	VISE PRINCIPALS SIGNATURE	IQAC COORDINATOR (SEAL & SIGNATURE)
-----------------------------	--	---	-------------------------------------

H. V. Patil
Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Principal
Krishna Mahavidyalaya, Rethare Bk
Tal. Karad : 415 108 (MS)

IQAC, Coordinator,
KRISHNA MAHAVIDYALAYA,
Rethare Bk; Shivnagar - 415108
Tal. Karad, Dist. Satara

Krishna Mahavidyalaya, Rehtare Bk.

Department of Mathematics

Activity Report 2021 - 22

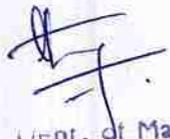
'Certificate Course in Operation Research'

Department of mathematics introduce a Certificate Course in Operation Research for B. Sc. Mathematics students from 02/12/2021 to 18/12/2021 with limited twenty students on first come first serve basis. Total 18 students are enrolled for this course.

The main objective of this course Operation Research (OR) is to find the optimum or best solution for decision making kept in mind with limited resources. On successful completion of this course the students should be able to make better decisions in complex scenarios by the application of a set of advanced analytical methods. Also, they will learn how to enhancing daily operations, fair comparison building a high-level strategy and smoother inventory planning and management.

In this course Mr. H. V. Patil, Miss Sawant R. S., Mr. Tawade S. S. and Mr. Kale M. J. from Department of Mathematics and Statistics has participated as a resource person and completed prescribed syllabus by delivering their respective lectures. Total 18 students are participated in this course. This course helps the students to create an interest in studying Mathematics easily and inspires their desire for learning more and more of the subject. Also helps them to understand to takes the decision for solving the problems involving the operations of the system to give a solution that is in the best interest of the organization.




Dept. of Mathematics
Krishna Mahavidyalaya Rehtare Bk.

Krishna Mahavidyalaya, Rethare Bk
Department of Mathematics

Title Of Course: Certificate Course in Operation Research

Duration: Twelve Working Days

Course Objective: The main objective of course Operation Research (OR) is to find the optimum or best solution for decision making kept in mind with limited resources

Course Outcomes: On successful completion of this course the students should be able to make better decisions in complex scenarios by the application of a set of advanced analytical methods

Course Syllabus:

Unit 1: Introduction to Operation Research

- 1.1 Operation Research – Quantitative approach to Decision Making
- 1.2 The History of Operations Research
- 1.3 Nature of Significance of Operations Research
- 1.4 Features of Operations Research
- 1.5 Operations Research: Some Definitions

Unit 2: Linear Programming: Applications and Model Formulation

- 2.1 Introduction
- 2.2 Structure of Linear Programming Model
- 2.3 Advantages of Linear Programming Model
- 2.4 Limitations of Linear Programming Model
- 2.5 Applications Areas of Linear Programming

Unit 3: Linear Programming: The Graphical Method

- 3.1 Introduction
- 3.2 Important Definitions
- 3.3 Graphical Solution Methods of LP Problem

Unit 4: Transportation Problem

- 4.1 Introduction
- 4.2 Mathematical Model of Transportation Problem
- 4.3 The Transportation Method
- 4.4 Methods for Finding Initial Solution

Unit 5: Assignment Problem

- 5.1 Introduction



5.2 Mathematical Statement of the Problem

5.3 Solution Methods of Assignment Problem

5.4 Variations of the Assignment Problem

References:

1. J. K. Sharma: Operation Research – Theory and Applications, Macmillan India Ltd.
2. Sharma S.D., Operation Research -Theory Methods and Applications Kedarnath, Ramnath Meerut, Delhi Reprint 2015.
3. Mohan, C. and Deep, Kusum, Optimization Techniques, New Age ,2009.




Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare BK


PRINCIPAL
KRISHNA MAHAVIDYALAYA
RETHARE (BK.), TAL. KARAD

Date:22-11-2021

Krishna Mahavidyalaya, Rethare Bk
Department of Mathematics and Statistics

2021-22

NOTICE

Department of mathematics and statistics is going to organize the certificate course in Operation Research. for limited B.Sc . Students in the first week of December 2021. Please enrolled your names on or before 30-11-2021.



