



**CBCS CURRICULUM OF
POST GRADUATE DIPLOMA IN PLANT
BIOTECHNOLOGY PROGRAMME**

SUBJECT CODE = PGDPBT



The Draft Syllabus of Post Graduate Diploma in Plant Biotechnology Programme (2022-2023) of Ranchi University was placed before the Board of Studies (Botany). The members discussed about the contents of the syllabus in details. Some minor modifications were suggested. All the suggestions were incorporated and thereafter the syllabus was approved by the Members of Board of Studies. (Duly signed copy attached)

✓ 26/3/22

N. K. Pandey
Khandwa
26.3.22

AKJ
26/3/22

Members of Board of Studies of CBCS Syllabus as per Guidelines of the Ranchi University, Ranchi.

**Syllabus Constitution by Board of Studies in Post Graduate Diploma in Plant Biotechnology
Ranchi University, Ranchi
(w.e.f. 2022 Onwards)**

Sl. No.	Name	
1.	Dr. Kunul Kandir Director University Professor & Head University Department of Botany Ranchi University, Ranchi	Chairperson <i>Kandir</i> 26.3.2022
2.	Dr. N. K. Dubey Professor & Head Department of Botany BHU, Varanasi	External Expert <i>N. K. Dubey</i> 26.3.22
3.	Dr. Anwar Mallick Professor (Retd.) Department of Botany V.B.U. Hazaribagh	External Expert <i>Anwar Mallick</i> 26/3/22
4.	Dr. A. K. Srivastava University Professor (Retd.) University Department of Botany Ranchi University, Ranchi	Alumni <i>A. K. Srivastava</i> 26/3/22
5.	Dr. Latika Sharan Associate Professor University Department of Botany Ranchi University, Ranchi	Member <i>Sharan</i> 26.3.2022
6.	Dr. Anita Mehta Associate Professor University Department of Botany Ranchi University, Ranchi	Member <i>Anita Mehta</i> 26.3.22
7.	Dr. Anil Kumar Associate Professor University Department of Botany Ranchi University, Ranchi	Member <i>Anil Kumar</i> 26/3/22
8.	Dr. Radha Krishna Jha Assistant Professor (SG) University Department of Botany Ranchi University, Ranchi	Member <i>Radha Krishna Jha</i> 26/3/22
9.	Dr. Smrity Prabha Assistant Professor University Department of Botany Ranchi University, Ranchi	Member <i>Smrity Prabha</i> 26/3/22
10.	Dr. Ladly Rani Assistant Professor University Department of Botany Ranchi University, Ranchi	Member <i>Ladly Rani</i> 26.3.2022
11.	Dr. Sameer Gunjan Lakra Assistant Professor University Department of Botany Ranchi University, Ranchi	Member <i>Sameer Gunjan Lakra</i> 26/03/2022
12.	Dr. Shweta Nag Assistant Professor University Department of Botany Ranchi University, Ranchi	Member <i>Shweta Nag</i> 26/03/22
13.	Dr. Binod Kumar Mahto Assistant Professor University Department of Botany Ranchi University, Ranchi	Member <i>Binod Kumar Mahto</i> 26/03/2022

Contents

S.No.

Members of Board of Studies

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Ladly Raw
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Anil Kumar
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Rishi
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Shweta Nag
26/03/22

Adh
26/3/22

Sanjay Anjan Singh
26/3/22

Sharan
26.3.22

Kaushik
26.3.22

Prakash
26/3/22

Table AI-2.1 Semester wise Examination Structure for Mid Sem & End Sem Examinations:

