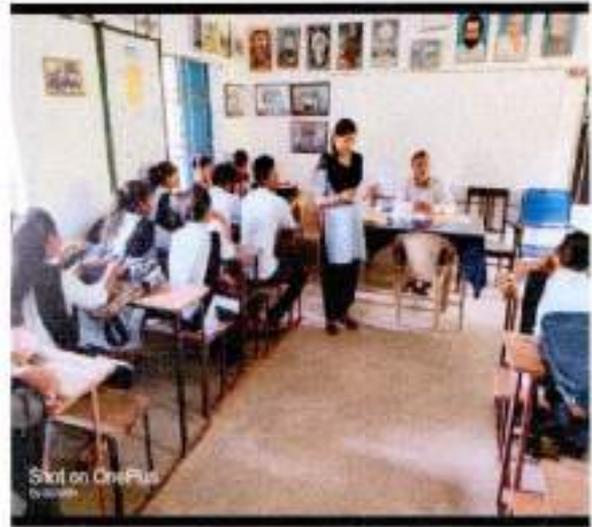




Help Desk Programme of Department of Odia



Student seminar by Department of Odia



Extra classes, Department of Odia



Help Desk Programme, Department of Economics



Power point presentation, department of Education



Help Desk Programme, Department of Education

Dr S. K. Palha
8/2/21

IQAC Co-ordinator
Pattamundai College



Group Discussion, Department of Economics



Extempore by students



Post Office Visit, Department of Commerce



Practical, Department of Zoology



Bank Office Visit, Department of Economics



Practical, Department of Chemistry

S.K. Pradhan
Dr S.K. Pradhan
8/12/21

IQAC Co-ordinator
Pattamundai College

JAM 2020 SCORECARD

JOINT ADMISSION TEST FOR M.Sc.

Indian Institute of Technology Kanpur



CANDIDATE'S DETAILS



Name : **RANJIT KUMAR PRADHAN**

Registration Number : **CY605A339**



CANDIDATE'S PERFORMANCE

Test Paper (Code)	Number of Candidates Appeared in Test Paper	Marks Scored (out of 100)	All India Rank
Chemistry (CY)	16687	30.0	1549

CUT-OFF MARKS*

	GEN/GEN-EWS	OBC (NCL)	SC/ST/PwD
Chemistry (CY)	16.96	15.26	8.48

* A candidate is considered in the merit list if the marks scored are greater than or equal to the cut-off marks mentioned for the category, for which a valid category certificate, if applicable, is to be produced along with this scorecard.

30-March-2020

Digital Signature: 4ccDe22e41948c25a99a9c248eb9f378

Prof. Sanjeev Garg
Organizing Chairperson, JAM 2020
on behalf of JAM-AB

- Candidates should note that being on the merit list of any test paper neither guarantees nor entitles one to admission at IITs and IISc.
- Candidates who are in the merit list of JAM 2020 can apply for admission to programs to which they are eligible only in the academic year 2020-21 at IITs and IISc.
- For admission to various programs, the candidates in the merit list have to submit admission form ONLINE at the JAM Online Application Processing System website (<https://joaps.iitk.ac.in>) between 09-April-2020 and 22-April-2020 with all the relevant documents. There is NO need to send a hard copy of the admission form/documents. Only those applications that are complete in all respects and have been properly submitted/uploaded within the stipulated time and date will be considered.
- Upon applying, offers will be made to candidates based on the order of merit, the candidate's choice(s) and the number of seats available at the admitting institute(s). Those candidates have to satisfy the Eligibility Requirements (ERs) and Minimum Educational Qualifications (MEQs) of the programme(s) of the admitting institute(s). The fulfillment of ER & MEQ is decided by the department offering the programme and the prerogative to accept/reject the candidate remains with the department.
- For latest updates on ER, MEQ and other admission related information, candidate must refer to the JAM 2020 portal website, <https://jam.iitk.ac.in/>, and the Information Brochure available there.
- The authenticity of the contents of this Scorecard may be verified with the GATE-JAM Office, IIT Kanpur, Kalyanpur, Kanpur, Uttar Pradesh 208016, till July 03, 2020.
- Information given in this Scorecard should not be used by any person/institute without prior permission of the GATE-JAM Office, IIT Kanpur, Kalyanpur, Kanpur, Uttar Pradesh 208016.

IQAC Co-ordinator
Pattamundai College



NATIONAL TESTING AGENCY

Excellence in Assessment

E-certificate No.: 20D/21J02957

University Grants Commission



ज्ञान-विज्ञान विमुक्तये



NATIONAL ELIGIBILITY TEST FOR ASSISTANT PROFESSOR

NTA Ref. No: 210510409570

Roll No: OR05001028



REKHA SETHI
22-02-2021

Certified that REKHA SETHI

Son/Daughter of JHUNA SETHI

and CHANDRAKANTA SETHI

has qualified

the UGC-NET for eligibility for Assistant Professor held on 24-11-2021

for December 2020 and June 2021 (merged session) in the subject

Economics / Rural Economics /Co-operation / Demography / Development Planning/ Development Studies / Econometrics/ Applied

Economics/Development Eco./Business Economics

As per information provided by the candidate, he/she had completed/appeared or was pursuing his/her Master's degree or equivalent examination in the related subject at the time of applying for UGC-NET.

The date of eligibility for Assistant Professor is the date of declaration of UGC-NET result, i.e., 19-02-2022, or the date of completion of Master's degree or equivalent examination with required percentage of marks within two years from the date of declaration of UGC-NET result, i.e. by 18-02-2024, whichever is later.

This is an electronic certificate only, its authenticity and category in which the candidate had appeared should be verified from National Testing Agency (NTA) by the institution/appointing authority. This electronic certificate can also be verified by scanning the QR Code.

The validity of this electronic certificate is forever.

Date of issue: 12-03-2022

Subarashar
12/3/22

IOA Senior Director, NTA
Pattanamundai College

Note: NTA has issued the electronic certificate on the basis of information provided by the candidate in his/her online Application Form. The appointing authority should verify the original records/certificates of the candidate while considering him/her for appointment, as the NTA will not be liable for any false information provided by the candidate. The NTA is only responsible for the result which can be verified from the repository available in the website of NTA (ugcnet.nta.nic.in). The candidate must fulfil the minimum eligibility conditions as laid down in the notification for UGC-NET.



NATIONAL TESTING AGENCY

Excellence in Assessment

E-certificate No: JUN20U01976

University Grants Commission



ज्ञान-विज्ञान विमुक्तये



NATIONAL ELIGIBILITY TEST FOR ASSISTANT PROFESSOR

NTA Ref. No: 200510719266

Roll No: OR0550800174



Certified that SADHANA SUBHADARSHINI TARAI

is/are Daughter of BHARATI TARAI

and PARSURAM TARAI

has qualified

the UGC-NET for eligibility for Assistant Professor held on 30th September, 2020 in the subject ECONOMICS/ RURAL ECONOMICS/ CO-OPERATION/ DEMOGRAPHY/ DEVELOPMENT PLANNING/ DEVELOPMENT STUDIES/ ECONOMETRICS/ APPLIED ECONOMICS/ DEVELOPMENT ECONOMICS/ BUSINESS ECONOMICS

As per information provided by the candidate, he/she had completed/appeared or was pursuing his/her Master's degree or equivalent examination in the related subject at the time of applying for UGC-NET

The date of eligibility for Assistant Professor is the date of declaration of UGC-NET result, i.e. 30th November, 2020, or the date of completion of Master's degree or equivalent examination with required percentage of marks within two years from the date of declaration of UGC-NET result, i.e. by 29th November, 2022, whichever is later.

This is an electronic certificate only, its authenticity and category in which the candidate had appeared should be verified from National Testing Agency (NTA) by the institution/appointing authority. This electronic certificate can also be verified by scanning the QR Code.

The validity of this electronic certificate is forever.

Date of issue: 10.12.2020

Signature and stamp of J. Anand, UGC Co-ordinator, Palayamkottai College

Note: NTA has issued the electronic certificate on the basis of information provided by the candidate in his/her online Application Form. The appointing authority should verify the original records/certificates of the candidate while considering him/her for appointment, as the NTA will not be liable for any false information provided by the candidate. The NTA is only responsible for the result which can be verified from the repository available in the website of NTA (ugcnet.nta.nic.in). The candidate must fulfil the minimum eligibility conditions as laid down in the notification for UGC-NET.

Department of English
Pattamunda College, Pattamunda

Sr. No.	Name of the books	Name of the author	Year	Supplier	Rate	Particulars	Remark
01	Shriyugandharan Kavali	Kavali Lall	2018	Mr. Mishra	120.00	Born Bhatnagar PVT	
02	Konchakra	Lalla Gao	2014	Mr. Mishra	200.00	Extens University Lib	
03	-b-	"	"	Mr. Mishra	200.00	OUP	
04	Shriyugandharan Kavali	Kavali Lall	2018	Mr. Mishra	120.00	OUP	
05	-b-	"	"	Mr. Mishra	200.00	"	
06	-b-	"	"	Mr. Mishra	200.00	"	
07	-b-	"	"	Mr. Mishra	200.00	"	
08	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	Pentash Book Depot	
09	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
10	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
11	-b-	"	"	Mr. Mishra	58.00	"	
12	-b-	"	"	Mr. Mishra	58.00	"	
13	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
14	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
15	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
16	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
17	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
18	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
19	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
20	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
21	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
22	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
23	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
24	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
25	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
26	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
27	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
28	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
29	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	
30	Highway to Heaven	Edward Albert	2017	Mr. Mishra	58.00	"	

Signature
25/7/22

IOAC Co-ordinator
Pattamunda College

Sr. No.	Name of the Book	Name of the Author	Year	Subject	Page	Particulars	Remark
63	None of the Book	Dr. V. Anandha	2017	A.H. Mishra	150-20	Student Store	
64	Extensive history of India	Dr. V. Anandha	2019	"	175-20	Teaching Troupe	
65	The Creative	"	"	"	115-20	"	
66	The Love Song of J. Alfred Prufrock	S. Indrakumar Kanjumoni	2019	A.H. Mishra	40-20	Poojitha Book Dept	
67	-do-	"	"	"	40-20	"	
68	-do-	"	"	"	40-20	"	
69	-do-	"	"	"	40-20	"	
70	The Horn of the Bismarck	Poem singer variations	2019	A.H. Mishra	75-20	Manaswini	
71	-do-	"	"	"	75-20	"	
72	-do-	"	"	"	75-20	"	
73	-do-	"	"	"	75-20	"	
74	The Horn of the Bismarck	Shakti Bhatia Kanjumoni	2019	A.H. Mishra	140-20	Subject Purchase	
75	Principles of English	"	"	"	220-20	Rama Bhatia for	
76	-do-	"	"	"	220-20	"	
77	Principles of English	H. Chakrabarti	2019	A.H. Mishra	220-20	Manaswini	
78	-do-	"	"	"	220-20	"	
79	-do-	"	"	"	220-20	"	
80	-do-	"	"	"	220-20	"	
81	-do-	"	"	"	220-20	"	
82	The Creative	Dr. Kanjuman	2019	A.H. Mishra	160-20	Rama Bhatia for	
83	-do-	"	"	"	160-20	"	
84	-do-	"	"	"	160-20	"	
85	-do-	"	"	"	160-20	"	
86	The Love Song of J. Alfred Prufrock	Dr. Kanjuman	2019	A.H. Mishra	195-20	Subject Purchase	
87	-do-	"	"	"	195-20	"	
88	-do-	"	"	"	195-20	"	

[Handwritten Signature]
20/12/22

IOAC Co-ordinator
Pattamundai College

Sl. No.	Name of the Book	Name of the Author	Edition	Supplier	Price	Publisher	Remarks
92	Volpone, Don Juan	Dr. Kalyan Prasad	2008, 2016	Shri. Krishna	₹25.00	Concept Publications	
93	do	"	"	"	₹25.00	"	
94	do	"	"	"	₹25.00	"	
95	do	"	"	"	₹25.00	"	
96	do	"	"	"	₹25.00	"	
97	do	"	"	"	₹25.00	"	
98	do	"	"	"	₹25.00	"	
99	do	"	"	"	₹25.00	"	
100	do	"	"	"	₹25.00	"	
101	do	"	"	"	₹25.00	"	
102	do	"	"	"	₹25.00	"	
103	do	"	"	"	₹25.00	"	
104	do	"	"	"	₹25.00	"	
105	do	"	"	"	₹25.00	"	
106	do	"	"	"	₹25.00	"	
107	do	"	"	"	₹25.00	"	
108	do	"	"	"	₹25.00	"	
109	do	"	"	"	₹25.00	"	
110	do	"	"	"	₹25.00	"	
111	do	"	"	"	₹25.00	"	
112	do	"	"	"	₹25.00	"	
113	do	"	"	"	₹25.00	"	
114	do	"	"	"	₹25.00	"	
115	do	"	"	"	₹25.00	"	
116	do	"	"	"	₹25.00	"	
117	do	"	"	"	₹25.00	"	
118	do	"	"	"	₹25.00	"	
119	do	"	"	"	₹25.00	"	
120	do	"	"	"	₹25.00	"	

[Handwritten Signature]

IQAC Co-ordinator
Pattamundai College

Sl. No.	Name of the book	Name of the Author	Year	Pages	Price	Publisher
241	A Portrait of a King	James Joyce	2015	1	46.59	F.P. Classics
242	do	"	2015	1	46.59	"
243	The Hesperides of Homer	John Tzetzes	2015	1	179.00	"
244	do	"	2015	1	179.00	"
245	Robinson Crusoe	Daniel Defoe	2015	1	115.00	"
246	Station Engineering and Passing	Luigi Simeoni	2007	1	124.00	Pravara
247	do	"	2007	1	124.00	"
248	History of the Republic of Venice	Marco Polo	2009	1	197.00	Fourtledge
249	Interacting and Adapting to Change	Dr. J. S. Singh	2019	1	210.00	Carnegie U.P.
250	do	"	"	1	200.00	"
251	do	"	"	1	200.00	"
252	English Communication	Dr. I. Koul	2015	1	128.00	Arora's Publishing House
253	Oratorical	Richard S. Tedlow	2011	1	149.00	Penguin
254	Oratorical Exercises	Richard S. Tedlow	2011	1	149.00	Viva Book
255	do	"	"	1	149.00	"
256	Crime and Punishment	Fyodor Dostoevsky	2015	1	250.00	F.P. Classics
257	do	"	"	1	250.00	"
258	Treasure Island	R.L. Stevenson	2015	1	150.00	"
259	Trade Marking of Goods	Dr. S. Prasad	2015	1	124.00	Strategic
260	Beginning Post-Modernism	John Sallis	2015	1	300.00	Viva Book
261	do	"	2015	1	300.00	"
262	Beginning Post-Modernism	John Sallis	2015	1	300.00	"
263	do	"	"	1	300.00	"
264	18th Century Literature	Dr. S. Prasad	2019	1	200.00	Kalyani Publishers

Please to verify that number of books available in the department of the Patnamdai College, and submit the department

Purchased from A.K. Mishra
 Advertis
 Invoice No. A/2019/102/102
 Date: 12/19/2019

(3) 2019/102/102/102
 Dr. S. Prasad

[Signature]
 057912

IOAC Co-ordinator
 Patnamdai College



**BANKI (AUTONOMOUS)
COLLEGE, BANKI, CUTTACK**

CODE : 07082902, Odisha, Tel.: 06723 - 240221



P.G

Name : **BISMRUTI NAYAK**
Roll No. : **PG21ENG-006**
Father : **Biswanath Nayak**
Hon's : **P.G. English**
D.O.B. : **02-Jun-00**
B.G : **O+**
Address : **At-Arua Post-Kadaliban
Dist-Kendrapara**
Mobile : **7008280534**

A.K. Saha

Principal

Signature: 2011-12



Office of Management & Technology

Managed By: Office of Educational & Compliance

Phone: 800.451.1234 | Fax: 800.451.1234

Email: officeofcompliance@state.edu

Money Receipt

Date: 06/15/2024

Value: \$1,000.00

System ID: 123456

Bank: 4011000000000000

Name: State of Ohio

Address: 1600 Ohio Statehouse

City: Columbus, OH 43260

State: OH

Zip: 43260

Category	Amount	Balance	Balance Due
Category 1	\$1,000.00	\$1,000.00	\$0.00
Category 2	\$0.00	\$1,000.00	\$0.00
Total	\$1,000.00	\$1,000.00	\$0.00

* This receipt is not valid unless it is signed by the appropriate authority.

* If you are the recipient of this receipt, you must sign it.

* If you are the issuer of this receipt, you must sign it.



Signature

David Wilson, Director



**U.N. (AUTO.) COLLEGE OF
SCIENCE & TECHNOLOGY**

PEACHI JNANAPITHA, ADASPUR, CUTACK
STUDENT IDENTITY CARD



Name : SUBHASHMITA NAYAK

Roll No. : PGPOLSC21-021

Course : PG in Pol. Science

Session: 2021-23

PRINCIPAL

PH: 0671-2101409

Name : Sangita Sarangi

Roll No. : 21/A&AE/015

Session : 2021 - 2023

Course : P.G.