Head,
Department of Mathematics
Krishna Mahavidyalaya, Rethare Bk.



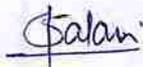


Principal,

Krishna Mahavidyalaya, Rethare Bk.

PRINCIPAL
KRISHNA MAHAVIDYALAYA
RETHARE (BK.), TAL. KARAD

B.sc I

 Salani

B.sc II



B.sc III

 Salani

Krishna Mahavidyalaya, Rethare Bk
Department of Mathematics and Statistics

2021-22

List of enrolled students for certificate course in Operation Research

Sr.No.	Name of students	Sign of students
1	Vaishnavi Hanmant bhatke	<u>V.Bhatke</u>
2.	Mohite Nikita Vilas	<u>N.Mohite</u>
3.	Shikalgar fardin Hajarutali	<u>Shikalgar</u>
4.	Pawar Arun Kumar	<u>Arun Pawar</u>
5.	Hadmode Aniket Prakash	<u>Aniket Hadmode</u>
6)	Patel Wasim Kadir	<u>Wasim Patel</u>
7)	Patel Afsohaidar salim	<u>Afsohaidar Patel</u>
8)	Mane Harshad Vijay	<u>Harshad Mane</u>
9)	Zele Ritesh Dattatray	<u>R.D. Zele</u>
10)	om Shivaji chavan	<u>Om Chavan</u>
11)	salunkhe shruti shashikant	<u>Shruti Salunkhe</u>
12)	Chavan kajal Rajesh	<u>Kajal Chavan</u>
13)	chavan pratiksha kiran	<u>Pratiksha Chavan</u>
14)	Jagtap Rehanika subhash	<u>Rehanika Jagtap</u>
15)	Pawar Sairaj Shivaji	<u>Sai Pawar</u>
16)	Salunkhe Pratik Prakash	<u>P. Salunkhe</u>
17)	Gabhule Akshada dilip	<u>A. Gabhule</u>
18)	Patil Revan Prakash	<u>Revan Patil</u>



Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Krishna Mahavidyalaya, Rethare Bk

Department of Mathematics

Certificate Course in Operation Research 2021-22

Schedule of course

Sr. No	Name of faculty	Date	Time	Topic
1.	Mr. Patil H. V	02/12/2021	9.00 a.m. to 11.00 a.m.	Unit-1: Introduction to Operation Research Unit-2: Linear programming: Applications and model formulation
		03/12/2021	9.00 a.m. to 11.00 a.m.	
		04/12/2021	9.00 a.m. to 11.00 a.m.	
2.	Mr. Kale M. J	06/12/2021	9.00 a.m. to 11.00 a.m.	Unit-2: Linear programming: Applications and model formulation Unit-3: Linear programming: The graphical method
		07/12/2021	9.00 a.m. to 11.00 a.m.	
		08/12/2021	9.00 a.m. to 11.00 a.m.	
		09/12/2021	9.00 a.m. to 11.00 a.m.	
3.		10/12/2021	9.00 a.m. to 10.00 a.m.	Course test
4.	Miss. Sawant R. S	11/12/2021	9.00 a.m. to 11.00 a.m.	Unit-4: Transportation problem
		13/12/2021	9.00 a.m. to 11.00 a.m.	
		14/12/2021	9.00 a.m. to 11.00 a.m.	
5.	Mr. Tawade S. S	15/12/2021	9.00 a.m. to 11.00 a.m.	Unit-4: Assignment problem
		16/12/2021	9.00 a.m. to 11.00 a.m.	
		17/12/2021	9.00 a.m. to 11.00 a.m.	
6.		18/12/2021	9.00 a.m. to 10.00 a.m.	Course test




Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

Krishna Mahavidyalaya Rethare Bk.