Sem	Core, SE/ GE/ DC/ EC & Compulsory FC Courses				Examination Structure		
	Paper	Paper Code	Credit	Name of Paper	Mid Semester Evaluation (F.M.)	End Semester Evaluation (F.M.)	End Semester Practical/ Viva (F.M.)
I	Core Course	CC PGDPBT 101	5	Plant Genetic Engineering	30	70	---
	Core Course	CC PGDPBT 102	5	Crop Improvement	30	70	---
	Core Course	CC PGDPBT 103	5	Secondary plant products and metabolic engineering	30	70	---
	Practical's on Core	CP PGDPBT 104	5	Practical-I	---	---	100
II	Core Course	CC PGDPBT 201	5	Molecular Biology and Techniques	30	70	---
	Core Course	CC PGDPBT 202	5	Bioinformatics, computational Biology and Bioanalytic	30	70	---
	Practical's on Core	CP PGDPBT 203	5	Practical-II	---	---	100
	PROJECT	PR PGDPBT 204	5	Project Work	---	---	100

Leahy Dami
26.3.2022

Anil Kumar
26/3/22
RUMS
26/03/22

Shweta Nay
26/03/22

Sharan
26.3.22

Manish
26/3/22

Ash
26/3/22

Sanjay Gyangan Jaiswal
26/03/22

Kaandee
26.3.22

SEMESTER I

4 Papers

Total 100 x 4 = 400 Marks

I. CORE COURSE [CCPGDPBT101]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100

Pass Marks (MSE:17 + ESE:28)=45

Instruction to Question Setter:

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "Better of Two" shall be applicable for computation of marks for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Plant Genetic Engineering

(Theory 60hr, Tutorial 15hr)

1. Basic concept of plant genetic engineering and enzymes involved in it.
2. Promoters: Tissue specific promoters, characterization of plant promoters.
3. Gene transfer in nuclear genome and chloroplasts; *Agrobacterium*-mediated gene transfer, direct gene transfer, antibiotic marker-free transgenics.
4. Methods for analysis of differential gene expression in plants.

Raw
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Anil Kumar
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Ramesh
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Manish
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Kaushal
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CORE COURSE [CCPGDPBT102]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100

Pass Marks (MSE:17 + ESE:28)=45

Instruction to Question Setter:

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "Better of Two" shall be applicable for computation of marks for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Crop Improvement

(Theory 60hr, Tutorial 15hr)

1. Concept of Plant tissue culture and its significance in crop improvement.
2. Transgenic plants:
 - (A) Herbicides resistance
 - (B) Insect Resistance
 - (C) Disease Resistance
 - (D) Abiotic Resistance
3. Gene silencing: RNAi (PTGS, Antisense technology) and Applications.
4. Genome Editing tools- ZFNs, TALENs and CRISPR-Cas9
5. Biosafety, Bioethics and plant biotechnology

Ladly Devi
26.3.2022

Anil Kumar
26/3/22
RUPNIS
26/03/22

Shweta Nag
26/03/22

Sharan
26.3.22

Ash
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Prakash
26/3/22

Samuel Gungun Kataria
26/03/22

Kaushik
26-3-22

CORE COURSE [CCPGDPBT103]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100

Pass Marks (MSE:17 + ESE:28)=45

Instruction to Question Setter:

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.**

End Semester Examination (ESE):

There will be two groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type of 5 marks.** **Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.**

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "Better of Two" shall be applicable for computation of marks for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Secondary plant products and metabolic engineering (Theory 60hr, Tutorial 15hr)

1. Introduction to Secondary Plant Products: Pathways & Significance/Functions
2. A general account of Nitrogenous compounds and phenolics
3. Pathway Engineering: Principles and case studies.
4. Metabolic engineering for enhancement of secondary metabolites.

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26.3.2022

Anil Kumar
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RND/22
26/03/22

Shweta Naf
26/03/22

Sharan
26.3.22

Prakash
26/3/22

Samuel Gyanjani Laksh
26/03/22

Abhinav
26/3/22
Koushik
26.3.22

II. CORE COURSE PRACTICA [CPPGDPBT104]:

(Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs)

Pass Marks =45

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd. 5 marks).

PRACTICAL-I

Practical: 60Hours

1. Buffer preparation for genomic DNA and plasmid isolation.
2. Isolation of plant genomic DNA from leaves and Plasmid DNA.
3. Restriction digestion of bacterial Plasmid DNA.
4. Agarose gel electrophoresis and Spectroscopy.
5. Preparation of plant tissue culture medium and inoculation of explants into it.
6. Phytochemical analysis of secondary metabolites from plant tissues.