Department : A & A Economics

Sangita Sarangi
Signature of the student

Signature of the Head



VANI VIHAR, BHUBANESWAR-4

UTKAL UNIVERSITY

POST GRADUATE DEPARTMENTS





PONDICHERRY UNIVERSITY
 திண்டுச்சிப் பல்கலைக்கழகம்
 Pondicherry University

Online Payment Bill

Pondicherry University Branch
Transaction Number: WSM20297933409

Date: 27-09-2021 11:46:5

Student Name : SATYABAN ROUJ
 Application Number : 9498
 Year : 2021 - 2022
 Course : M.A. (Economics)

Fee name Amount in Rs

Tuition Fee	3000	:	:
Registration Fee	300	:	:
Matriculation Fee	100	:	:
Recognition fee	400	:	:
Sports Fund	500	:	:
Medical Examination / Facilities Fund	600	:	:
Library Fund	1500	:	:
Computer Lab Fund	2000	:	:
Amenities Development Fund	6000	:	:
Students Welfare Fund	400	:	:
Alumni Association Fund	200	:	:
Caution Deposit (Refundable)	1000	:	:
Industry Interface Fund		:	:
Advanced Lab Facility Fund		:	:
Placement Activity Fund	200	:	:
Academic Activity Fund	1000	:	:
Field Study/ Tour Fund		:	:
Group Medical Insurance	118	:	:
University Development Fund	1200	:	:
Digital Resource Fund		:	:
Digital Activity Fund	2000	:	:
Total	20518	:	:

Rupees Twenty Thousand Five Hundred and Eighteen only

Applicant's Signature : Shroff
 Manager

Call No: 9348530076

Online Payment Number 3991



Online Payment Bill

Pondicherry University Branch

Transaction Number: WUR20323896981

Date: 07-10-2021

Date:

Student Name

: BIKASH KUMAR NAYAK

Application Number

: 9501

Year

: 2021 - 2022

Course

: M.A. (Economics)

Fee names

Tuition Fee	: 3000
Registration Fee	: 300
Matriculation Fee	: 100
Recognition fee	: 400
Sports Fund	: 500
Medical Examination / Facilities Fund	: 600
Library Fund	: 1500
Computer Lab Fund	: 2000
Amenities Development Fund	: 6000
Students' Welfare Fund	: 400
Alumni Association Fund	: 200
Caution Deposit (Refundable)	: 10000
Industry Interface Fund	:
Advanced Lab Facility Fund	:
Placement Activity fund	: 200
Academic Activity Fund	: 1000
Field Study/ Tour Fund	:
Group Medical Insurance	: 118
University Development Fund	: 1200
Digital Resource Fund	:

Amount in Rs

Amount in Rs

Fee names

: 2000

Digital Activity Fund

: 20518

Total

Rupees Twenty Thousand Five Hundred and Eighteen only

Applicant's Signature Shroff Manager

Cell No: 9938568741

DIGITAL IDENTITY CARD

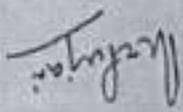


ଓଡ଼ିଶା ରାଜ୍ୟ ଉଚ୍ଚ ବିଦ୍ୟାଳୟ, ସମ୍ବଲପୁର
Odisha State Open University, Sambalpur
Sambalpur, Odisha - 768004
www.osou.ac.in



SATYABRATA PATRA

Enrollment No. : MAEC2120402
Admission Year : 2021
Programme : Master of Arts (Economics) (MAEC)
Blood Group : A+
Cell Num. : 9583183232

Issuing Authority : 



Card holder : Satyabrata Patra

ଓଡ଼ିଶା ରାଜ୍ୟ ଉଚ୍ଚ ବିଦ୍ୟାଳୟ, ସମ୍ବଲପୁର

Important Instructions
This Digital Identity Card can be produced to avail facilities provided by the University.

- The authenticity of this card can be verified by scanning the QR code.

CENTRAL UNIVERSITY OF HARYANA

(Established vide Act No. 25 (2009) of Parliament)
(NAAC Accredited 'A' Grade University)

STUDENT IDENTITY CARD

S. NO. : 361



Name : RANJIT KUMAR PRAHDAN

F. Name : GOLEKHA PRAHDAN

Programme : M.Sc.

Department: CHEMISTRY

Roll No. : 200535

D.O.B. : 10/05/2000

Authorised Signature

Holder's Signature

Valid Till

2023

Registrar

Address

At- Mugakani, PO-Junapangara
Dist-Kendrapara, Odisha-754225

Emergency No

: 977576113

D.O.B.

: 06.01.1999

Blood Group: B-vc

Registration No

: 20170402024

Department

: Chemistry

Father's Name

: Ramesh Chandra Muduli

Name

: Rahasbehari Muduli

Student Id Card



Central University of Jharkhand
(Established by an Act of Parliament of India in 2009)

Brambe, Ranchi - 835205

ଶ୍ରୀ ଚନ୍ଦ୍ର ଶର୍ମା

Admission Slip

Note: Please retain the part of the acknowledgment slip for further reference.

Acknowledgment Slip



Form Number	CS1000226
Programme	Master of Science (Chemistry)
Order Number	22085
Transaction Number	11019061913
Fee Particulars	A. SOCIETY DEPOSIT (RETURNABLE) (1000) B. ADMISSION FEE (750) C. PHYSICIAN FEE (500) D. IDENTITY CARD (60) E. MED CROSS FUND (80) F. SSC FEE (10) G. INSURANCE FEE (100) H. STUDENT WELFARE FUND (200) I. ACADEMIC FEE (50) J. UNIVERSITY MAGAZINE (100) K. LIBRARY FEE (500) L. TUITION FEE (500) M. ELECTRICAL ACTIVITIES FEE (150) N. CENTRAL ACTIVITIES FEE (75) O. COMPUTER LAB FEE (INTERNET FEE) (200) P. EXAMINATION FEE (100) Q. EXAMINATION FEE (100) R. ENVIRONMENT DEVELOPMENT FUND (150) S. MEDICAL CHARGES (120) T. SPORTS FEE (120) U. LAB FEE (INSTRUMENTAL VENTURE WORKSHOPS) (1500) V. STUDENT ACADEMIC ACTIVITIES (50)
Amount Paid	₹ 7475.00
Transaction Date	Wed Nov 10 10:27:25 IST 2021

I BHARAT SAHOO herewith acknowledge the above mentioned programme and department hereby undertake to produce the migration certificate in original and other relevant certificates as and when I am directed to submit. In case of failure to produce the same, I shall forthwith vacate the seat and shall have no claim for refund of fees etc, paid for the semester. The amount of bonding / scholarship / fellowship drawn, if any, shall also be refunded forthwith.

COMMISSION ACKNOWLEDGEMENT 2021-22 BHADRAK AUTONOMOUS COLLEGE, BHADRAK

NAME: Madhusmita Das

1st Year, Subject of: A. CHEMISTRY

Roll No: 21-A-CHEM-025

for Sign. [Signature]
23.12.21



SKCG AUTO COLLEGE, PARALAKHEMUNDI

ACKNOWLEDGEMENT

Mr/Miss NITU PARIDA

Class M.Sc. Roll No. CH-21-16 has been

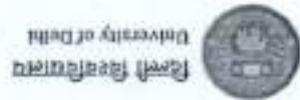
provisionally admitted to 3rd 1st Year M.Sc.

with Honours CHEM GE-1

GE-2 _____ MIL _____



Print



Acknowledgement Slip

Form Number	21CHEM1097029
Reference Number	15970/21CHEM1097029/16/2/271
Name	MIHIR KUMAR MUDULI
Email	mihir9607@gmail.com
Mobile	8018809565
Course	M.Sc. Chemistry
Department/College	Hans Raj College
Department/College Allocated	Hans Raj College
Course Fee	18304
Transaction Datetime	2021-11-30 15:42:17
Admission Status	Payment Done
Re-Allocation Status	
Applied For Re-Allocation	No
Re-Allocation Applied On	NA

Note: Please retain the print of the acknowledgement slip for further reference.

PG DEPARTMENT OF SOCIAL SCIENCE
FPA UNIVERSITY, WYASA VIHAR, BALASORE

Mr/Ms Arpita Das is admitted in MA 1st Semester of

PG Department of Social Science on 27.12.21 in Sociology with admission Roll

NR/S/550/98/2021ME/She submitted the following documents.

- 1. Intimation letter
- 2. CLC B Conduct Certificate
- 3. Caste Certificate
- 4. Disability Certificate
- 5. Anti-Ragging Affidavit
- 6. Migration Certificate

HEAD OF THE DEPARTMENT
PG DEPARTMENT OF SOCIAL SCIENCE
FPA UNIVERSITY, BALASORE, OISS.

for 6 marks
27.12.21

Students Registration, Lucknow

Aparna Das

Aparna Das



2200127526



इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय
इंदिरा गांधी, नई दिल्ली - 110068
Indira Gandhi National Open University
Maiden Garh, New Delhi - 110068



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Name : APARNA DAS

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Number : 2021/3720

of Birth : 01-05-2001

Gender : FEMALE

Group : O+

Medium : M.A. IN ENGLISH

Soumyashree Parida

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Soumyashree Parida

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Section: 12th
Roll No.: 12PH001
Page No.: 1
Date: / /

Subject: Physics
Chapter: Ray Optics and Optical Instruments
Topic: Ray Optics and Optical Instruments

Sl. No.	Q. No.	Q. Text	Ans.
1	1	Define the term 'refractive index'.	Refractive index is the ratio of the speed of light in vacuum to the speed of light in the medium.
2	2	State Snell's law of refraction.	Snell's law states that the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant for a given pair of media.
3	3	Derive the expression for the refractive index of a medium in terms of the speed of light in vacuum and in the medium.	$n = \frac{c}{v}$
4	4	Define critical angle.	Critical angle is the angle of incidence for which the angle of refraction is 90 degrees.
5	5	State the condition for total internal reflection.	Total internal reflection occurs when light travels from a denser medium to a rarer medium and the angle of incidence is greater than the critical angle.

Total Marks:	50
Time Allowed:	3 hours

Year:	2023-24
Month:	June
Day:	15
Hour:	10:00 AM
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SURENDRA KUMAR MALLIK

Roll No: MEDN4121
Course: MA EDUCATION
Blood Group: B+VE
Date of Birth: 15.03.2001

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Received from Carri Perich's Parents
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No.	Description	Rs.	Pcs.
1	Admission Fees		
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9	Cable Rental		
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11	D.M.A.		
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16	Medical Aid Fees		
17	Laboratory and simulation fees		
18	Athletic Fees		
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21	Seating Service		
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23	Magazine Charges		
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25	Chairman Fees / U.S. Establishment fees		
26	Pool Students Aid fund		
27	Practical Fees/College Music		
28	College Union		
29	Director's Club		
30	Laboratory improvement fund		
31	General Breakage		
32	Special Subsidy Fees / College, High Field		
33	Flag Day		
34	Students Club		
35	Engl.		
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QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

+3 1st YEAR ARTS (1st SEMESTER)

CORE-1

INTRODUCTORY MICRO ECONOMICS

GROUP-A

Each question carries one mark.

1. Economics is derived from ____ word.
2. ____ is the basic economic unit.
3. Economics is a _____ science.
4. Alfred Marshall gave the _____ definition of economics.
5. Who is the father of economics?
6. The book written by Adam Smith is _____.
7. A theory consists of _____.
8. _____ is an economic mode of presenting a theory.
9. Economic model consist of a set of _____.
10. Ceteris paribus is simply known as _____.
11. What is a theory?
12. What is an assumption?
13. Circular representation of data can be shown in _____.
14. _____ is an arrangement of data in chronological order.
15. Price of a good and its quantity demanded are _____ related.
16. The graphical illustration of demand schedule is called _____.
17. Demand curve is _____ sloped.
18. In law of demand Giffen goods are treated as _____ goods.
19. Pen and ink are considered to be _____ goods.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

20. The movement along the demand curve causing reduction in demand is called _____.
21. If the demand curve shifts to right, the quantity demanded _____ at any given price.
22. The law of supply shows _____ relationship between price and quantity supplied.
23. The price at which demand for and supply of goods is equal, is called _____.
24. What causes the shift of demand curve to the right?
25. What happens to demand for a good if its demand curve shifts to the left?
26. The measure of responsiveness of quantity demand to change in price is called _____.
27. The value of perfectly elasticity of demand is _____.
28. The value of perfectly inelastic demand is _____.
29. If the total expenditure spent on goods increases with fall in price, the demand is said to be _____.
30. What is shape of perfectly elastic demand?
31. What happens to total expenditure spent on a good if the elasticity of demand for that good is unit elastic?
32. Consumer surplus is closely related to the _____ curve for a product.
33. The difference between the amounts a buyer is willing to pay for a good and amount actually paid is called _____.
34. The consumer surplus _____ with lower prices.
35. The producer surplus is closely related to _____ curve.
36. What happens to producer surplus if the price of the product rises?
37. Budget constraint is applicable to _____ numbers of goods.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

38. The shape of budget line is _____.
39. _____ And _____ are given for the construction of a budget constraint.
40. The consumer purchases the combination that lies _____ the budget line.
41. If the income of the consumer increases, the budget line _____.
42. The normal shape of income consumption curve is _____.
43. The shape of the indifference curve for perfect substitute is _____.
44. The shape of the indifference curve in case of perfect complementary goods is _____.
45. Why does price line shift to the right.
46. The shape of total fixed cost curve is _____.
47. The average cost curve is _____ shape.
48. When MC is greater than AC, the AC wills _____.
49. MC equals to AC at _____ of the average cost curve.
50. Which curve is called envelop curve?
51. What is the shape of MC?
52. A firm attains equilibrium when _____.
53. When average cost is less than average revenue _____ profit is earned.
54. The shape of average revenue is _____ in perfectly competitive market.
55. In the long run _____ profit is earned.
56. Equilibrium is a state of _____.
57. The value of marginal product _____ with increase in employment of labour.
58. The value of marginal product _____ with increase in employment of labour.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

59. Marginal revenue product = marginal physical product* _____.

60. Higher price _____ the producer surplus.

GROUP-B

Each question carries two marks

Short answer type questions within two to three sentences.

1. What is opportunity cost?
2. What is theory?
3. What is a law?
4. What is production possibility frontier?
5. What is micro economics?
6. What is positive economics?
7. What do you mean by normative science?
8. Why does demand curve shift left or right?
9. What does the slope of demand curve shows us?
10. What is graph?
11. What is the relationship between price and quantity demand?
12. How can you derive market demand curve from individual demand curve?
13. What is market in economics?
14. What is stable equilibrium?
15. What is partial equilibrium?
16. What is supply price?
17. What do you mean by demand?
18. Define elasticity of demand?
19. What elasticity of demand?
20. What does unit elasticity of demand refer to?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

21. Describe arc elasticity of demand?
22. Define cross elasticity of demand?
23. What is elasticity of supply?
24. What is consumer surplus?
25. What is producer surplus?
26. How is consumer surplus measured?
27. What is budget constraint?
28. Why does the budget line slope downward?
29. What do you mean by trade-off?
30. Why does a budget line shift?
31. What is income effect?
32. What is price consumption curve?
33. What is substitution effect?
34. What does the indifference curve show?
35. What is cost function?
36. What is short run?
37. Distinguish between short-run and long-run?
38. Distinguish between fixed factor and variable factor?
39. What is the relation between average cost and marginal cost?
40. What is social cost?
41. What do you mean by accounting cost?
42. What do you mean by real cost?
43. What is implicit cost?
44. Define marginal cost?
45. What is market period?
46. What is normal profit?
47. Define perfect competition?
48. What do you mean by homogeneous goods?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

49. What is marginal physical product?

50. What is equilibrium wage rate?

GROUP-C

Each question carries three marks.

1. Write a short note on how people make decision.
2. Write a short note on the scientific method.
3. Write a short note on economist as scientist.
4. Write a short note on observation.
5. Write a short note on role of assumptions.
6. Write a short note on Economic model.
7. Write a short note on why economists disagree.
8. Write a short note on uses of graphs in economics.
9. How can you derive market demand curve from individual demand curve?
10. How is consumer surplus measured?
11. What is producer surplus?
12. What are the types of income elasticity of demand?
13. What is cross elasticity?
14. Distinguish between relatively elastic and relatively inelastic demand?
- 15.
16. Distinguished between short-run and long-run?
17. State the properties of Indifference curve?
18. State two extreme example of indifference curves with diagrams?
19. What is price effect?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

20. What is income effect?
21. Distinguished between fixed factor and variable factor?
22. What is the relation between average cost and marginal cost?
23. What is the use of mathematics in economics?
24. Distinguish between contraction of demand and decrease in demand?
25. Why does supply curve shift to the right?
26. What is substitution effect?
27. Distinguish between perfectly elastic and perfectly inelastic demand?
28. What is producer surplus?
29. How is consumer surplus measured through demand curve?
30. How is consumer surplus measured?
31. What is budget constraint?
32. Why does the budget line slope downward?
33. What do you mean by trade-off?
34. Why does a budget line shift?
35. What is deadweight loss?
36. Why does indifference curve slope downward from left to right?
37. What is price effect?
38. What is the effect of change in prices of two goods on budget line?
39. What is marginal rate of substitution?
40. What is an inferior good?
41. What do mean by Giffen's good?
42. Distinguish between budget line and budget constraint?
43. Distinguish between fixed cost and variable cost?
44. Why does average cost take the shape of U shape?
45. State the relation ship between average cost and marginal cost?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

46. Distinguish between fixed and variable cost?
47. What is shutdown point?
48. Show the short run marginal cost curve of a competitive firm?
49. What is the condition for long run equilibrium under perfect competition?
50. What do you mean by external economies?
51. What are the factors responsible for shift in the labour supply curve?
52. What are the factors responsible for shift in the labour demand curve?
53. Why the labour supply curve is backward bending?
54. What do you mean by marginal productivity?