Department of Mathematics & Statistics

Certificate Course in Operation Research 2021-22

Attendance Sheet

Dates: 02/12/2021 to 18/12/2021

Time: 09.00 a.m. to 11.00 a.m

Roll No.	Name of the students	02/12/2021	03/12/2021	04/12/2021	06/12/2021	07/12/2021	08/12/2021	09/12/2021	10/12/2021	11/12/2021	13/12/2021	14/12/2021	15/12/2021	16/12/2021	17/12/2021	18/12/2021
1	Miss Bakale V. H.	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB	VBK/AB
2	Miss Mohite .N.V.	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB	SMO/AB
3	Mr. Shikalagar F.H.	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB	SHI/AB
4	Mr. Pawar .A.K.	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB
5	Mr. Hadmode A. P.	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB	HAD/AB
6	Mr. Patel. W.K	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB	WKP/AB
7	Mr. Mane H.V.	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB	MAN/AB
8	Mr. Zale R. D.	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB	ZAL/AB
9	Mr. Chavan O.S.	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB
10	Mr. Patel A.S.	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB
11	Miss Salunkhe S. S.	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB
12	Miss Chavan K. R.	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB
13	Miss Chavan P. K.	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB	CHA/AB
14	Miss Jagtap P. S.	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB	JAG/AB
15	Mr. Pawar S. S.	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB	PAW/AB
16	Mr. Salunkhe P. P.	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB	SAL/AB
17	Miss. Gabhale A.D.	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB	GAB/AB
18	Mr. Patil R.P.	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB	PAT/AB



Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk

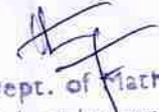
Krishna Mahavidyalaya, Rethare Bk.
Department of Mathematics & Statistics
Certificate Course in Operation Research 2021-22

Marklist

Total Marks 10 +10 = 20

Sr.No.	Name of student	Course Test 1 10/12/2021	Course Test 2 18/12/2021
1	Miss. Bakale V. H.	05	05
2	Miss. Mohite N.V.	05	05
3	Mr. Shikalagar F.H.	07	06
4	Mr. Pawar A.K.	09	07
5	Mr. Hadmode A. P.	08	07
6	Mr. Patel W.K.	06	05
7	Mr. Mane H.V.	06	06
8	Mr. Zale R. D.	06	05
9	Mr. Chavan O.S.	05	05
10	Mr. Patel A.S.	04	05
11	Miss. Salunkhe S.S.	05	07
12	Miss. Chavan K. R.	07	07
13	Miss. Chavan P. K.	08	08
14	Miss. Jagtap P.S.	06	07
15	Mr. Pawar S.S.	07	08
16	Mr. Salunkhe P.P.	08	07
17	Miss. Gabhale A.D.	07	07
18	Mr. Patil R.P.	08	07




Head of Dept. of Mathematics
Krishna Mahavidyalaya Rethare Bk.



SHETAKARI SHIKSHAN PRASARAK MANDAL'S

KRISHNA MAHAVIDYALAYA, RETHARE BK.



CERTIFICATE

Operation Research

This is to certify that, ~~Mr.~~Miss

Bakale Vaishnavi Hanwant.

participated and successfully completed certificate course in "Operation Research" organized by Department Of Mathematics and Statistics held on 2nd December 2021 to 18th December 2021 at Krishna Mahavidyalaya, Rethare Bk.

S. S. Tawade

Mr. S. S. Tawade

Co-Ordinator

Department Of Statistics

M. J. Kale

Mr. M. J. Kale

Co-Ordinator

Department Of Mathematics

H. V. Patil

Mr. H. V. Patil

Head

Department Of Mathematics

C. B. Salunkhe

Dr. C. B. Salunkhe

Principal

Krishna Mahavidyalaya, Rethare Bk.



SHETAKARI SHIKSHAN PRASARAK MANDAL'S

KRISHNA MAHAVIDYALAYA, RETHHARE BK.