Loddy Dahi
26.3.2022

Anil Kumar
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Rishi
26/03/22

Sheetal Negi
26/03/22

Sharon
26.3.22

Akhil
26/3/22
Suman
26/03/22

Kaushik
26.3.22

Manish
26/3/22

SEMESTER II

4 Papers

Total 100 x 4 = 400 Marks

I. CORE COURSE [CCPGDPBT201]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100

Pass Marks (MSE:17 + ESE:28)=45

Instruction to Question Setter:

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "Better of Two" shall be applicable for computation of marks for SIA.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

Molecular Biology and Techniques

Theory: 60 Hours; Tutorial:15 Hours

1. Gene cloning and techniques.
2. Nucleic acid amplification and its types: RT-PCR, Nested-PCR, Anchored -PCR.
3. Spectroscopy Techniques principle and application.
4. Chromatography Techniques- principle and application of TLC and Paper chromatography.
5. Electrophoretic techniques Theory and applications of Agarose gel electrophoresis; PAGE and SDS-PAGE, e-gel electrophoresis
6. Centrifugation Basic principles and applications.

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Ward
26.3.22

Prakash
26/3/22

Ward
26/3/22

Samir Gujjar
26/3/22

II. CORE COURSE [CCPGDPBT2021]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100

Pass Marks (MSE:17 + ESE:28)=45

Instruction to Question Setter:

Mid Semester Examination (MSE):

There will be two groups of questions in written examinations of 20 marks. Group A is compulsory and will contain five questions of very short answer type consisting of 1 mark each. Group B will contain descriptive type five questions of five marks each, out of which any three are to be answered.

End Semester Examination (ESE):

There will be two groups of questions. Group A is compulsory and will contain two questions. Question No.1 will be very short answer type consisting of five questions of 1 mark each. Question No.2 will be short answer type of 5 marks. Group B will contain descriptive type six questions of fifteen marks each, out of which any four are to be answered.

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "Better of Two" shall be applicable for computation of marks for SIA.

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd, 5 marks).

Bioinformatics, computational Biology and Bioanalytic

Theory: 60 Hours; Tutorial: 15 Hours

1. Introduction to Bioinformatics and Biological database.
2. Computer assisted drug design- concept, methods and practical approaches, various computational methods applied to design the drugs: QSAR and 3DQSAR methods, CADD software demonstration
3. Diagrammatic, graphical and tabular representations of data; measures of central tendency, dispersion, skewness and kurtosis.
4. Basic concepts of hypothesis testing, two kinds of error, level significance, p value, t- Test for mean and difference between two means, partial t-test., and Chi square test for goodness of fit.
5. Analysis of variance for one way and two way classified data.

Loddy Rami
26/3/22
Anil Kumar
26/3/22

Ravi
26/3/22

Sheetal Negi
26/03/22

Sharan
26.3.22

Prakash
26/3/22

Samuel Gyanan Selva
Astash
Abhinav
Kandam
26.3.22

III. CORE COURSE PRACTICAL [CPPGDPBT203]:

(Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs)

Pass Marks =45

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:

(Attendance Upto 75%, 1 mark; 75 < Attd. < 80, 2 marks; 80 < Attd. < 85, 3 marks; 85 < Attd. < 90, 4 marks; 90 < Attd. 5 marks).

PRACTICAL-II

Practical: 60Hours

1. Separation of Pigments by Thin layer Chromatography.
2. Search and Sequence retrieve from genbank database.
3. Alignment of sequence by using tools: ClustalX, ClustalW, Mega and Bioedit.
4. Phylogenetic tree analysis by using Mega software.
5. Primer designing by using online tools.
6. PCR amplification and analysis.