GROUP-D

Each question carries 7 marks

1. How do people make decisions? Describe four principles on decision-making made by the people.
2. Describe the subject matter of economics in detail.
3. What is assumption? What is its role in economic theory?
4. What is demand? What are the factors influencing demand?
5. Why does demand curve slope downward?
6. What is price elasticity of demand? What are the factors influencing elasticity of demand?
7. How can the elasticity of demand be measured by arc elasticity measure?
8. What is consumer surplus? How can it be measured?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

9. What is producer surplus? How can it be measured?
10. Describe the application of consumer surplus and producer surplus on the efficiency of the cost of a tax?
11. What do you mean by indifference curve? Describe its properties?
12. Describe the consumer's equilibrium through indifference curve?
13. Describe the Slutsky's method of substitution effect.
14. What is income effect? Discuss nature and properties for normal and inferior goods.
15. How can you describe work-leisure relationship through indifference curve?
16. Show that price effect is the combination of income effect and substitution effect?
17. Why long run average cost curve is U shaped?
18. Make an analysis of worker choice between leisure and money income.
19. Describe the Neo-classical version of marginal productivity theory.
20. Show the shut down point of the firm. Explain why firms shut down?



+3 1st YEAR ARTS (1st SEMESTER)

CORE-2

METHEMETICAL METHODS FOR ECONOMICS-I

GROUP-A

Fill in the blanks. (Each question carries one mark)

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

1. A null set is denoted by_____.
2. A void set is denoted by_____.
3. $A \cup B = B$ _____ A .
4. If $A \subset B$, then $A \cap B =$ _____.
5. If $A \subset B$, then $A \cup B =$ _____.
6. $A \cup U =$ _____.
7. _____ is regarded as the father of set theory.
8. The Venn diagram was introduced by_____.
9. Relation sets are obtained from_____.
10. $Y = x + 5$ is a_____ function.
11. $Y = x^a$ is a _____ function.
12. $Y = 3x^2 + 2x + 4$ is a_____ function.
13. A function is said to be_____ function when two or more elements of its domain are related to one elements of its codomain.
14. A function is said to be_____ function when no elements of its codomain is related with more than one element of its domain.
15. A function is said to be_____ function when all the elements of its domain are associated with a single element of its codomain.
16. A function that is obtained by interchanging the order pairs of a one-one onto function is called an inverse function.
17. A function that is directly expressed in terms of independent variable is called _____ function.
18. A function in which each elements of its domain corresponds to itself is called _____ function.
19. $\lim_{x \rightarrow \infty} \frac{1}{x} =$ _____.
20. $\lim_{x \rightarrow 0} e^x =$ _____.
21. Differentiation of a constant function is_____.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

22. Differential coefficient of $e^x =$ _____.
23. Differential coefficient of $a^x =$ _____.
24. Differential coefficient of $\log e^x =$ _____.
25. Differential coefficient of $x^4 + 4x =$ _____.
26. If total cost is $C = x^2 - 5x^2 + 31x$, then marginal cost will be_____.
27. If total cost is $C = x^3 - 2x^2 + 43x$, then average cost will be_____.
28. The first order partial derivatives of the function $2x^2 + 5xy - y^3$ w.r.t X is_____.
29. The first order partial derivatives of the function $2x^2 + 5xy - y^3$ w.r.t Y is_____.
30. In case of substitute commodity, the value of cross elasticity of demand will be_____.
31. In case of complementary commodity, the value of cross elasticity of demand will be_____.
32. A matrix consists of one element only is called _____ matrix.
33. A matrix that appears with equal number of rows and columns is called_____ matrix.
34. A diagonal matrix in which all the leading diagonal elements are equal is called_____ matrix.
35. A square matrix in which all the leading diagonal elements are unity and all other elements are zeroes is called a_____ matrix.
36. If $AXA' = I$, then A is _____ matrix.
37. _____ is a numerical value or expression associated with a square matrix.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

38. The determinant of a matrix is same as the determinant of its _____.
39. If any row or column of the determinant consist of zeroes only the value of the determinant becomes _____.
40. If any two row or column of the determinant are identical then the value of the determinant becomes _____.
41. A square matrix with a non-zero matrix is called _____ matrix.
42. A square matrix A is said to be _____ if $|A|=0$.
43. Determinant of the matrix $\begin{bmatrix} 8 & 5 \\ 1 & 6 \end{bmatrix}$ is _____.
44. Rank of the matrix $\begin{bmatrix} 6 & 9 \\ 2 & 3 \end{bmatrix}$ is _____.
45. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is an example of _____ matrix.
46. _____ is the M_{21} of $\begin{bmatrix} 9 & 8 \\ 12 & 5 \end{bmatrix}$.
47. C_{12} of $\begin{bmatrix} -5 & -8 \\ -4 & -12 \end{bmatrix}$ is _____.
48. The matrix A is idempotent if: $A \times A =$ _____.
49. An adjoint matrix is the of the cofactor matrix

GROUP-B

Each question carries 2 marks

1. What do you mean by cardinality of a set?
2. What is void set?
3. What is valid set?
4. What is finite set?
5. What is infinite set?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

6. What is singleton set?
7. What is multitone set?
8. What is equal set?
9. What is equivalent set?
10. What is disjoint set?
11. Set of all colleges of Odisha, explain this set by descriptive method?
12. Set of odd numbers between 5 and 50, explain this set by descriptive method?
13. Set of even numbers between 1 and 45, explain this set by descriptive method?
14. Set of natural numbers between 1 and 100, explain this set by descriptive method?
15. By using suitable example prove that $A - (B \cup C) = (A - B) \cap (A - C)$
16. By using suitable example prove that $A - (B \cap C) = (A - B) \cup (A - C)$
17. What is reflexive relation?
18. What is symmetric relation?
19. What is order relation?
20. What is binary relation?
21. What is inverse relation?
22. Represent the function $f(x) = 3 + 2x$ by means of the appropriate graph?
23. Represent the function $f(x) = x^2 + 5$ by means of the appropriate graph?
24. Represent the function $f(x) = \frac{3+2x}{2}$ by means of the appropriate graph?
25. Find inverse of the function $f(x) = 3x - 1$
26. Find inverse of the function $y = 5x^3$
27. What is function?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

28. What is image?
29. What is pre-image?
30. Write short note on Radix?
31. Write short note on Normalisation?
32. Write short note on fractional number?
33. Write short note on mixed number?
34. Write short note on floating point representation?
35. Convert the binary no. $(111)_2$ into decimal equivalent?
36. Convert the binary no. $(1101)_2$ into decimal equivalent?
37. Convert 54 into its binary equivalent?
38. Convert 5455 into its binary equivalent?
39. Convert 550 into its binary equivalent?
40. Convert 3565 into its binary equivalent?
41. What is onto function?
42. What is into function?
43. What is one one function?
44. What is many one function?
45. What is constant function?
46. What is discontinuous function?
47. What is even function?
48. What is odd function?
49. What is composite function?
50. What is exponential function?
51. What is polynomial function?
52. What is rational function?
53. What is irrational function?
54. What is monotonic function?
55. What is parametric function?

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

56. Define limit of a function?

57. Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 4}$

58. Define continuity of a function?

59. Find if the function $\frac{x^2 - 9}{x - 3}$ is discontinuous at $x = 3$

60. What is differential coefficient?

61. What is differentiation?

62. State the product rule of differentiation?

63. State the quotient rule of differentiation?

64. State the chain rule of differentiation?

65. Find the differential coefficients of $\frac{1}{x^3}$ with respect to x ?

66. Find the differential coefficients of $\frac{1}{\sqrt{x}}$ with respect to x ?

67. Find the differential coefficients of $\log_5 x$ with respect to x ?

68. Find the differential coefficients of e^{-x} with respect to x ?

69. Find the differential coefficients of $x^3 e^x$ with respect to x ?

70. Find the differential coefficients of $2x + 3^2$ with respect to x ?

71. Find the differential coefficients of $\frac{1}{\log_x 7}$ with respect to x ?

72. Find average and marginal cost from the total cost function $C = x^2 - 5x^2 + 31x$

73. What is homogeneous function?

74. Find the first order partial derivatives of the function $2x^2 + 5xy - y^3$.

75. Find the first order partial derivatives of the function $\log(x^2 + y^2)$

76. Find the first order partial derivatives of the function $\frac{x^2 + y^2}{x^2 + y}$

77. Find the first order partial derivatives of the function $(5x + 4y)^3$

78. Find the first order partial derivatives of the function \sqrt{xy}

79. Find the first order partial derivatives of the function e^{x^y}

QUESTION BANK

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80. Find the four second order partial derivatives of the function $f(x,y) = 2x^2y^3$
81. Find the four second order partial derivatives of the function $f(x,y) = 2x^3 - 5xy + y^3$
82. Find the partial elasticities $Z = x^2e^y$
83. Determine the price elasticity of demand for the function $x = 32 - 4p - p^2$ where $p=3$.
84. Determine the price elasticity of demand for the function $p = \frac{k}{x}$ where $k > 0$.
85. What is null matrix?
86. What is singleton matrix?
87. What is scalar matrix?
88. What is identity matrix?
89. What is triangular matrix?
90. What is diagonal matrix?
91. What is minor?
92. What is cofactor?
93. What is orthogonal matrix?
94. What is symmetric matrix?
95. What is singular matrix?
96. What is non-singular matrix?
97. Define determinant of a matrix?
98. State any three properties of determinant?
99. What is rank of a matrix?
100. Find determinant of $A = \begin{bmatrix} 12 & -6 \\ 7 & 9 \end{bmatrix}$

QUESTION BANK

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GROUP-C

Each question carries 3 marks

1. What is subset?
2. What is super set?
3. What is proper set?
4. What is power set?
5. What is Universal set?
6. What is complementary set?
7. What is overlapping set?
8. What is cartesian set?
9. What is proper subset?
10. By using suitable example prove that $A - (A - B) = A \cap B$
11. By using suitable example prove that $A' - B' = B - A$
12. By using suitable example prove that $A \cap (B - C) = (A \cap B) - (A \cap C)$
13. By using suitable example prove that $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$
14. What is anti-symmetric relation?
15. What is transitive relation?
16. What is equivalence relation?
17. Represent the function $f(x) = x^2 + 5$ by means of the appropriate graph?
18. Represent the function $f(x) = \frac{3+2x}{2}$ by means of the appropriate graph?
19. Find inverse of the function $f(x) = 3x - 1$
20. Find inverse of the function $y = 5x^3$
21. Define domain of a function?
22. Define co-domain of a function?

QUESTION BANK

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23. Define range of a function?
24. Convert the binary no. $(10111)_2$ into decimal equivalent?
25. Convert the binary no. $(101010)_2$ into decimal equivalent?
26. What is inverse function?
27. What is explicit function?
28. What is implicit function?
29. What is continuous function?
30. Evaluate $\lim_{x \rightarrow 1} \frac{x^4 - 81}{x - 3}$
31. Evaluate $\lim_{x \rightarrow \infty} \frac{x - 2}{x + 1}$
32. Find if the function $\frac{x^2 - 9}{x - 3}$ is discontinuous at $x = 3$
33. Find if the function $\frac{x^2 - 4}{x - 2}$ is continuous at $x = 2$
34. Show that $f(x) = (x^2 + 3x + 4)$ is continuous at $x = 1$
35. State the chain rule of differentiation?
36. Find the differential coefficients of e^{ax+b} with respect to x ?
37. Find the differential coefficients of $e^x \log x$ with respect to x ?
38. Find the differential coefficients of $\frac{x^3}{x^3 + 2}$ with respect to x ?
39. Find the differential coefficients of $x \cdot e^x$ with respect to x ?
40. Find the differential coefficients of $\frac{13}{1 - 5x}$ with respect to x ?
41. Find the differential coefficients of $(5 - 2x)^6$ with respect to x ?
42. Find the differential coefficients of $\sqrt{5 - 2x}$ with respect to x ?
43. Find the differential coefficients of 2^{x^3} with respect to x ?
44. Find the differential coefficients of 3^{e^x} with respect to x ?
45. Find the differential coefficients of x^x with respect to x ?
46. Find the differential coefficients of x^{e^x} with respect to x ?

QUESTION BANK

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47. Determine the price elasticity of demand for the function $x = 32 - 4p - p^2$ where $p=3$.

48. Determine the price elasticity of demand for the function $p = \frac{k}{x}$ where $k > 0$.

49. Determine the price elasticity of demand for the function $x = \frac{27}{p^3}$.

50. Determine the price elasticity of demand for the function $p = \frac{10}{(x+1)^2}$.

51. Find average and marginal cost from the total cost function $C = x^3 - 3x^2 + 15x$.

52. Find the four second order partial derivatives of the function $f(x,y) = 2x^3 - 5xy + y^3$

53. Find the four second order partial derivatives of the function $f(x,y) = \log(x^2y^3)$

54. Find the four second order partial derivatives of the function $f(x,y) = xe^{xy} - y^2$

55. What is scalar matrix?

56. What is identity matrix?

57. What is singular matrix?

58. State any three properties of determinant?

59. What is rank of a matrix?

60. Find inverse of the matrix $\begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$

61. Find the product of BA where, $A = \begin{bmatrix} -2 & 1 & 3 \\ 2 & -4 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 3 & 1 \\ 0 & -1 \\ 2 & 4 \end{bmatrix}$

62. Find adjoint of the matrix $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$

63. Solve the following linear equations by the method of matrix $3x + 11y = 7$
and $6x + 22y = 5$.

QUESTION BANK

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64. Determine rank of the following matrix $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 4 & 5 \\ 3 & 6 & 6 \end{bmatrix}$

65. Solve the following linear equations by using Cramer's rule $4x+3y=8$ and $6x+7y=17$.

GROUP-D

Each question carries 7 marks

1. If A and B are two sets then Prove that $(A \cup B) = (B \cup A)$
2. If A, B and C are three sets then Prove that $(A \cup B) \cup C = A \cup (B \cup C)$
3. If A, B and C are three sets then Prove that $(A \cap B) \cap C = A \cap (B \cap C)$
4. If A and B are two sets then Prove that $(A \cap B) = (B \cap A)$
5. If A, B and C are three sets then Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
6. If A, B and C are three sets then Prove that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
7. If A and B are two sets then Prove that $(A \cup B)' = A' \cap B'$ (De Morgan's law-I)
8. If A and B are two sets then Prove that $(A \cap B)' = A' \cup B'$ (De Morgan's law-II)
9. If A, B and C are three sets then Prove that $A - (B \cap C) = (A - B) \cup (A - C)$
10. Write down the limit theorems involving two functions?
11. Find the domain and range of the functions (I) $Y = \frac{1}{X}$ (II) $Y = \sqrt{4 - X}$,
 $Y \geq 0$ (III) $Y = \frac{1}{X-1}$

QUESTION BANK

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12. Prove that $Y = 7X^6 + 3X^4 - 2X^2 + 4$ IS an even function.
13. A Publishing house finds that the cost of production directly attributed to each book is Rs.30 and that the fixed cost are Rs.15000. If each book can be sold for Rs.45, then determine ;(I) the cost function (II) the revenue function (III) the profit function (IV) the break even point.
14. Prove that $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ where $a > 0$
15. Prove that $\lim_{x \rightarrow 0} e^x = 1$
16. Evaluate $\lim_{x \rightarrow 0} \frac{5x^3 - 6}{\sqrt{9 + 4x^2}}$
17. Determine whether the function is continuous or not at $X=2$, $f(X) = x^2 - 4x + 3$
18. Show that the $f(x) = 3x^2 = 4x - 5$ is continuous at $x=3$. Also prove that $f(x)$ is continuous for all value of X .
19. Find the differential coefficient of the following functions (I) $(x^2 + 5)^{3/2}$ (II) $\log[(5-2x)(5+3x)]$.
20. Find the derivative of the following functions; (I) x^{x^2}
(II) $(\log x)^x$
21. Determine the fourth order derivative of the function $y = \log \sqrt{3x + 4}$
22. Determine the price elasticity of demand for the function, $x = 32 - 4p - p^2$ where $p=3$.
23. Determine the price elasticity of demand for the function $x = \frac{27}{p^3}$ where x is the demand for goods at p price.
24. Determine the price elasticity of demand in terms of x for the function $p = \frac{10}{(x+1)^2}$
25. A firm with linear demand function can sell 1000 units when the price is Rs.4 per unit, and 1500 units when the price is Rs2 per unit/ On the given

QUESTION BANK

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premises determine (I) the demand function (II) the total revenue function (III) the average revenue function and (IV) the marginal revenue function.

26. Explain the relationship between average cost and marginal cost by using derivative?

27. Examine the average and marginal cost relations when the total variable cost is $C = x^3 - 3x^2 + 15x$.

28. Show that the elasticity of dem, and is equal to $\frac{AR}{AR-MR}$ under the linear demand law $p = a + bx$

29. Verify Euler's theorem when $z = x^2 + y^2$

30. Verify Euler's theorem when $z = \frac{x^3+y^3}{xy}$

31. The demand function for the two commodities are given as $x_1 = \frac{-p_1}{p_2}$ and $x_2 = \frac{p_1^2}{p_2}$, where p_1 and p_2 are prices and x_1 and x_2 denotes the quantities of the two commodities respectively. Shows that the two commodities are substitute of one another.