CERTIFICATE

Operation Research

This is to certify that, *Mr./Miss*

Mohite Nikita Vitas

participated and successfully completed certificate course in "Operation Research" organized by Department Of Mathematics and Statistics held on 2nd December 2021 to 18th December 2021 at Krishna Mahavidyalaya, Rethare Bk.

Mr. S.S. Tawade

Co-Ordinator

Department Of Statistics

Mr. M.J. Kale

Co-Ordinator

Department Of Mathematics

Mr. H.V. Patil

Head

Department Of Mathematics

Dr. C.B. Salunkhe

Princippal

Krishana Mahavidyalaya, Rethare Bk.



SHETAKARI SHIKSHAN PRASARAK MANDAL'S
KRISHNA MAHAVIDYALAYA, RETHARE BK.



CERTIFICATE

Operation Research

This is to certify that, Mr./Miss Shikshakar Jyoti Hejari participated and successfully completed certificate course in "Operation Research" organized by Department Of Mathematics and Statistics held on 2nd December 2021 to 18th December 2021 at Krishna Mahavidyalaya, Rethare Bk.

 Mr. S.S. Tawade Co-Ordinator	 Mr. M.J. Kale Co-Ordinator	 Mr. H.V. Patil Head	 Dr. C.B. Salunkhe Principal
Department Of Statistics	Department Of Mathematics	Department Of Mathematics	Krishana Mahavidyalaya, Rethare Bk.



SHETAKARI SHIKSHAN PRASARAK MANDAL'S

KRISHNA MAHAVIDYALAYA, RETHARE BK.



CERTIFICATE

Operation Research

This is to certify that, Mr./Miss Paar Arun Sumar

participated and successfully completed certificate course in "Operation Research" organized by Department Of Mathematics and Statistics held on 2nd December 2021 to 18th December 2021 at Krishna Mahavidyalaya, Rethare Bk.



Mr. S.S. Tawade

Co-Ordinator

Department Of Statistics



Mr. M.J. Kale

Co-Ordinator

Department Of Mathematics



Mr. H.V. Patil

Head

Department Of Mathematics



Dr. C.B. Salunkhe

Principal

Krishna Mahavidyalaya, Rethare Bk.



Krishna Mahavidyalaya, Rethare Bk

Department of Mathematics

Certificate Course in Operation Research 2021-22

Course Test No. – 1

06
10

Date: 10/12/2021

Name of Student: Mane Hareshad Vijay

Email: hvms5454@gmail.com

Sign of student: Hareshad

Total Marks: 10

PRN No: 2021064363

Mob. No: 9390255454

Sign of supervisor: Mane

Instructions:

1. All Questions are compulsory.
2. Each questions Carries one Mark.

Que.1) Operation Research Approach is

- a) Multi-disciplinary
- b) intuitive
- c) Scientific
- d) all of the above

Que.2) Operation Research analysts do not

- a) Predict future operations
- b) Build more than one model
- c) Collect relevant data
- d) Recommend decision and accept

Que.3) For analyzing a problem, decision – makers should normally study

- a) Its qualitative aspects
- b) Its quantitative aspects
- c) Both a) and b)
- d) Neither a) and b)

Que.4) Decision variables are

- a) Controllable
- b) Uncontrollable
- c) Parameters
- d) None of the above

Que.5) Constraints is an LP model represents

- a) Limitations.
- b) Requirements.
- c) Balancing limitations and requirements.

d) All of the above.

Que.6) non-negativity condition is an important component of LP model because

- a) Variables value should remain under the control of decision-maker.
- b) Value of variables make sense and correspond to real-world problems.
- c) Variables are interrelated in terms of limited resources.
- d) None of the above.

Que.7) Before formulating a formal LP model, it is better to

- a) Express each constraint in words.
- b) Express the objective function in words.
- c) Decision variables are identified verbally.
- d) All of the above.

Que.8) If two constraints do not intersect in the positive quadrant of the graph, then

- a) The problem is infeasible.
- b) The solution is unbounded.
- c) one of the constraints is redundant.
- d) None of the above.