32. If $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 5 & 0 \end{bmatrix}$ verify that $(AB)' = B'A'$

33. What is determinant? Explain the properties of determinant.

34. Prove that $\begin{vmatrix} x+a & b & c \\ c & x+b & a \\ a & b & x+c \end{vmatrix} = 0$

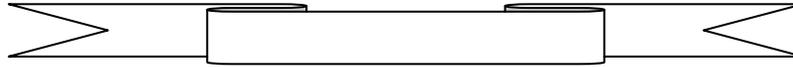
35. Solve the following system of equations by using Cramer's rule $3x - 4y + 5z = -6$, $X + Y - 2Z = -1$, $2X + 3Y + Z = 5$

36. Find inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$

QUESTION BANK

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37. Solve the following equation by matrix method $X+Y+2Z=4$, $2X-Y+3Z=9$, $3X-Y-Z=2$



+3 1ST YEAR ARTS (2ND SEMESTER)

CORE-3

INTRODUCTORY MACRO ECONOMICS

GROUP-A

Each question Carries 1 mark

1. _____ had classified economics into two branches such as micro economics and macroeconomics.
2. _____ theory is that part of economics which studies the overall average and aggregates of the system.
3. _____ deals with the functioning of the economy as a whole.
4. The famous book 'General theory of Employment, Interest and Money' was written by _____.
5. The famous book 'General theory of Employment, Interest and Money' was published in the year _____.
6. The say's law of market state that _____ creates its own demand.
7. _____ is the combination of inflation and unemployment.
8. A _____ is a quantity measured at a particular point of time.
9. A _____ is a quantity measured over a specified period of time.

QUESTION BANK

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10. _____ refers to that position in which all units of an economy are in equilibrium.
11. _____ refers to that position of equilibrium which is concerned with the equilibrium of a single economic unit.
12. Net indirect tax = Indirect tax - _____.
13. Market price = Factor cost + Indirect tax - _____.
14. GNP = GDP + _____.
15. NNP at market price = GDP at market price - _____
+ _____.
16. NNP at factor cost is also known as _____.
17. Personal income = _____ - corporate saving – corporate tax.
18. Disposable personal income = Personal income - _____.
19. _____ method is also known as value added method.
20. National income identity in a two-sector economy requires Investment must be equal to _____.
21. National income identity in a three-sector economy requires Investment plus Government expenditure must be equal to _____.
22. National income identity in a four-sector economy requires $I+G+(X-M)$ = _____.
23. A _____ is an outflow or withdrawal of income from the circular flow.
24. According to _____ money is what money does.
25. The paper notes and coins are called _____.
26. _____ assets is an assets that can be easily exchanged for goods and services.
27. The direct exchange of economic goods for one another is called _____.

QUESTION BANK

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28. When money takes the form of a commodity with intrinsic value it is called _____.
29. _____ is money that cannot be redeemed for anything other than that a replica of itself.
30. Time deposits, Bill of exchange, Treasury bills etc are example of _____ money.
31. Debit cards, Credit cards are example of _____ money.
32. _____ are those coins whose face value is more than intrinsic value.
33. The book ‘Purchasing power of money’ was written by _____.
34. The transaction approach of quantity theory money was put forward by _____.
35. The modern quantity theory money was given by _____.
36. The liquidity theory of money was given by _____.
37. According to Keynes the transaction demand for money is a function of _____.
38. The speculative demand for money is a function of _____.
39. At a low rate of interest demand for money become perfectly elastic, this situation is called _____.
40. Currency with the public + Bank reserve = _____.
41. _____ is the ratio of change of money supply to the change in High powered money.
42. There is a _____ relation between value of money and price level.
43. A persistent and appreciable rise in general price level is called _____.
44. According to _____ “Inflation is unjust, deflation is inexpedient, of the two perhaps deflation is worse”.

QUESTION BANK

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45. _____ represent inverse relationship between rate of unemployment and rate of changes in wage rate.
46. The shape of long run phillips curve is _____.
47. _____ implies absence of involuntary unemployment.
48. The principle of effective demand was given by _____.
49. _____ is the logical starting point of keynesian theory of employment.
50. _____ is determined at the level where aggregate demand is equal to aggregate supply
51. The ratio of consumption to income is called _____.
52. The ratio of change in consumption to change in income is called _____.
53. $APC + APS =$ _____.
54. $MPC + MPS =$ _____.
55. If MPC is 0.75, value of the multiplier will be _____.
56. The psychological law of consumption was given by _____.
57. Induce investment is a function of _____.
58. The concept of multiplier was first developed by _____.
59. Employment multiplier was given by _____.
60. Investment multiplier was given by _____.

GROUP-B

Each question carries 2 marks.

1. What is economic static?
2. Define comparative static.
3. Define stock.
4. Define equilibrium.

QUESTION BANK

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5. What is partial equilibrium?
6. What is GNP?
7. Define NDP at factor cost.
8. What is private income?
9. Define money.
10. Define near money.
11. What Fisher's equation?
12. Give Cambridge equation.
13. What do you mean by value of money?
14. Define inflation.
15. What is hyper inflation?
16. What is suppressed inflation?
17. What is full employment?
18. What is MPC?
19. What is MPS?
20. What is APC?
21. What is Multiplier?
22. What do you mean by induced investment?
23. What is aggregate demand?
24. What is forward multiplier?
25. What is marginal propensity to save?
26. What is investment demand schedule?
27. What is token money?
28. What is say's law?
29. What is budget?
30. What is unbalance budget?
31. What is consumption function?
32. What do you mean by financial investment?

QUESTION BANK

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33. What do you mean by autonomous investment?
34. What do you mean by net investment?
35. Define value addition.
36. What is meant by problem of double counting?
37. Write any two conceptual difficulties faced in the estimation of national income.
38. What is green accounting?
39. Why saving treated as leakage in a circular flow model?
40. Mention any two characteristics of money.
41. What is primary function of money?
42. Define cost push inflation.
43. What is meant by demand pull inflation?
44. What is the meaning of laissez-faire policy?
45. Explain voluntary unemployment.
46. What do you mean by ex-ante saving?
47. What do you mean by ex-post saving?
48. What is aggregate supply?
49. What do you mean by effective demand?
50. What do you mean by real investment?

GROUP-C

Each question carries three marks

1. Explain the scope of macroeconomics?
2. What are the limitations of macroeconomics?
3. Distinguish between micro and macroeconomics.
4. Define economic dynamics.

QUESTION BANK

DEPARTMENT OF ECONOMICS, PATTAMUNDAI COLLEGE, PATTAMUNDAI

5. Define the concept of flow.
6. What is general equilibrium?
7. Define GDP at market price.
8. What is meant by net national product at factor cost?
9. What is personal income?
10. Distinguish between GDP and GNP.
11. Define intermediate goods.
12. What is meant by problem of double counting?
13. Write three conceptual difficulties faced in the estimation of national income.
14. What is green accounting?
15. Why saving treated as leakage in a circular flow model?
16. Mention main characteristics of money.
17. What is primary function of money?
18. What is secondary function of money?
19. What is contingency function of money?
20. Define outside money.
21. Define inside money.
22. Define fiat money.
23. What is limited legal tender money?
24. Define full-bodied money.
25. What is velocity of money?
26. What is an Index Number?
27. Define wholesale price index.
28. Define consumer price index.
29. Define cost of living index
30. Mention the characteristics of index number.
31. What is meant by simple index number?

QUESTION BANK

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32. Define wage induced inflation.
33. What is profit push inflation?
34. What are the measures to control inflation?
35. Define demonetisation.
36. What do you mean by stagflation?
37. What is inflationary gap?
38. Define cost push inflation.
39. What is meant by demand pull inflation?
40. What is the meaning of laissez-faire policy?
41. Explain voluntary unemployment.
42. What do you mean by ex-ante saving?
43. What do you mean by ex-post saving?
44. What is aggregate supply?
45. What do you mean by effective demand?
46. What do you mean by real investment?
47. What is the difference between induced and autonomous investment?
48. What is difference between ex-ante saving and ex-post saving?
49. What is dynamic multiplier?
50. Distinguish between expansionary and contractionary fiscal policy.

GROUP-D

Each question carries 7 marks

1. What do you mean by macroeconomics? Discuss the importance and limitation of macroeconomics.

QUESTION BANK

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2. Distinguish between micro and macroeconomics. Discuss the salient features and limitation of macroeconomics.
3. Define macroeconomics. Explain the scope and limitations of macroeconomics.
4. What is meant by economic static, comparative static and economic dynamics?
5. What do you mean by concept of equilibrium? Explain its significance in economic analysis.
6. Explain briefly the main concepts of national income. State their interrelationship with each other.
7. Explain concept of domestic product. Distinguish between gross domestic product and gross national product.
8. What do you mean by national income? What are the various conceptual and statistical problems faced while estimating national income?
9. Define gross national product. Discuss the product and income method of calculating gross national product. Would the estimate be equal by either method?
10. Explain the interrelationship between products or value added, income generation and expenditure method of national income accounting.
11. Explain in brief the product method of measurement of national income. Mention the difficulties involved in the use of product method of measurement of national income.
12. Explain in brief the methods of measurement of national income. What are the difficulties in the measurement of national income?
13. Explain diagrammatically the circular flow of income and product in two sector model.
14. Explain the circular flow of income in a three sector economy with the help of a diagram.

QUESTION BANK

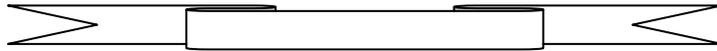
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15. Explain circular flow of income in four sector model.
16. Distinguish between real flows and money flows. Explain and illustrate with the help of a diagram.
17. What is meant by better system of exchange? Explain its merits and demerits.
18. Money is what money does. " critically examine the statement .
19. What is money? Critically examine the statement.
20. Critically examine Fishers equation of quantity theory of money.
21. Critically examine Cambridge equation of quantity theory of money.
22. Explain Keynes fundamental equation of money and prices.
23. Would you consider cash balance approach to the value of money as superior to transaction theory? Explain.
24. What is an Index Number? What are its uses? Discuss the problems of constructing an index number.
25. Analyse the process of measuring the value of money and discuss its limitations.
26. Define inflation. What are the causes of inflation? Suggest measures to correct it.
27. Critically examine the effects of inflation on economic development.
28. Define stagflation. Suggest various measures to combat it.
29. Explain Keynesian theory of inflation. Discuss the concept of inflationary gap.
30. Explain Phillips inflation-unemployment trade off.
31. Critically examine the classical theory of employment.
32. "The full employment is a normal feature of capitalistic economy." Critically examine the statement.
33. "Supply creates its own demand." Explain the statement critically.
34. Explain the Keynesian theory of income and employment.

QUESTION BANK

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35. Explain meaning of the term propensity to consume. What are the main features or characteristics of consumption function?
36. What is marginal propensity to consume? What are its determinants?
37. State and explain Keynes psychological law of consumption along with its importance in the determination of income and employment in the economy.
38. What is meant by investment? Analyse the factors which govern the inducement to invest.
39. Discuss the significance of marginal efficiency of capital and rate of interest as determinants of investment.
40. Explain and illustrate the concept of multiplier. What is the importance of multiplier in economic analysis and economic policy?



+3 1ST YEAR ARTS (2ND SEMESTER)

CORE-4

MATHEMATICAL METHODS FOR ECONOMICS-II

GROUP-A

Each question carries 1 mark

1. The input output model was developed by_____.
2. _____ Shows the numbers of units any industry's output needed to produce one unit of another industry's output.
3. The input coefficient matrix is also called_____ matrix.

QUESTION BANK

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4. _____ Condition used to test the feasibility of an input output model.
5. In case of input output model the $[I-A]$ matrix is known as _____.
6. For the feasibility of input output model, the determinant of $[I-A]$ matrix must be _____.
7. For the feasibility of input output model, the diagonal elements of $[I-A]$ matrix must be _____.
8. In _____ model the entire production is consumed internally.
9. In _____ model there is absence of final demand sector.
10. The second order derivative of $y = 4x^2$ is _____.
11. The second order derivative of $y = \frac{1}{3x^2}$ is _____.
12. The second order derivative of $y = 5x^3 + 3x^2 + 34$ is _____.
13. The second order derivative of $y = e^{2x}$ _____.
14. If the 1st order derivative is greater than zero, then the function is called _____ function.
15. If the 1st order derivative is less than zero, then the function is called _____ function.
16. A function is _____ at $x=a$ if in an area very close to $[a, f(a)]$ the graph of the function lies completely above its tangent line.
17. A function is _____ at $x=a$ if in an area very close to $[a, f(a)]$ the graph of the function lies completely below its tangent line.
18. A positive second order derivative at $x=a$ denotes the function is _____ at a .
19. A negative second order derivative at $x=a$ denotes the function is _____ at a .

QUESTION BANK

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20. A _____ is a point at which the function is either at a relative maximum or minimum.
21. _____ is a point on the graph where the function crosses its tangent line and changes from convex to concave or vice versa.
22. _____ occurs only where the second order derivative is zero.
23. At the point of inflexion value of second order derivative is _____.
24. _____ is the process of finding the relative maximum or minimum of a function.
25. The dy/dx of $2x - 3y = 6$ is _____.
26. The dy/dx of $x^2 + 2y = 23$ is _____.
27. The dy/dx of $3x^2 + 4y = 65$ is _____.
28. The total differential of $y = 4x^3 + 7x^2 - 3x + 3$ is _____.
29. The total differential of $y = 7x^2 + 4x - 45$ is _____.
30. The total differential of $y = 4x^2 3x$ is _____.
31. The total differential of $y = \frac{2x-3}{3x}$ is _____.
32. The necessary condition for maximisation is $f'(a) =$ _____.
33. The necessary condition for minimisation is $f'(a) =$ _____.
34. The sufficiency condition for maximisation is $f''(a)$ _____.
35. The sufficiency condition for minimisation is $f''(a)$ _____.
36. The critical value of the function $y = 7x^2 + 112x - 54$ is _____.
37. The critical value of the function $y = -9x^2 + 72x - 13$ is _____.
38. The critical value of the function $y = -7x^2 + 126x - 23$ is _____.

QUESTION BANK

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39. For the maximization of a multi variable function $f_{xx} \cdot f_{yy}$ must be _____.
40. For the minimization of a multi variable function $f_{xx} \cdot f_{yy}$ must be _____.
41. In case of multivariable optimization if $f_{xx} \cdot f_{yy} < (f_{xy})^2$ and f_{xx} and f_{yy} have the same signs, the function is at _____ point.
42. In case of multivariable optimization if $f_{xx} \cdot f_{yy} < (f_{xy})^2$ and f_{xx} and f_{yy} have different signs, the function is at _____ point.
43. The integral value of $\int 3.5 dx$ is _____.
44. The integral value of $\int -\frac{1}{2} dx$ is _____.
45. The integral value of $\int dx$ is _____.
46. The integral value of $\int 5x^2 dx$ is _____.
47. The integral value of $\int 8^x dx$ is _____.
48. The integral value of $\int_1^4 10x dx$ is _____.
49. Reversing the limit changes the _____ of the definite integral.
50. If the upper limit of the integration equals the lower limit of the integration, the value of the definite integral is _____.
51. If marginal revenue is $100 - 2q - 3q^2$ then total revenue will be _____.
52. If marginal revenue is $84 - 4q - q^2$ then total revenue will be _____.
53. If marginal cost is $25 + 30q - 9q^2$ then total variable cost will be _____.

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- 54.If marginal cost is $45 + 10q - 92$ then total cost will be _____.
- 55.If all the principal minors are negative, the boarder Hessian is _____ definite.
- 56.A positive definite Hessian always satisfies the sufficient condition of a relative _____.
- 57.If the principal minors alternate consistently in sign from positive to negative, the boarder Hessian is _____ definite.
- 58.A negative definite Hessian always meets the sufficient condition for a relative _____.

GROUP-B

Each question carries 2 marks

1. Define closed input output model?
2. Define open input output model?
3. What is static input output model?
4. What is dynamic input output model?
5. What is transaction matrix?
6. What is a technological coefficient?
7. What is technological coefficient matrix?
8. What is input vector?
9. State the feasibility conditions of input output model?
- 10.Find the second order derivative of $y = 3x^4 - 2x^3 + 6x$
- 11.Find the second order derivative of $\sqrt{1 - x^2}$
- 12.Find the second order derivative of $y = \log x$
- 13.Find the second order derivative of $y = \log (x + a)$
- 14.What is increasing function?

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15. What is decreasing function?
16. What is concavity of a function?
17. What is convexity of a function?
18. What is point of inflexion?
19. State the condition for convexity of a function?
20. State the condition for concavity of a function?
21. State the condition for point of inflexion?
22. Define total differential?
23. Find the total differential of the function $y = 7x^3 - 5x^2 + 6x - 3$
24. Find the total differential of the function $y = (4x + 3)(3x - 8)$
25. Find the total differential of the function $z = 7x^2y^3$
26. Find the total differential of the function $Z = \frac{9y^3}{x-y}$
27. Find the total differential of the function $z = (x - 3y)^3$
28. Find the total differential of the function $Z = x^2 + 2xy$
29. Find the total differential of the function $Z = x^y$
30. Find the total derivative dz/dx for $Z = 6x^2 + 15xy + 3y^2$ where $y = 7x^2$
31. Find the total derivative dz/dx for $Z = (13x - 18y)^2$ where $y = 3x - 4$
32. What is implicit function?
33. Find derivative dy/dx of the implicit function $4x^2 - y^3 = 76$
34. Find derivative dy/dx of the implicit function $24x^3 + 4y^2 = 564$
35. Find derivative dy/dx of the implicit function $7x^2y^3 = 67$
36. Find derivative dy/dx of the implicit function $x^2 + 2xy = 76$
37. What is stationary function?
38. State the condition for increasing function?
39. State the condition for decreasing function?
40. Define maxima of a function?

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41. Define minima of a function?
42. State the condition for relative maxima?
43. State the condition for relative minima?
44. Test whether the function is increasing or decreasing or stationary at $x=4$,
 $y = 3x^2 - 14x + 5$
45. Test whether the function is increasing or decreasing or stationary at $x=4$,
 $y = x^3 - 7x^2 + 6x - 2$
46. Test whether the function is increasing or decreasing or stationary at
 $x=4, y = x^4 - 6x^3 + 4x^2 - 13$
47. Test to see if the following function is concave or convex at $x=3$,
 $y = -2x^3 + 4x^2 = 9x - 15$
48. Test to see if the following function is concave or convex at $x=3, y =$
 $(5x^2 - 8)^2$
49. Find the critical value of the function $f(x) = -7x^2 + 126x - 23$
50. Find the critical value of the function $f(x) = 3x^3 - 36x^2 + 135x - 13$
51. Find the critical value of the function $f(x) = 2x^4 - 16x^3 + 32x^2 + 5$
52. State the condition for relative maximum in case of multi variable function?
53. State the condition for relative minimum in case of multi variable function?
54. What is convex set?
55. What is convex function?
56. What is integration?
57. Determine the integral $\int 4x^3 dx$.
58. Determine the integral $\int x^{\frac{2}{3}} dx$.
59. Determine the integral $\int x^{-\frac{5}{2}} dx$.

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60. Determine the integral $\int \frac{1}{3x} dx$.
61. Determine the integral $\int (5x^3 + 2x^2 + 3x) dx$.
62. Determine the integral by using the substitution method $\int 10x(x^2 + 3)^4 dx$.
63. Determine the integral by using the by parts method $\int \frac{2x}{(8-x)^3} dx$.
64. Evaluate the definite integral $\int_1^{10} 3x^2 dx$.
65. Evaluate the definite integral $\int_1^{64} x^{-2/3} dx$.
66. What is constraint optimization?
67. State the necessary condition for constraint maxima?
68. State the necessary condition for constraint minima?
69. What is Lagrange multiplier?
70. What is Lagrange function?
71. How to interpret Lagrange multiplier in case of constraint optimization.

GROUP-C

Each question carries 3 marks

1. State the main features of input output model?
2. State the assumptions of input output model?
3. What is input coefficient matrix?
4. What is Hawkins Simon conditions?
5. What is Leontief matrix?
6. Find the second order derivative of $y = x^3 \log x$
7. Find the second order derivative of $y = (2x + 3)^{10}$
8. Find the second order derivative of $y = x^2 + \sqrt{x}$
9. Find the total differential of the function $y = \frac{9x-4}{5x}$

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10. Find the total differential of the function $y = (11x + 9)^3$
11. Find the total differential of the function $Z = \sqrt{x + y}$
12. Find the total differential of the function $Z = \frac{x}{x+y}$
13. Find the total derivative dz/dx for $z = \frac{9x-7y}{2x+5y}$ where $y = 3x - 4$
14. Find the total derivative dz/dx for $Z = 8x - 12y$ where $y = \frac{x+1}{x^2}$
15. Find derivative dy/dx of the implicit function $6x^2 + 15xy + 3y^2 = 363$
16. Find derivative dy/dx of the implicit function $3x^2 + 13xy + 7y^2 = 324$
17. Find derivative dy/dx of the implicit function $4x^2 + 5xy + 3y^3 = 853$
18. Find derivative dy/dx of the implicit function $x^4y^6 = 676$
19. Find the relative extrema of the function $f(x) = -7x^2 + 126x - 23$
20. Find the relative extrema of the function $f(x) = 3x^3 - 36x^2 + 135x - 13$
21. Find the relative extrema of the function $f(x) = 2x^4 - 16x^3 + 32x^2 + 5$
22. State the condition for relative maximum in case of multi variable function?
23. State the condition for relative minimum in case of multi variable function?
24. Optimize the function $y = 7x^2 + 112x - 54$
25. Optimize the function $y = -9x^2 + 72x - 13$
26. Optimize the function $y = x^3 - 6x^2 - 135x + 4$
27. Optimize the function $y = -2x^3 + 15x^2 + 84x - 25$
28. Optimize the function $y = x^4 - 8x^3 - 80x^2 + 15$
29. Optimize the function $y = -(x + 13)^4$
30. Optimize the function $y = (9 - 4x)^4$
31. Maximize the function and find the maximum value $TR = 32q - q^2$

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32. Maximize the function and find the maximum value $\pi = -q^2 + 11q - 24$
33. Maximize the function and find the maximum value $-q^3 - 6q^2 + 1440q - 545$
34. What is convex set?
35. What is convex function?
36. Determine the integral $\int (2x^6 - 3x^4) dx$.
37. Determine the integral $\int 2^{4x} dx$.
38. Determine the integral $\int e^{5x} dx$.
39. Determine the integral by using the substitution method $\int x^4(2x^5 - 5)^4 dx$.
40. Determine the integral by using the substitution method $\int (x - 9)^{\frac{7}{4}} dx$.
41. Determine the integral by using the substitution method $\int 6x - 11)^{-5} dx$.
42. Determine the integral by using the substitution method $\int \frac{1}{9x-5} dx$.
43. Determine the integral by using the substitution method $\int 24xe^{3x^2} dx$.
44. Determine the integral by using the by parts method $\int x^2 e^{2x} dx$.
45. Determine the integral by using the by parts method $\int \frac{5x}{(x-1)^2} dx$.
46. Determine the integral by using the by parts method $\int 15x(x + 4)^{\frac{3}{2}} dx$.
47. Evaluate the definite integral $\int_0^3 4e^{2x} dx$.
48. Evaluate the definite integral $\int_0^{10} 2e^{-2x} dx$.
49. What is Border Hessian Determinant?
50. State the necessary and sufficient condition for constraint maxima?
51. State the necessary and sufficient condition for constraint minima?

QUESTION BANK

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GROUP-D

Each question carries 7 marks

1. Develop an input output model for the economy which is divided into three producing industries. Also point the procedure for its solution?

2. Explain Hawkins-Siman conditions. Are these conditions satisfied for for

$$A = \begin{bmatrix} 1.2 & 0.3 \\ 0.4 & 1.8 \end{bmatrix}$$

3. A three sector economy has the following input coefficient matrix A and

the final demand vector F: $A = \begin{bmatrix} 0.3 & 0.2 & 0.2 \\ 0.2 & 0.1 & 0.5 \\ 0.2 & 0.4 & 0.2 \end{bmatrix}$ $F = \begin{bmatrix} 80 \\ 30 \\ 50 \end{bmatrix}$ Find the

gross output of each sector to meet the final demand. What would be the labour requirement for the final output of the three industries.

4. A three sector economy has the following input coefficient matrix A and

the final demand vector F: $A = \begin{bmatrix} 0.2 & 0.3 & 0.2 \\ 0.4 & 0.1 & 0.3 \\ 0.3 & 0.5 & 0.2 \end{bmatrix}$ $F = \begin{bmatrix} 150 \\ 200 \\ 210 \end{bmatrix}$ Find the

gross output of each sector to meet the final demand.

5. Analyse the assumption, uses and limitations of input output model?

6. In a closed input output model, the interrelationship between the industries of the economy and the final demand are given below:

Industries	A	B	C	Final demand
A	10	4	8	14
B	4	6	4	18
C	6	4	4	10

Calculate the output levels of the three industries consistent with the model.

7. Find the 2nd and 3rd order differential coefficients w.r.t x (i) $y = 3x^3 - 9x$ (ii) $y = x^2 \log x$

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8. Find the 2nd and 3rd order differential coefficients w.r.t x when $y = xe^{x^2}$
9. Show that $y = x^2 = 2x - 3$ is concave upward and $y = 5 - 3x - x^2$ is concave downward.
10. Prove that the curve given by $3y = x^3 - 3x^2 - 9x + 11$ has a maximum at $x = -1$ and minimum at $x = 3$ and point of inflexion at $x = 1$.
11. Maximize profit π for a firm, given total revenue $R = 4000q - 33q^2$ and total cost $C = 2q^3 - 3q^2 + 400q + 5000$, assuming $q > 0$.
12. Find derivative dy/dx of the implicit function $4x^2 + 5xy + 3y^3 = 853$ and $x^4y^6 = 676$.
13. Find the total differential of the functions $Z = \frac{9y^3}{x-y}$ and $z = (x - 3y)^3$
14. Find the relative extrema of the function $f(x) = 3x^3 - 36x^2 + 135x - 13$ and $f(x) = 2x^4 - 16x^3 + 32x^2 + 5$.
15. Optimize the function $y = x^4 - 8x^3 - 80x^2 + 15$ and $y = -(x + 13)^4$.
16. Optimize the function $y = x^3 - 6x^2 - 135x + 4$ and $y = -2x^3 + 15x^2 + 84x - 25$
17. Optimize the multi variable function $z = 3x^2 - xy + 2y^2 - 4x - 7y + 12$
18. Optimize the multi variable function $z = 48y - 3x^2 - 6xy - 2y^2 + 72x$
19. Optimize the multi variable function $f(x, y) = 3x^3 - 5y^2 - 225x + 70y + 23$
20. Optimize the multi variable function $f(x, y) = 3x^3 - 9xy + 3y^3$
21. Explain the properties of definite integral?
22. Given the demand function $p = 45 - 0.5q$, find the consumer surplus when $p = 32.5$ and $q = 25$.

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23. Given the supply function $p = (q + 3)^2$ find the producer surplus at $p=81$ and $q=6$.
24. Given the demand function $p = 25 - q^2$ and the supply function $p = 2q + 1$ assuming perfect competition find consumer and producer surplus.
25. Integrate the following definite integral by using the methods of integration by parts $\int_2^5 \frac{3x}{(x+1)^2} dx$ and $\int_1^3 \frac{4x}{(x+2)^3}$.
26. Determine the integral by using the substitution method $\int \frac{1}{9x-5} dx$.
and $\int 24xe^{3x^2} dx$.
27. What combinations of goods x and y should a firm produce to minimize costs when the joint cost function is $C = 6x^2 + 10y^2 - xy + 30$ and the firm has a production quota of $x + y = 34$. estimate the effect on cost if the production quota reduced by 1 unit.
28. What output mix should a profit maximizing firm produce when its total profit function is $\pi = 80x - 2x^2 - xy - 3y^2 + 100y$ and its maximum output capacity is $x + y = 12$.
29. Minimize cost for a firm with the cost function $C = 5x^2 + 2xy + 3y^2 + 800$ subject to the production quota $x + y = 39$.
30. Maximize utility $u = q_1q_2$ when $P_1=1$ and $P_2=4$ and budget $B=120$.
31. Optimize the CD production function $q = K^{0.3}L^{0.5}$ subject to the constraint $6K+2L=384$.
32. What is constraint optimization? Explain the process of constraint optimization by using Lagrange-Multiplier method.





A

Webinar on
**“Application of Calculus in Mathematical
Modelling: A Journey through
Inventory Modelling”**

Organized by

**Department of Mathematics ,
Pattamundai College, Pattamundai**

on

26th September 2020.

Session 2020-21



REPORT

A webinar was organised by Department of Mathematics, Pattamundai College, Pattamundai on 26th September 2020 on the topic **“APPLICATION OF CALCULUS IN MATHEMATICAL MODELLING: A JOURNEY THROUGH INVENTORY MODELLING”**. Dr. Bijoy Krishna Debnath, Assistant Professor of Mathematics, Department of Applied Sciences, School of Engineering, Tezpur University, Assam who graced the webinar with his analytical thinking. We were able to get the beautiful glimpses of the students of our Department in this webinar. Sri Arabinda Pandab, Head of the Department gave a key note address of the topic. Principal Prof Adhikari Laxminarayan Dash welcomed the guest and participants of different colleges of our state through web. The webinar was ended with a vote of thanks by Dr Nirmal Kumar Sahoo, another faculty member.


Arabinda Pandab
HOD& Convenor



OFFICE OF THE PRINCIPAL

Mobile : 9437376724

PATTAMUNDAI COLLEGE

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PATTAMUNDAI, KENDRAPARA, ODISHA - 754215

Ref No. : 888

Date..... 21/9/20..

To

Dr. Bijoy Krishna Debnath,
Assistant Professor of Mathematics,
Department of Applied Sciences,
School of Engineering,
Tezpur University, Assam

Sub: Invitation to act as the **Resource Person** in the extramural webinar
of Department of Mathematics of Pattamundai College.

Sir,

I am pleased to invite you to kindly act as the resource person in the
extramural webinar on "**Application of Calculus in Mathematical Modelling: A
Journey through Inventory Modelling**" organised by Dept of Mathematics on 26th
September 2020 at 10.30a.m.

Your kind consent in this regard is highly solicited.


Principal 21.9.20
Pattamundai College
Principal
Pattamundai College



Principal Pattamundai College <pattamundaicollege@gmail.com>

Arabinde Pandey
 21.9.20
 Principal
 Pattamundai College

Invitation for Resource Person

2 messages

Principal Pattamundai College <pattamundaicollege@gmail.com>

Mon, Sep 21, 2020 at 11:20 AM

To: bijoy91@tezu.ernet.in

pl Find the attachment
 Principal
 Pattamundai College
pattamundaicollege@gmail.com

Math Webniar 2.pdf
 144K

Dr. Bijoy Krishna Debnath <bijoy91@tezu.ernet.in>

Mon, Sep 21, 2020 at 11:27 AM

To: Principal Pattamundai College <pattamundaicollege@gmail.com>

Dear Principal,

It is an immense pleasure for me to act as a resource person for the said webinar. I am confirming myself to attain as a resource person. Thank you so much for inviting me. Hope to see you in the webinar.

> pl Find the attachment
 > *Principal*
 > *Pattamundai College*
 > *pattamundaicollege@gmail.com <pattamundaicollege@gmail.com> *
 >

शुभकामनाओं सहित/ With Regards,
 डॉ विजय कृष्ण देबनाथ/ Dr. Bijoy Krishna
 Debnath
 सहायक प्रोफेसर, गणित / Assistant
 Professor, Mathematics
 अनुप्रयुक्त विज्ञान विभाग/
 Department of Applied Sciences,
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C.V of Resource Person Dr. Bijoy Krishna Debnath

Dr. Bijoy Krishna Debnath is currently working as an Assistant Professor of Mathematics at Department of Applied Sciences, School of Engineering, Tezpur University, Assam. Prior to that he was working as an Assistant Professor at Government College of Engineering, Kalahandi, Odisha. He did his Ph.D. in Operations Research from National Institute of Technology Agartala, Masters from Gauhati University. His area of research includes Operations Research, Fuzzy Mathematics and Optimization, Mathematical Modelling. He has published research articles in SCI, SCOPUS and Journal of international repute that includes International Journal of Operations research, Hacettepe Journal of Mathematics and Statistics, International Journal of Logistic System and Management, Iranian Journal of Fuzzy Systems.



DEPARTMENT OF MATHEMATICS
PATTAMUNDAI COLLEGE , PATTAMUNDAI

Organises
A Webinar on

“Application of Calculus in Mathematical Modelling: A Journey through Inventory Modelling”

Date: 26.09.2020 , Time:10: 30 A.M



RESOURCE PERSON

Dr. Bijoy Krishna Debnath,

Assistant Professor,

Department of Applied Sciences,

School of Engineering, Tezpur University, Assam



Prof. A.L.N Dash

Principal

Pattamundai College

Pattamundai



Mr. A. Pandab

H.O.D and Convenor



Dr. N.K. Sahoo

Co-Convenor

Topic: Application of Calculus in Mathematical Modelling: A Journey through Inventory Modelling



Presented By: Dr. Bijoy Krishna Debnath, Assistant Professor (Mathematics), School of Engineering, Tezpur University, Assam, India

Presented at: Pattamundai College on 26.09.2020

Outline of Presentation

- Calculus
- Maxima and Minima of function
- Basics of Inventory Modelling
- Discussion on an Inventory Model as a Special Case

What do you mean by Calculus?

Calculus is the branch of mathematics that deals with the finding and properties of derivatives and integrals of functions i.e. application of derivatives and integrals. One of those application of derivatives involved convexity, concavity and point of inflexion.

Definition

Consider a function $f(x)$ that is defined in an interval I . If the second order derivative $f''(x) \geq 0$ for all x in an interval I then f is convex on I . On the other hand, if $f''(x) \leq 0$ for all x in an interval I , then f is concave on I .

Suppose that f is differentiable on an interval I . The graph of f is

- concave up on I if f' (slope from negative to positive) is increasing on I i.e., slope is increasing; and
- concave down on I , if f' (slope from positive to negative) is decreasing on I i.e., slope is decreasing

For a continuous and differentiable function $f(x)$ a *stationary point* x^* is a point at which the slope of the function vanishes, i.e. $f'(x) = 0$ at $x = x^*$, where x^* belongs to its domain of definition.