Que.9) Constraints in LP problems are called active if they

- a) Represent optimal solution.
- b) At optimality do not consume all the available resources.
- c) Both of a) and b).
- d) None of the above.

Que.10) the solution space (region) of an LP problem is unbounded due to

- a) An incorrect formulation of the LP model.
- b) Objective function is unbounded.
- c) Neither a) nor b).
- d) Both a) and b).





Krishna Mahavidyalaya, Rethare Bk

Department of Mathematics

Certificate Course in Operation Research 2021-22

06
10

Course Test No. – 1

Date: 10-12-2021

Name of Student: Patel Wasim Kadir.

Email: rooney6026@gmail.com

Sign of student: Wasim

Total Marks: 10

PRN No: 2020057497.

Mob. No: 7071764904.

Sign of supervisor: Wasim

Instructions:

1. All Questions are compulsory.
2. Each questions Carries one Mark.

Que.1) Operation Research Approach is

- a) Multi-disciplinary
- b) intuitive
- c) Scientific
- d) all of the above

Que.2) Operation Research analysts do not

- a) Predict future operations
- b) Build more than one model
- c) Collect relevant data
- d) Recommend decision and accept

Que.3) For analyzing a problem, decision – makers should normally study

- a) Its qualitative aspects
- b) Its quantitative aspects
- c) Both a) and b)
- d) Neither a) and b)

Que.4) Decision variables are

- a) Controllable
- b) Uncontrollable
- c) Parameters
- d) None of the above

Que.5) Constraints is an LP model represents

- a) Limitations.
- b) Requirements.
- c) Balancing limitations and requirements.

d) All of the above.

Que.6) non-negativity condition is an important component of LP model because

- a) Variables value should remain under the control of decision-maker.
- b) Value of variables make sense and correspond to real-world problems.
- c) Variables are interrelated in terms of limited resources.
- d) None of the above.

Que.7) Before formulating a formal LP model, it is better to

- a) Express each constraint in words.
- b) Express the objective function in words.
- c) Decision variables are identified verbally.
- d) All of the above.

Que.8) If two constraints do not intersect in the positive quadrant of the graph, then

- a) The problem is infeasible.
- b) The solution is unbounded.
- c) one of the constraints is redundant.
- d) None of the above.

Que.9) Constraints in LP problems are called active if they

- a) Represent optimal solution.
- b) At optimality do not consume all the available resources.
- c) Both of a) and b).
- d) None of the above.

Que.10) the solution space (region) of an LP problem is unbounded due to

- a) An incorrect formulation of the LP model.
- b) Objective function is unbounded.
- c) Neither a) nor b).
- d) Both a) and b).





Krishna Mahavidyalaya, Rethare Bk
Department of Mathematics
Certificate Course in Operation Research 2021-22
Course Test No. - 2

06
10

Date: 18/12/2021

Name of Student: Shikalgar Fardin Hajaratali

Email: fardinhajaratali@gmail.com

Sign of student: Shikalgar

Total Marks: 10

PRN No: 2021053428

Mob. No: 9356910244

Sign of supervisor: SP. Vaidya

Instructions:

1. All Questions are compulsory.
2. Each questions Carries one Mark.

Q.1) The initial solution of a transportation problem can be applying any know method. However, the only condition is that

- a) The solution be optimal.
- b) The rim conditions are satisfied.
- c) The solution not be degenerate.
- d) All of the above.

Q.2) The dummy source or destination in a transportation problem is added to

- a) Satisfy rim conditions.
- b) Prevent solution from becoming degenerate.
- c) Ensure that total cost does not exceed a limit.
- d) None of the above.

Q.3) The occurrence of degeneracy while solving a transportation problem means that

- a) Total supply equals total demand.
- b) The solution so obtained is not feasible.
- c) The few allocations become negative.
- d) None of the above.

Q.4) An alternative optimal solution to a minimization transportation problem exists whenever opportunity cost corresponding to unused route of transportation is:

- a) Positive and greater than zero.
- b) Positive with at least one equal to zero.
- c) Negative with at least one equal to zero.
- d) None of the above.