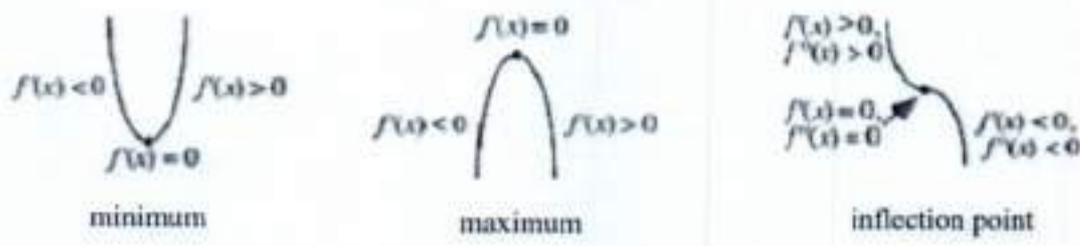


Fig. 1

Figure 2 shows the global and local optimum points.

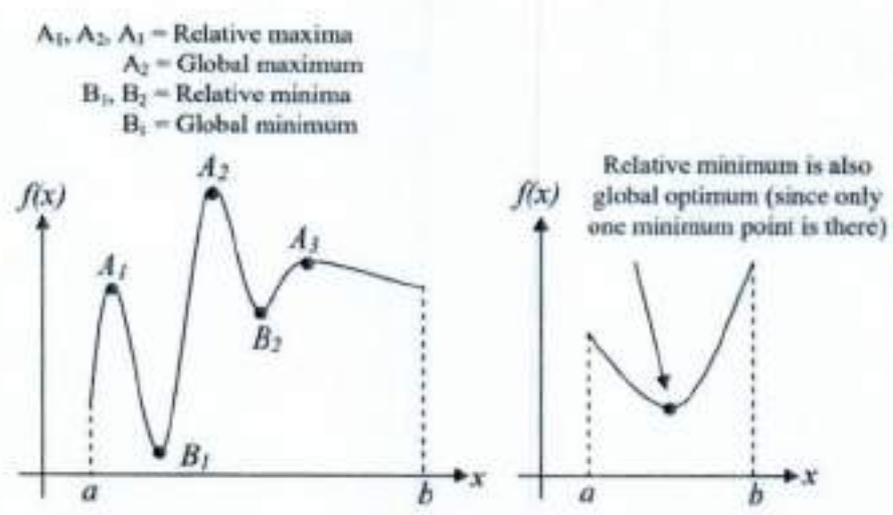


Fig. 2

What is inventory

Inventory can be defined as a stock on hand at a given point of time which may be held for the purpose of later use or sale. It has an economic value that include raw material, work in progress inventory, semi finish or final product. In inventory control, our main aim is to manage the inventories in such a manner so that the day to day work is running smoothly without any delay but at the minimum cost.

Various costs related to inventory are

➤ **Purchase Cost:** This is the cost involved in purchasing of inventories. It depends upon the quantity. Therefore,

$$\text{Purchase Cost (PC)} = \text{No of units (Annual Demand)} \times \text{cost/unit.}$$

➤ **Ordering Cost:** The costs involved in ordering inventories from source to destination is called

ordering cost. It includes the tender, processing charge, paper works, inspection and transportation. Therefore,

$OC = \text{No of orders} \times \text{cost/order}$.

- **Setup Cost:** When the inventory items produced internally, then the costs associated with bringing the shutdown system into work, the costs related with this is called set-up cost. It includes maintenance cost, schedule chart preparation, bringing raw materials, arrangement of workers, tools, equipment costs etc. Therefore,

$SC = \text{No of Set-up} \times \text{cost/set-up}$.

- **Holding / Carrying Cost:** The costs associated with the storing, keeping the inventory items within the production system. It includes shortage costs, handling costs, damage costs etc. It depends upon the quantity and period for which the inventory is kept. Therefore,

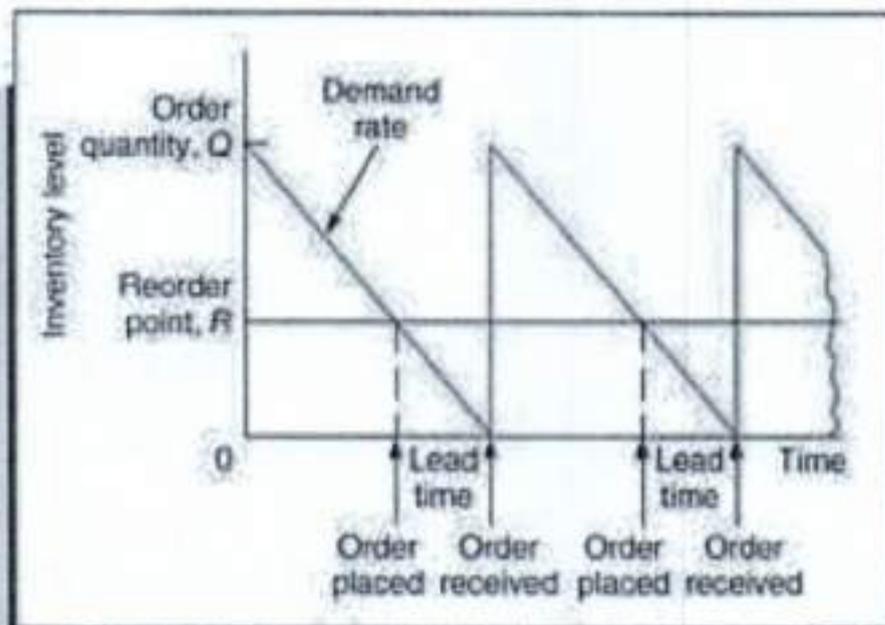
$\text{Holding Cost} = \text{Avg. inventory for a period} \times \text{Holding Cost/ unit time}$.

- **Shortage Costs:** It occur for any absence in the inventory and the costs which are associated with not serving the customer. The loss due to this is called shortage cost or stock-out costs. Therefore,

$SC = \text{No of units short} \times \text{shortage cost/unit}$

Inventory Control-Terminology

- **Demand:** it is the number of items (products) required per unit of time. The demand may be either deterministic or probabilistic in nature.
- **Order cycle:** The time period between two successive orders is called order cycle.
- **Lead time:** The length of time between placing an order and receipt of items is called lead time.
- **Safety stock:** It is also called buffer stock or minimum stock. It is the stock or inventory needed to account for delays in materials supply and to account for sudden increase in demand due to rush orders.
- **Re-order level (ROL):** It is the point at which the replenishment action is initiated. When the stock level reached R.O.L., the order is placed for the item.
- **Re-order quantity:** This is the quantity of material (items) to be ordered at the re-order level. Normally this quantity equals the economic order quantity



Model Description

Let us discuss an inventory model by considering two levels of trade credit, limited storage capacity and assuming the retailer can delay incurring interest charges on the unpaid and overdue balance due to the difference between interest earned and interest charged, a situation designed to reflect real world business situations.

Assumptions

- The replenishment rate is infinite, i.e., the replenishment is instantaneous.
- Backlogging is not allowed.
- The lead-time is assumed to be negligible.
- The demand rate is known with certainty and uniform.
- A constant fraction, θ , of the on-hand inventory which deteriorates per unit time and there is no repair or replenishment of the deteriorated inventory during a cycle time.
- The retailer can accumulate revenue and earn interest after the customer pays for the amount of purchasing cost to the retailer until the inventory cycle T when $M < T$ and the retailer earns interest on sales revenue up to the permissible period M when $M > T$.
- The retailer can decide to pay off all accounts either at the end of the permissible period M or at any time point during $(M, T]$.

Notations

- D = annual demand rate

- θ = a constant fraction of the on-hand inventory which deteriorates per unit time
- c = unit purchase cost of the item.
- s = unit selling price of the item.
- h = unit stock holding cost for item in OW (excluding capital opportunity cost)
- k = unit stock holding cost for item in RW (excluding capital opportunity cost)
- A = the ordering cost per order.
- M = the retailer's trade credit period offered by supplier in years.
- N = the customer's trade credit period offered by retailer in years.
- I_e = the annual interest that can be earned per unit.
- I_p = the annual interest charges payable per unit.
- T = replenishment cycle time
- W = the storage capacity of OW

Let $I(t)$ be the inventory level at any time t , ($0 \leq t \leq T$). Depletion due to demand and due to deterioration will occur simultaneously. The differential equation that describes the instantaneous state of $I(t)$ over $[0, T]$ is given by

$$\frac{dI}{dt} + \theta I(t) = -D, \quad 0 \leq t \leq T. \quad (1)$$

The solution of the above differential equation with boundary condition $I(T) = 0$ is

$$I(t) = \frac{D}{\theta} [e^{\theta(T-t)} - 1], \quad 0 \leq t \leq T. \quad (2)$$

Thus,

$$Q = I(0) = \frac{D}{\theta} (e^{\theta T} - 1). \quad (3)$$

The number of units that deteriorate during one cycle is

$$Q - DT = \frac{D(e^{\theta T} - \theta T - 1)}{\theta}. \quad (4)$$

Let

$$T_c = \frac{1}{\theta} \ln \left(\frac{\theta W}{D} + 1 \right). \quad (5)$$

Eqs. (3) yields

$$Q > W \text{ if and only if } T > T_c. \quad (6)$$

(4) The interest earned per year can be obtained as follows:

Case 1: $0 < T \leq N$

$$\text{Annual interest earned} = sI_e D(M - N)$$

Case 2: $N < T \leq M$

$$\text{Annual interest earned} = \frac{sI_e D(2MT - N^2 - T^2)}{2T}$$

Case 3: $M < T \leq W^*$

In this case, $T \leq W^*$ implies that the retailer pays off the total amount owed to the supplier cDT and has amount $sDM + \frac{sI_e M^2}{2} - cDT$ on hand at time M , then the retailer can obtain the interest earned $I_e(sDM + \frac{sI_e M^2}{2} - cDT)(T - M) + \frac{sI_e(M^2 - N^2)}{2T}$ during the time period $[M, T]$. On the other hand, after the time point M , the retailer continuously sells items and uses the revenue to earn interest until time T . That is, the retailer can accumulate revenue and earn interest $sID(T - M)^2/2$ during the period M to T . Therefore,

$$\text{Annual interest earned} = \frac{I_e}{T} \left(sDM + \frac{sI_e M^2}{2} - cDT \right) (T - M) + \frac{sI_e D(T - M)^2}{2T} + \frac{sI_e D(M^2 - N^2)}{2T}$$

Case 4: $W^* < T$

In this case, $W^* < T$ implies that the money in the account at time M is less than the purchasing cost, then the retailer gradually reduces the finance loan from constant sales and revenue received until the time point $M + (cDT - sDM - \frac{sI_e M^2 - N^2}{2})/sD$. After this time point, the retailer continuously sells items and uses the revenue to earn interest until time T . Therefore,

$$\text{Annual interest earned} = \frac{sI_e D \left\{ T - M - \left[cDT - sDM - \frac{sI_e M^2 - N^2}{2} \right] / sD \right\}^2}{2T}$$

Case 3: $M < T \leq W^*$

In this case, $T < W^*$ implies that $sDM + \frac{sI_e M^2 - N^2}{2} > cDT$, then the retailer pays no interest charge.

Case 4: $W^* < T$

In this case, $W^* < T$ which implies that $sDM + \frac{sI_e M^2 - N^2}{2} < cDT$, then the retailer needs to finance the difference with interest rate I_e at time M . Based on the assumptions, the retailer gradually reduces the amount of financed loan from constant sales and revenue received. Therefore, the interest payable per cycle is

$$\frac{I_e}{2sD} \left\{ cDT - \left[sDM + \frac{sI_e D(M^2 - N^2)}{2} \right] \right\}^2$$

Furthermore, the annual total relevant cost for the retailer can be expressed as

$$\begin{aligned} TC(T) = & \text{ordering cost} + \text{deteriorating cost} + \text{stock - holding in RW} + \text{stock - holding cost in OW} \\ & + \text{interest payable} - \text{interest earned.} \end{aligned}$$

From possible values of N, M and W^* , this study has the following four possible cases.

(I) Suppose $T_a < N < M < W^*$

In this case, the annual total relevant cost can be as follows

$$TC(T) = \begin{cases} TC_1(T) & \text{if } 0 < T < T_a \\ TC_2(T) & \text{if } T_a < T < N \\ TC_3(T) & \text{if } N < T < M \\ TC_4(T) & \text{if } M < T < W^* \\ TC_5(T) & \text{if } W^* < T \end{cases} \quad \begin{matrix} (1a) \\ (1b) \\ (1c) \\ (1d) \\ (1e) \end{matrix}$$

where

$$TC_1(T) = \frac{A}{T} + \frac{D(h+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - sL_0 D(M-N) \quad (2)$$

$$TC_2(T) = \frac{A}{T} + \frac{D(k+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{(k-h)}{\theta T} [D(e^{\theta T_a} - \theta T_a - 1) + \theta^2 W(T - T_a)] - sL_0 D(M-N) \quad (3)$$

$$TC_3(T) = \frac{A}{T} + \frac{D(k+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{(k-h)}{\theta T} [D(e^{\theta T_a} - \theta T_a - 1) + \theta^2 W(T - T_a)] - \frac{sL_0 D(2MT - N^2 - T^2)}{2T} \quad (4)$$

$$TC_4(T) = \frac{A}{T} + \frac{D(k+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{(k-h)}{\theta T} [D(e^{\theta T_a} - \theta T_a - 1) + \theta^2 W(T - T_a)] - \frac{sL_0 D(M^2 - N^2)}{2T} - \frac{L_0}{T} - \left[sDM + \frac{sL_0 D(M^2 - N^2)}{2} - cDT \right] (T-M) - \frac{sL_0 D(T-M)^2}{2T} \quad (5)$$

and

$$TC_5(T) = \frac{A}{T} + \frac{D(k+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{(k-h)}{\theta T} [D(e^{\theta T_a} - \theta T_a - 1) + \theta^2 W(T - T_a)] - \frac{sL_0 D(M^2 - N^2)}{2T} - \frac{L_0}{2sDT} - \left\{ cDT - \left[sDM + \frac{sL_0 D(M^2 - N^2)}{2} \right] \right\}^2 - \frac{sL_0 D}{2T} \left\{ T - M - \frac{cDT - \left[sDM + \frac{sL_0 D(M^2 - N^2)}{2} \right]}{sD} \right\}^2 \quad (6)$$

From Eqs. (2)-(6), it is obvious that $TC_1(T_a) = TC_2(T_a)$, $TC_2(N) = TC_3(N)$, $TC_3(M) = TC_4(M)$ and $TC_4(W^*) = TC_5(W^*)$. Furthermore, $TC(T)$ is continuous on $(0, \infty)$.

In this case, the annual total relevant cost can be as follows

$$TC(T) = \begin{cases} TC_1(T) & \text{if } 0 < T < N \\ TC_6(T) & \text{if } N < T < T_a \\ TC_7(T) & \text{if } T_a < T < M \\ TC_4(T) & \text{if } M < T < W^* \\ TC_5(T) & \text{if } W^* < T \end{cases} \quad \begin{matrix} (7a) \\ (7b) \\ (7c) \\ (7d) \\ (7e) \end{matrix}$$

where

$$TC_6(T) = \frac{A}{T} + \frac{D(h+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{sL_0 D}{2T} (2MT - N^2 - T^2) \quad (8)$$

Obviously, $TC_1(N) = TC_6(N)$ and $TC_6(T_a) = TC_7(T_a)$. Furthermore, $TC(T)$ is continuous on $(0, \infty)$.

(III) Suppose $N < M < T_a < W^*$

In this case, the annual total relevant cost can be as follows

$$TC(T) = \begin{cases} TC_1(T) & \text{if } 0 < T < N \\ TC_6(T) & \text{if } N < T < M \\ TC_7(T) & \text{if } M < T < T_a \\ TC_4(T) & \text{if } T_a < T < W^* \\ TC_5(T) & \text{if } W^* < T \end{cases} \quad \begin{matrix} (9a) \\ (9b) \\ (9c) \\ (9d) \\ (9e) \end{matrix}$$

where

$$TC_7(T) = \frac{A}{T} + \frac{D(h+c\theta)(e^{\theta T} - \theta T - 1)}{\theta^2 T} - \frac{sL_0 D(M^2 - N^2)}{2T} - \frac{L_0}{T} \left[sDM + \frac{sL_0 D(M^2 - N^2)}{2} - cDT \right] (T-M) - \frac{sL_0 D}{2T} (T-M)^2 \quad (10)$$

Likewise, $TC_6(M) = TC_7(M)$ and $TC_7(T_a) = TC_4(T_a)$. Furthermore, $TC(T)$ is continuous on $(0, \infty)$.

Table 1

The optimal replenishment policy used Theorem 1.

	r	D	A	s	k	h	l_1	l_2	N	M	W	T_0	W^*	Δ_1	Δ_2	Δ_3	Δ_4	Δ_5	Γ	$FW(\bar{T}^*)$	
(A1)	0.1	250	100	5	10	3	1	0.12	0.15	0.2	0.3	30	0.3900	0.600	<0	<0	<0	<0	<0	$T_1=0.621$	415.2456
(A2)	0.5	500	100	5	10	3	1	0.12	0.15	0.2	0.3	50	0.0995	0.600	<0	<0	<0	<0	<0	$T_1=0.362$	453.4573
(B1)	B11	B12	B13	B14	2	1.1	1	B15	0.15	0.0161	0.0165	B16	B17	B18	<0	<0	<0	<0	<0	$T_1=0.0161$	148020
(B2)	0.1	500	80	5	10	3	1	0.12	0.15	0.2	0.3	30	0.0995	0.600	<0	<0	<0	<0	<0	$T_1=0.33$	395.6781
(B3)	0.1	500	50	5	10	3	1	0.12	0.15	0.2	0.3	30	0.0995	0.600	<0	<0	<0	<0	<0	$T_1=0.237$	282.7535
(C1)	C11	C12	C13	1.9999	2	1.1	1	C14	0.15	C15	C16	C17	C18	0.0161	<0	>0	<0	<0	<0	$T_1=0.0161$	166450
(C2)	0.01	100	5	2	4	3	1	0.12	0.15	0.2	0.21	10	0.1	0.4205	<0	<0	<0	<0	<0	$T_1=0.199$	39.7380
(C3)	0.1	500	5	5	10	3	1	0.12	0.15	0.2	0.3	50	0.0995	0.600	<0	<0	<0	<0	<0	$T_1=0.1065$	27.2602
(D1)	D11	100	D12	1.9999	2	1	1.995	D13	0.15	D14	D15	1.65	D16	D17	<0	<0	<0	<0	<0	$T_1=D18$	D19
(D2)	0.1	500	3	5	10	1.1	1	0.12	0.15	0.1	0.12	50	0.0995	0.2405	<0	<0	<0	<0	<0	$T_1=0.0890$	55.1821
(D3)	0.1	500	3	5	10	3	1	0.12	0.15	0.2	0.3	50	0.0995	0.600	<0	<0	<0	<0	<0	$T_1=0.0890$	7.1821

B11 = 0.00001; B12 = 0.001000; B13 = 1224.0458507278; B14 = 1.0999; B15 = 0.000005; B16 = 144800; B17 = 0.01609990070; B18 = 0.01610082507383;
 C11 = 0.00001; C12 = 10.000.000; C13 = 1378.82297; C14 = 0.000005; C15 = 0.016119; C16 = 0.0161201; C17 = 101.000; C18 = 0.0099999;
 D11 = 0.00001; D12 = 0.012920483; D13 = 0.000115; D14 = 0.01650098; D15 = 0.016501; D16 = 0.0164999984940; D17 = 0.01650182509129;
 D18 = 0.016194501; D19 = 1.567067798.

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CERTIFICATE OF PARTICIPATION

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has participated a webinar on
"Application of Calculus in Mathematical
Modeling: A Journey through Inventory
Modelling" organized by
Department of Mathematics

on
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Dr. Biju Krishna Dabral is presenting

What do you mean by Calculus??

Calculus is the branch of mathematics that deals with the finding and properties of derivatives and integrals of functions i.e. application of derivation and integrals. One of those application of derivations method concerning continuity and point of inflection.

Definition

Consider a function $f(x)$ that is defined in an interval I . If the second order derivative $f''(x) > 0$ for all x in an interval I , then f is concave up on I . On the other hand, if $f''(x) < 0$ for all x in an interval I , then f is concave down on I .

Theorem

Suppose that f is differentiable on an interval I . The graph of f is:

- concave up on I , if f' (slope from negative to positive) is increasing on I i.e. slope are increasing, and
- concave down on I , if f' (slope from positive to negative) is decreasing on I i.e.

Dr. Biju Krishna Dabral is presenting

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What is inventory

Inventory can be defined as a stock or fund at a given point of time which may be held for the purpose of later use or sale. It has a economic value that include raw material, work in progress inventory, semi-finished or final product. In inventory control, one main aim is to manage the inventory in such a manner so that the day to day work is running smoothly without any delay but at the necessary level.

Various costs related to inventory are:

- (i) **Purchase Cost:** This is the cost involved in purchasing of inventories. It depends upon the quantity. Therefore, Purchase Cost (PC) = $Q \times \text{unit cost (Purchase Element)}$ = unit cost
- (ii) **Delivering Cost:** The costs involved in sending inventories from source to destination is called delivering cost. It include the freight, packing charge, paper costs, inspection and transportation. Therefore, $DC = Q \times \text{unit cost}$ = unit cost

Dr. Biju Krishna Dabral is presenting

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ପଞ୍ଚାମୃତ୍ୟୁର କଲେଜ ଗଣିତ ବିଭାଗ ଖେଦିନାର

ପଞ୍ଚାମୃତ୍ୟୁର, ୪୯୦ (ନି.ପ୍ର): ପଞ୍ଚାମୃତ୍ୟୁର କଲେଜ ଗଣିତ ବିଭାଗ ପକ୍ଷରୁ ଆୟତ୍ତିକୋଣର ଅପ କାହ୍ନୁରାୟ ଉଚ୍ଚ ମାଧ୍ୟମିକ ବିଭାଗ ମଧ୍ୟରେ ଏ କର୍ମସୂଚୀ ପ୍ରକାଶ କରାଯାଇଛି । ମଧ୍ୟରେ ଶାସ୍ତ୍ର ବିଭାଗର କଲେଜ ଅଧ୍ୟକ୍ଷ ପ୍ରଫେସର ଅଧ୍ୟକ୍ଷା ସୁଧାଂଶୁରାୟ ମଧ୍ୟରେ ଗଣିତ ବିଭାଗର ଅଧ୍ୟକ୍ଷ ଭାବେ ନିଯୁକ୍ତି ଦିଆଯାଇଛି । ଏଥିରେ ଆସନ ଉପରେ ବିଭାଗର ଗଣିତ ବିଭାଗର ପ୍ରଫେସର ଡଃ ବିଜୟକୃଷ୍ଣ ଦେବନାଥ ଯୋଗଦେଇ କାହ୍ନୁରାୟର ପ୍ରୟୋଗ ଓ ଗଣିତରେ ଉଚ୍ଚତମ ଶ୍ରେଣୀର ମନୋନୀୟତା ପ୍ରଦାନ କରିଥିଲେ । ବିଭାଗର ମୁଖ୍ୟ ପ୍ରଧାନ ଅଧ୍ୟକ୍ଷ ପ୍ରଫେସର ସୁଧାଂଶୁରାୟ ଓ ଅଧ୍ୟକ୍ଷ ପ୍ରଫେସର ଡଃ ବିଜୟକୃଷ୍ଣ ଦେବନାଥ ମଧ୍ୟ ଉପସ୍ଥିତ ରହିଥିଲେ । ଅଧ୍ୟକ୍ଷ ଡଃ ବିଜୟକୃଷ୍ଣ ଦେବନାଥ ମଧ୍ୟ ଉପସ୍ଥିତ ରହିଥିଲେ ।

ପଞ୍ଚାମୁଣ୍ଡାଳ କଲେଜ ଗଣିତ ବିଭାଗ ଡ୍ରେବିନାର

ପଞ୍ଚାମୁଣ୍ଡାଳ(ଆପ): ପଞ୍ଚାମୁଣ୍ଡାଳ ଉତ୍ତର ଉତ୍ତର ବିଭାଗ ପଞ୍ଚମ 'ଆପ୍ରିଲେସନ୍ ଅଫ କାଲ୍କୁଲସ୍ ଇନ୍ ମ୍ୟାଥମେଟିକାଲ ମେଥଡି' ଏ ଉର୍ଦ୍ଧ୍ୱ ପାଠ୍ୟପୁସ୍ତକ ମାନଙ୍କ ଶୀର୍ଷକ ଡ୍ରେବିନାର ହେଉଛି ପଞ୍ଚାମୁଣ୍ଡାଳ ପ୍ରଫେସର ଅଧିକାରୀ ଉତ୍କଳ-ପାଠକ ଶାନ୍ତନୁ ଚରଣଶର୍ମାଙ୍କଦ୍ୱାରା ପ୍ରସ୍ତୁତ ହୋଇଅଛି।

ଏହି ପାଠ୍ୟ ପୁସ୍ତକଟିଏ ବିଶ୍ୱବିଦ୍ୟାଳୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ବିତରଣକୁ ଯୋଗ୍ୟ ଭାବରେ ଉପଯୋଗୀ ପ୍ରଦାନ ଓ ଉଚ୍ଚତର ଉପଯୋଗୀ ମନେକରି ଉପଯୋଗୀ ମାଧ୍ୟମରେ ମାଧ୍ୟମରେ ବିକ୍ରୟ କରାଯିବ। ବିଭାଗୀୟ ମୁଖ୍ୟ ପ୍ରଧାନଙ୍କ ଅନୁମତି ପ୍ରାପ୍ତ ହୋଇଛି ଏବଂ ଏ ପୁସ୍ତକ ପ୍ରକାଶ କରିବାକୁ ଉଦ୍ଦେଶ୍ୟ ରଖାଯାଇଛି। ଏହି ପୁସ୍ତକଟିଏ ଉଚ୍ଚ ଉପଯୋଗୀ/ଉପଯୋଗୀ ଓ ଉପଯୋଗୀ ହେବ ବୋଲି କୁହାଯାଇଛି।

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ପଞ୍ଚାମୁଣ୍ଡାଳ କଲେଜରେ ଡ୍ରେବିନାର

ପଞ୍ଚାମୁଣ୍ଡାଳ(ଆପ): ପଞ୍ଚାମୁଣ୍ଡାଳ ଉତ୍ତର ଉତ୍ତର ବିଭାଗ ପଞ୍ଚମ 'ଆପ୍ରିଲେସନ୍ ଅଫ କାଲ୍କୁଲସ୍ ଇନ୍ ମ୍ୟାଥମେଟିକାଲ ମେଥଡି' ଏ ଉର୍ଦ୍ଧ୍ୱ ପୁସ୍ତକଟିଏ ଶୀର୍ଷକ ଡ୍ରେବିନାର ହେଉଛି ପଞ୍ଚାମୁଣ୍ଡାଳ ପ୍ରଫେସର ଅଧିକାରୀ ଉତ୍କଳ-ପାଠକ ଶାନ୍ତନୁ ଚରଣଶର୍ମାଙ୍କଦ୍ୱାରା ପ୍ରସ୍ତୁତ ହୋଇଅଛି। ଏହି ପୁସ୍ତକଟିଏ ବିଶ୍ୱବିଦ୍ୟାଳୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ବିତରଣକୁ ଯୋଗ୍ୟ ଭାବରେ ଉପଯୋଗୀ ପ୍ରଦାନ ଓ ଉଚ୍ଚତର ଉପଯୋଗୀ ମନେକରି ଉପଯୋଗୀ ମାଧ୍ୟମରେ ମାଧ୍ୟମରେ ବିକ୍ରୟ କରାଯିବ। ବିଭାଗୀୟ ମୁଖ୍ୟ ପ୍ରଧାନଙ୍କ ଅନୁମତି ପ୍ରାପ୍ତ ହୋଇଛି ଏବଂ ଏ ପୁସ୍ତକ ପ୍ରକାଶ କରିବାକୁ ଉଦ୍ଦେଶ୍ୟ ରଖାଯାଇଛି। ଏହି ପୁସ୍ତକଟିଏ ଉଚ୍ଚ ଉପଯୋଗୀ/ଉପଯୋଗୀ ଓ ଉପଯୋଗୀ ହେବ ବୋଲି କୁହାଯାଇଛି।

ଆବଶ୍ୟକତା ଦୃଷ୍ଟିରେ ବିଶ୍ଳେଷଣ କରାଯାଇଛି। ବିଭାଗୀୟ ମୁଖ୍ୟ ପ୍ରଧାନଙ୍କ ଅନୁମତି ପ୍ରାପ୍ତ ହୋଇଛି ଏବଂ ଏ ପୁସ୍ତକ ପ୍ରକାଶ କରିବାକୁ ଉଦ୍ଦେଶ୍ୟ ରଖାଯାଇଛି। ଏହି ପୁସ୍ତକଟିଏ ଉଚ୍ଚ ଉପଯୋଗୀ/ଉପଯୋଗୀ ଓ ଉପଯୋଗୀ ହେବ ବୋଲି କୁହାଯାଇଛି।

ଏ. ନିରାଡ଼ା ଦ୍ୱାରା ପ୍ରସ୍ତୁତ ହୋଇଥିବା ପୁସ୍ତକଟିଏ ବିଶ୍ୱବିଦ୍ୟାଳୟ ପାଠ୍ୟ ପୁସ୍ତକ ପ୍ରଣୟନ ଓ ବିତରଣକୁ ଯୋଗ୍ୟ ଭାବରେ ଉପଯୋଗୀ ପ୍ରଦାନ ଓ ଉଚ୍ଚତର ଉପଯୋଗୀ ମନେକରି ଉପଯୋଗୀ ମାଧ୍ୟମରେ ମାଧ୍ୟମରେ ବିକ୍ରୟ କରାଯିବ। ବିଭାଗୀୟ ମୁଖ୍ୟ ପ୍ରଧାନଙ୍କ ଅନୁମତି ପ୍ରାପ୍ତ ହୋଇଛି ଏବଂ ଏ ପୁସ୍ତକ ପ୍ରକାଶ କରିବାକୁ ଉଦ୍ଦେଶ୍ୟ ରଖାଯାଇଛି। ଏହି ପୁସ୍ତକଟିଏ ଉଚ୍ଚ ଉପଯୋଗୀ/ଉପଯୋଗୀ ଓ ଉପଯୋଗୀ ହେବ ବୋଲି କୁହାଯାଇଛି।

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ପ୍ରମେୟ

ଗଣିତ ବିଭାଗରେ ଡ୍ରେବିନାର

ପରୀକ୍ଷା, ୨୦୨୦ (ଅଘ): ପରୀକ୍ଷାକ୍ରମ
ନିମ୍ନ ଉପର ବିଭାଗ ପଢ଼ାବୁ ଆଦିକେବଳ
ଅଠ ଲକ୍ଷରୁ ଉର୍ଦ୍ଧ୍ୱ ମାଧ୍ୟମିକରେ ମଧ୍ୟ
ଏ କର୍ମର ପ୍ର ଗଠନକାରୀ ମତେଣି ଶାନ୍ତି
ଡ୍ରେବିନାର ଉପରେ ଅଧ୍ୟକ୍ଷ ପ୍ରଦେଶର ଅଧିକାରୀ
କାର୍ଯ୍ୟକାରୀତା ଉପରେ ଯୋଗଦାନରେ ଅନୁଷ୍ଠିତ
ହୋଇପାରେ। ଏଥିରେ ଅଧ୍ୟକ୍ଷ କେବଳ
ବିଶ୍ୱବିଦ୍ୟାଳୟ ଉପର ବିଭାଗ ପଢ଼ାବୁ
ପ୍ରଦେଶର ତ ବିଭାଗରୁ କେବଳ ଯୋଗଦେଇ
କାର୍ଯ୍ୟକାରୀ ପ୍ରୟୋଗ ଓ କର୍ମରେ କାର୍ଯ୍ୟକାରୀ
ମତେଣି ଅବଶ୍ୟକତା ସଂପର୍କରେ ବିଶ୍ୱେଷଣ
କରିଥିଲେ। ବିଭାଗର ମୁଖ୍ୟ ପ୍ରଧ୍ୟକ୍ଷଙ୍କ ଅଧିକ
ପଞ୍ଜର ପୁସ୍ତକ ଉପରେ ଓ ଅଧିକ ପଢ଼ାବୁ
ପ୍ରଦାନ କରିଥିଲେ। କେବଳ ଅଧ୍ୟକ୍ଷଙ୍କ ଦ.
ନିର୍ମଳ କୁମାର ସହ ଧ୍ୟାନରେ ଦେଖିଲେ।
ଏହି କାର୍ଯ୍ୟକ୍ରମରେ ବହୁ ଅଧ୍ୟାପକ/ଅଧ୍ୟାପିକା
ଓ କାର୍ଯ୍ୟକାରୀ ଯୋଗ ଦେଇଥିଲେ।

ପଟ୍ଟାମୁଣ୍ଡାଇ କଲେଜ ଗଣିତ ବିଭାଗ ଡ୍ରେବିନାର

• ପଟ୍ଟାମୁଣ୍ଡାଇ ପିଏସଏସ
ପଟ୍ଟାମୁଣ୍ଡାଇ କଲେଜ ଗଣିତ
ବିଭାଗ ପକ୍ଷରୁ ଆପ୍ତିକେତନ ଅଫ
କଲ୍ୟାଣ ଉଚ୍ଚ ମାଧ୍ୟମିକୀର
ମଡେଲି ଏ କର୍ଣ୍ଣି ସ୍ତୁତୀକାନ୍ତରା
ମଡେଲି ଶାଶିବ ଡ୍ରେବିନାର
କଲେଜ ଅଧ୍ୟକ୍ଷ ପ୍ରଫେସର
ଅଧିକାରୀ ଉତ୍ତମାକାଶ୍ୟ
ଦାଶଙ୍କ ପୌରପିତ୍ୟରେ ଅନୁଷ୍ଠିତ
ହୋଇଯାଇଛି । ଏଥିରେ ଆସୀମ
ଚେତପୁର ବିଶ୍ୱବିଦ୍ୟାଳୟ ଗଣିତ
ବିଭାଗ ସହକାରୀ ପ୍ରଫେସର ଡ
ବିକ୍ରମକୃଷ୍ଣ ଦେବନାଥ ଯୋଗ
ଦେଇ କାହ୍ନୁପୁର ପ୍ରଫେସର
ଓ ଗଣିତରେ ଇନଭେନଶାଗା
ମଡେଲର ଆବଶ୍ୟକତା ଅଫର୍ସରେ
ବିଶ୍ଲେଷଣ କରିଥିଲେ । ବିଭାଗୀୟ
ମୁଖ୍ୟ ପ୍ରଧାନଙ୍କ ଅନୁମତି ପାଶ୍ଚର
ସାମ୍ବନ୍ଧରେ ଓ ଅତିଥିପରିଚୟ
ପ୍ରଦାନ କରିଥିଲେ । ଶେଷରେ
ଅଧ୍ୟାପକ ଡ ନିର୍ମଳ କୁମାର ସାହୁ
ଧନ୍ୟବାଦ ଦେଇଥିଲେ । ଏହି
କାର୍ଯ୍ୟକ୍ରମରେ ବହୁ ଅଧ୍ୟାପକ,
ଅଧ୍ୟାପିକା ଓ ଛାତ୍ରଛାତ୍ରୀ ଯୋଗ
ଦେଇଥିଲେ ।

A WEBINAR
ON
“SCIENCE IN OUR CULTURE”

Presented by:

Kamalakanta Jena

Associate Professor in Physics & P.G. Co-ordinator,
Bhadrak Auto College, Bhadrak.

on

24TH SEPTEMBER 2020



DEPARTMENT OF PHYSICS
PATTAMUNDAI COLLEGE
PATTAMUNDAI

REPORT

A Webinar was organized by Department of Physics, Pattamundai College, Pattamundai on 24.09.2020 on the Topic "**SCIENCE IN OUR CULTURE**". Prof. Kamalakanta Jena , Associate Professor of Physics, Bhadrak Autonomous College, was the Resource person for the Webinar. In this Webinar, Dr. Ramesh Kumar Sahoo, Head of the Department, gave a key note of the Topic. Principal Prof. Adhikari Laxminarayan Dash welcomed the guest and participants. Sri Baikunth Charan Roul introduced guest of the webinar. The webinar was ended with a vote of thanks by Dipika Rani Dash, a student of +3 3rd year Science.