Q.5) One disadvantage of using North-West corner Rule to find initial solution to the transportation problem is that

- a) It is complicated to use.
- b) It does not take into account cost of transportation.
- c) It leads to a degenerate initial solution.
- d) All of the above.

Q.6) Maximization assignment problem is transformed into a minimization problem by

- a) Adding each entry in a column from the maximum value in that column.
- b) Subtracting each entry in a column from the maximum value in that column.
- c) Subtracting each entry in the table from the maximum value in that table.
- d) Any one of the above.

Q.7) If there were n workers and n jobs there would be

- a) $n!$ solutions.
- b) $(n-1)!$ Solutions.
- c) $(n!)^n$ solutions.
- d) n solution.

Q.8) An assignment problem can be solved by

- a) Simplex method.
- b) Transportation method.
- c) Both a) and b)
- d) None of the above.

Q.9) For a salesman who has to visit n cities, following are the ways of his tour plan

- a) $n!$
- b) $(n+1)!$
- c) $(n-1)!$
- d) n

Q.10) The assignment problem

- a) Requires that only one activity be assigned to each resource.
- b) Is a special case of transportation problem.
- c) Can be used to maximize.
- d) All of the above.





Krishna Mahavidyalaya, Rethare Bk
Department of Mathematics
Certificate Course in Operation Research 2021-22
Course Test No. - 2

Date: 18/12/2021

Name of Student: Pawar Sairaj Shivaji

Email: saipawar0983@gmail.com

Sign of student: Sairaj

Total Marks: 10

PRN No: 2021053395

Mob. No: 9765320160

Sign of supervisor: S. J. Pawar

Instructions:

1. All Questions are compulsory.
2. Each questions Carries one Mark.

Q.1) The initial solution of a transportation problem can be applying any know method. However, the only condition is that

- a) The solution be optimal.
- b) The rim conditions are satisfied.
- c) The solution not be degenerate.
- d) All of the above.

Q.2) The dummy source or destination in a transportation problem is added to

- a) Satisfy rim conditions.
- b) Prevent solution from becoming degenerate.
- c) Ensure that total cost does not exceed a limit.
- d) None of the above.

Q.3) The occurrence of degeneracy while solving a transportation problem means that

- a) Total supply equals total demand.
- b) The solution so obtained is not feasible.
- c) The few allocations become negative.
- d) None of the above.

Q.4) An alternative optimal solution to a minimization transportation problem exists whenever opportunity cost corresponding to unused route of transportation is:

- a) Positive and greater than zero.
- b) Positive with at least one equal to zero.
- c) Negative with at least one equal to zero.
- d) None of the above.

Q.5) One disadvantage of using North-West corner Rule to find initial solution to the transportation problem is that

- a) It is complicated to use.
- ✓ b) It does not take into account cost of transportation.
- c) It leads to a degenerate initial solution.
- ✓ d) All of the above.

Q.6) Maximization assignment problem is transformed into a minimization problem by

- a) Adding each entry in a column from the maximum value in that column.
- ✓ b) Subtracting each entry in a column from the maximum value in that column.
- c) Subtracting each entry in the table from the maximum value in that table.
- ✓ d) Any one of the above.

Q.7) If there were n workers and n jobs there would be

- ✓ a) $n!$ solutions.
- b) $(n-1)!$ Solutions.
- c) $(n!)^n$ solutions.
- ✓ d) n solution.

Q.8) An assignment problem can be solved by

- a) Simplex method.
- b) Transportation method.
- ✓ c) Both a) and b)
- ✓ d) None of the above.

Q.9) For a salesman who has to visit n cities, following are the ways of his tour plan

- a) $n!$
- ✓ b) $(n+1)!$
- ✓ c) $(n-1)!$
- ✓ d) n

Q.10) The assignment problem

- ✓ a) Requires that only one activity be assigned to each resource.
- b) Is a special case of transportation problem.
- ✓ c) Can be used to maximize.
- ✓ d) All of the above.