Dr. Ramesh Kumar Sahoo
H.O.D. and Convenor



OFFICE OF THE PRINCIPAL

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PATTAMUNDAI COLLEGE

NAAC ACCREDITED B+ GRADE

PATTAMUNDAI, KENDRAPARA, ODISHA - 754215

Ref No. : 880

Date..... 18/9/2020

To

Mr. Kamalakanta Jena (O.E.S-1)
Associate Professor in Physics & P.G Co-ordinator
Bhadrak Auto College, Bhadrak.

Sub :- Invitation to act as Resource Person in Extramural Webinar

Sir,

You are cordially requested to act as Resource Person for the Physics
Webinar on "Science in our culture" to be held on 24 .09.2020 at 12.15 pm.

Your consent in this regard is highly solicited.

Yours


Principal 18.9.20

Pattamundai College,



Principal Pattamundai College <pattamundaicollege@gmail.com>

Invitation for Resource Person

2 messages

Principal Pattamundai College <pattamundaicollege@gmail.com>
To: kkjena1@gmail.com

Fri, Sep 18, 2020 at 3:03 PM

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 **scan0001.pdf**
324K

Kamalakanta Jena <kkjena1@gmail.com>
To: Principal Pattamundai College <pattamundaicollege@gmail.com>

Fri, Sep 18, 2020 at 4:44 PM

Thank you sir. It is my pleasure.

KKJena
[Quoted text hidden]

C.V. of Resource Person Prof. KamalaKanta Jena

Prof. Kamalakanta Jena is presently working as an Associate Professor of Physics at Bhadrak Autonomous College, Bhadrak. He is Life member of Odisha Physical Society and editor of Physics Magazine 'DIGBALAYA'. Prof. Jena is popular writer and he has written more than five hundred Science articles. His area of research is Nuclear Physics and he has submitted more than five research papers to Modern Physics Letter E (MPLE) for publication.



DEPARTMENT OF PHYSICS
PATTAMUNDAI COLLEGE , PATTAMUNDAI

Organises
A Webinar on

“SCIENCE IN OUR CULTURE”

Date: 24.09.2020 , Time:12.15 P.M.



RESOURCE PERSON

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Principal
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Dr. Ramesh Kumar Sahoo,
H.O.D Physics & Convenor



Mr. Baikuntha Charan Roul
Sr. Lect. &
Co-Convenor

***SCIENCE IN OUR
CULTURE***

Presented

By

Kamalakanta Jena

Associate Professor Bhadrak Autonomous College

BHADRAK

Our culture is an ancient and one of the most popular culture in the world. India is very well known for its rich culture heritage which is a combination of customs, traditions, lifestyle, religion, language, rituals, cuisine etc. It is a culture of exuberant diversity. Many aspects of our culture and traditions are quite scientific which is not known to vast public. Here, we analysis some of the cases:

1. Joining Both Palms Together to Greet

In our culture , people greet each other by joining their palms-termed as "Namaskar". The general reason behind this tradition is that greeting by joining both the palms means respect. However, Scientifically speaking, joining both the hands ensure joining the tips of allthe fingers together, which are denoted to the pressure points of eyes, ears and mind pressing them together is said to activatethe pressure points which helps us remember that person for a long time.

2. Wearing of Toe Rings:

Wearing toe rings is not just the significance of married women but there is scientific reason behind it. Normally toe rings are worn on the second toe. A particular nerve from the second toe connects the uterus and passes to heart. Wearing toe ring on this finger strengthens the uterus. It will keep menstrual cycle regularized. As silver is a good conductor , it also absorbs polar energie from the earth and passes it to the body.

3. Throwing coins into Rivers

The general perception for this act is that it brings Good Luck. However, scientifically, in the ancient tomes, most of the currency used was made of copper. Copper is a vital metal which is very useful to the

human-body. Throwing coins in the river was one way it was ensured we intake sufficient copper as part of the rivers were the only source of drinking water. Making it a custom ensured that all of us follow the practice.

4. Applying Tilak/kumkum on the forehead:

On the forehead between the two eyebrows, is a spot that is considered as major nerve point in human-body . The Tilak is believed to present the loss of "ENERGY", the red "KUMKUM" between the eyebrows is said to retain energy in the human-body and control the various levels of concentration while applying kumkum the points on the mid-brow region and Adnya-chakra is automatically passed. This also facilitates the blood supply to the face muscles.

5. Bells in Temples:

People who are isiting the temple would ring the bells before entering the inner Sanctum (Grabha Gruha) where the main idol is placed . According general perception, the bell is used to give sound for keeping evil forces away and the ring of the bell is pleasant to God. However, the Scientific reason behind bells is that their rings cleans our mind and helps us stay sharp and keep our full concentration on devotional purpose. These bells are made in such a way that when they produce a sound it creates a unity in our brains. The moment we ring the bells, it produces a sharp and enduring sound which lasts for minimum of 7 seconds in echo mode. The duration of echo is good enough to activate all the seven heading centers in our body.

6. Why We start with Spice and end with Sweet:

Our ancestors have *stressed* on the fact that our meals should be started off with something spicy and sweet dishes should be taken towards the end. The significance of this eating practices is that while spicy things activate the digestive juices and aids and ensure that the digestion process goes on smoothly and efficiently. Sweets or carbohydrates pulls down the digestive process. Hence, sweets were always recommended to be taken as the last item.

7. Why do we applying Mehendi on the hand feet:

Besides lending colour to the hands, Mehendi is a very powerful medicinal herb. It cools the body and keeps the nerves from becoming tense. This is the reason why mehendi applied on the hands and feet, which house nerve endings in the body.

8. Sitting on the floor and eating:

This tradition is not just about sitting on floor and eating, it is , sitting in the "SUKHASANA" position and then eating. SUKHASANA is the position we normally use for Yoga asanas. It helps in digestion.

9. Why We should not sleep with our head towards north:

Myth is that it involves ghost or death but scientifically it is because human body has its own magnetic field and Earth is a giant magnet. When we sleep with head towards north, our body's magnetic field become completely asymmetrical to the earth's magnetic field. That causes problem related to blood pressure and our heart needs to work harder in order to overcome this asymmetry of magnetic fields.

10. Fasting:

Ancient Indian Medical system points out correctly that the basic cause of many diseases is the accumulation of toxic material in the digestive system. Regular cleaning of toxic materials keeps one healthy. By fasting, the digestive organs get rest and all body mechanisms are cleaned and corrected. A complete fasting is good for health and occasional intake of warm lemon juice during the period of fasting prevents the flatulence.

Thank you all

REC



Galaxy A31



Bhishampala Booy

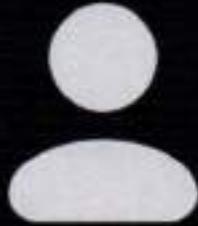


Kamalakanta Jena



Prabodh

REC



Madhusudan Behera



Pattanundai College



Dr. C.R.Mishra



Kamalakanta Jena

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Invite

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Invite

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| SN | Suraj Nayak |   > |

Invite

Registration List For the Webinar "SCIENCE IN OUR CULTURE"

Organised by Department of Physics, Pattamundai College, Pattamundai (Date:24.09.2020)

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DEPARTMENT OF PHYSICS
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Affiliated to Utkal University, Bhubaneswar, Odisha



Certificate of Participation

This is to certify that Mr./Ms./Mrs. PHYSICS of BAL GOPAL MAHAPATRA has actively participated in the Webinar on 'SCIENCE IN OUR CULTURE' organized by Department of Physics Pattamundai College, Pattamundai, Kendrapara, Odisha.

Date: 24th September 2020, Certificate No-RAGXNG-CE000034

R. Sahoo
24.09.2020

Mr. R.K. Sahoo
Convenor

K. Jena

Dr. K. Jena
Resource Person

A.L.N. Dash

Prof. A.L.N. Dash
Principal

THE SAMAJA on 26.09.2020

ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ଷ୍ଟେବିନାର

ପଢ଼ାମୁଣ୍ଡାଇ, ୨୫।୯ (ମି ପ୍ରା): ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ବିଭାଗ ପକ୍ଷରୁ ଆମ ସଂସ୍କୃତିରେ ବିଜ୍ଞାନ ଶୀର୍ଷକ ଆଲୋଚନାଚକ୍ର କଲେଜ ଅଧିକାରୀଙ୍କୁ ଯୋଗଦେଇଛି । ଏଥିରେ ଉଦ୍ଦେଶ୍ୟ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ସହକାରୀ ପ୍ରଫେସର ଜନକାକାଜ ଦେବୀ ଆମ ଦୈନନ୍ଦିନ ଜୀବନର ବିଭିନ୍ନ କାର୍ଯ୍ୟରେ ବିଜ୍ଞାନର ପ୍ରୟୋଗ ଓ ଆମ ସଂସ୍କୃତି ସହ ବିଜ୍ଞାନର ସମ୍ପର୍କ ବିଷୟରେ ଆଲୋଚନା କରିଥିଲେ । ଷ୍ଟେବିନାର ଆକାଂକ୍ଷା ରୂପେ ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ପ୍ରଥମ ଡ. ରମେଶ କୁମାର ସାହୁ ବାବୁ ଉପସ୍ଥିତ ଓ ଅଧ୍ୟାପକ ଦେବୁଶରଣ ରାଉତ ଅଧିକ୍ଷକ ପରିଷଦ ପ୍ରଦାନ କରିଥିଲେ । ଛାତ୍ରା ଦାପିତା ଦାସ ଧନ୍ୟବାଦ ଦେଇଥିଲେ ।

Date 26.09.2020

ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ଷ୍ଟେବିନାର

ପଢ଼ାମୁଣ୍ଡାଇ (ସମ୍ବୁଧ): ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ବିଭାଗ ପକ୍ଷରୁ ଆମ ସଂସ୍କୃତିରେ ବିଜ୍ଞାନ ଶୀର୍ଷକ ଆଲୋଚନାଚକ୍ର କଲେଜ ଅଧିକାରୀଙ୍କୁ ଯୋଗଦେଇଛି । ଏଥିରେ ଉଦ୍ଦେଶ୍ୟ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ସହକାରୀ ପ୍ରଫେସର ଜନକାକାଜ ଦେବୀ ଆମ ଦୈନନ୍ଦିନ ଜୀବନର ବିଭିନ୍ନ କାର୍ଯ୍ୟରେ ବିଜ୍ଞାନର ପ୍ରୟୋଗ ଓ ଆମ ସଂସ୍କୃତି ସହ ବିଜ୍ଞାନର ସମ୍ପର୍କ ବିଷୟରେ ଆଲୋଚନା କରିଥିଲେ । ଷ୍ଟେବିନାର ଆକାଂକ୍ଷା ରୂପେ ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ପ୍ରଥମ ଡ. ରମେଶ କୁମାର ସାହୁ ବାବୁ ଉପସ୍ଥିତ ଓ ଅଧ୍ୟାପକ ଦେବୁଶରଣ ରାଉତ ଅଧିକ୍ଷକ ପରିଷଦ ପ୍ରଦାନ କରିଥିଲେ । ଛାତ୍ରା ଦାପିତା ଦାସ ଧନ୍ୟବାଦ ଦେଇଥିଲେ । ଏହି ଆଲୋଚନାଚକ୍ରରେ ବହୁ ଅଧ୍ୟାପକ/ ଅଧ୍ୟାପିତା ଓ ଛାତ୍ରଛାତ୍ରୀ ଯୋଗ ଦେଇଥିଲେ ।

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ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ଷ୍ଟେବିନାର

ପଢ଼ାମୁଣ୍ଡାଇ, ପି-ଏନ-ଏସ: ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ବିଭାଗ ପକ୍ଷରୁ ଆମ ସଂସ୍କୃତିରେ ବିଜ୍ଞାନ ଶୀର୍ଷକ ଆଲୋଚନାଚକ୍ର କଲେଜ ଅଧିକାରୀଙ୍କୁ ଯୋଗଦେଇଛି । ଏଥିରେ ଉଦ୍ଦେଶ୍ୟ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ସହକାରୀ ପ୍ରଫେସର ଜନକାକାଜ ଦେବୀ ଆମ ଦୈନନ୍ଦିନ ଜୀବନର ବିଭିନ୍ନ କାର୍ଯ୍ୟରେ ବିଜ୍ଞାନର ପ୍ରୟୋଗ ଓ ଆମ ସଂସ୍କୃତି ସହ ବିଜ୍ଞାନର ସମ୍ପର୍କ ବିଷୟରେ ଆଲୋଚନା କରିଥିଲେ । ଷ୍ଟେବିନାର ଆକାଂକ୍ଷା ରୂପେ ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ପ୍ରଥମ ଡ. ରମେଶ କୁମାର ସାହୁ ବାବୁ ଉପସ୍ଥିତ ଓ ଅଧ୍ୟାପକ ଦେବୁଶରଣ ରାଉତ ଅଧିକ୍ଷକ ପରିଷଦ ପ୍ରଦାନ କରିଥିଲେ । ଛାତ୍ରା ଦାପିତା ଦାସ ଧନ୍ୟବାଦ ଦେଇଥିଲେ । ଏହି ଆଲୋଚନାଚକ୍ରରେ ବହୁ ଅଧ୍ୟାପକ/ ଅଧ୍ୟାପିତା ଓ ଛାତ୍ରଛାତ୍ରୀ ଯୋଗ ଦେଇଥିଲେ ।

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ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ

ପଦାର୍ଥ ବିଜ୍ଞାନ ଷ୍ଟେବିନାର

ପଢ଼ାମୁଣ୍ଡାଇ, ୨୫।୯ (ଅପ): ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ବିଭାଗ ପକ୍ଷରୁ ଆମ ସଂସ୍କୃତିରେ ବିଜ୍ଞାନ ଶୀର୍ଷକ ଆଲୋଚନାଚକ୍ର କଲେଜ ଅଧିକାରୀଙ୍କୁ ଯୋଗଦେଇଛି । ଏଥିରେ ଉଦ୍ଦେଶ୍ୟ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ସହକାରୀ ପ୍ରଫେସର ଜନକାକାଜ ଦେବୀ ଆମ ଦୈନନ୍ଦିନ ଜୀବନର ବିଭିନ୍ନ କାର୍ଯ୍ୟରେ ବିଜ୍ଞାନର ପ୍ରୟୋଗ ଓ ଆମ ସଂସ୍କୃତି ସହ ବିଜ୍ଞାନର ସମ୍ପର୍କ ବିଷୟରେ ଆଲୋଚନା କରିଥିଲେ । ଷ୍ଟେବିନାର ଆକାଂକ୍ଷା ରୂପେ ପଢ଼ାମୁଣ୍ଡାଇ କଲେଜ ପଦାର୍ଥ ବିଜ୍ଞାନ ପ୍ରଥମ ଡ. ରମେଶ କୁମାର ସାହୁ ବାବୁ ଉପସ୍ଥିତ ଓ ଅଧ୍ୟାପକ ଦେବୁଶରଣ ରାଉତ ଅଧିକ୍ଷକ ପରିଷଦ ପ୍ରଦାନ କରିଥିଲେ । ଛାତ୍ରା ଦାପିତା ଦାସ ଧନ୍ୟବାଦ ଦେଇଥିଲେ । ଏହି ଆଲୋଚନାଚକ୍ରରେ ବହୁ ଅଧ୍ୟାପକ / ଅଧ୍ୟାପିତା ଓ ଛାତ୍ରଛାତ୍ରୀ ଯୋଗ ଦେଇଥିଲେ ।

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