Lady Dami
26/3/2022

Anil Kumar
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Rishi
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Prakash
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Shweta Neg
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Sanjay Gyan
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Abhinav
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IV. CORE COURSE (PROJECT) [PRPGDPBT204]:

(Credits: 05)

Marks : 100 (ESE: 3Hrs)=100

Pass Marks =45

Guidelines to Examiners for

End Semester Examination (ESE):

Overall project dissertation may be evaluated under the following heads:

- Motivation for the choice of topic
- Project dissertation design
- Methodology and Content depth
- Results and Discussion
- Future Scope & References
- Participation in Internship programme with reputed organization
- Application of Research technique in Data collection
- Report Presentation
- Presentation style
- Viva-voce

The distribution of marks will be as follows:

1. Assessment of Project Thesis. 70
2. Describe in brief your work on project with its significance. 10
3. Eminent Scientists related to your project work Scientific Journals related to your project work. 10
4. Viva-voce. 10

PROJECT WORK

Each student **must** submit two copies of the dissertation work duly forwarded by the **Head of the Department and duly signed by the supervisor concerned**. The forwarded copies will be submitted in the Department of Botany, Ranchi University, for evaluation (Seven days before the seminar).

Topics

Each student shall have to complete a project work on any topic of his choice, but relevant to a topic from the concerned special paper, or on a topic allotted by his/her Project Guide/ Supervisor/ Department in Semester -II.

The topic of project should be completed under following heads:

1. Introduction
2. Review literature
3. Materials and Methods
4. Results
5. Discussion
6. Reference

The practical of project should be completed either in the Departmental laboratory or other Institutions.

NB:- Students will select topics for the project work in consultation with a teacher of the department.

The Seminar will be held in the Department of Botany, Ranchi University, Ranchi.

Ladly Devi
26/3/2022

Anil Kumar
26/3/22

Ravi
26/3/22

Shweta Nay
26/03/22

Dharon
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Abhinav Gyangan Lalng
26/03/22

26.3.22

DISTRIBUTION OF MARKS FOR EXAMINATIONS AND FORMAT OF QUESTION PAPERS

Distribution of Marks for Mid Semester Evaluation:

Table No. 15: Distribution of marks of Theory Examinations of Mid Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A	Group B
Mid Sem*	T30*	30 (20 +5 +5)	17	1 Hr	5 x 1 =5	3 (out of 5) x5 =15	05	5

*There shall be 20 marks theory examination for mid semester, 05 marks for attendance/ regular interactions & 05 marks for seminar/ assignment/ term paper given by faculty concerned in classrooms.

Distribution of Marks for End Semester Theory Examinations:

Table No. 16: Marks distribution of Theory Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A# (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A#	Group B
End Sem	T70	70	28	3 Hrs	Q.No.1 (5x1) + 1x5 =10	4 (out of 6) x15 =60	2	6

Question No.1 in Group-A carries very short answer type questions of 1 Mark

Note : There may be subdivisions in each question asked in Theory Examinations.

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26/3/22

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Shohan
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Sanus Gyujan Talwar
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Akhinshara
26/3/22
Khandu
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FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

20 MARKS



Ranchi University, Ranchi

Mid Sem No. _____

Exam Year _____

Subject/ Code _____

F.M. =20

Time=1Hr.

General Instructions:

सामान्य निर्देश :

- Group A** carries very short answer type compulsory questions.
(खंड 'A' में अत्यंत लघु उत्तरीय अनिवार्य प्रश्न हैं।)
- Answer 3 out of 5** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के पाँच में से किन्हीं तीन विषयनिष्ठ/वर्णनात्मक प्रश्नों के उत्तर दें।)
- Answer in your own words as far as practicable.
(यथासंभव अपने भावों में उत्तर दें।)
- Answer all sub parts of a question at one place.
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- Numbers in right indicate full marks of the question.
(पूर्णांक दायीं ओर लिखे गये हैं।)

Group A

1.
2.
3.
4.
5.

[5x1=5]

Group B

6.
7.
8.
9.
10.

[5]

[5]

[5]

[5]

[5]

Note: There may be subdivisions in each question asked in Theory Examination.

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26.3.2022

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Ramesh Chandra Lal
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Ranji
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FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

70 MARKS



Ranchi University, Ranchi

End Sem No.

Exam Year

Subject/ Code

F.M. =70

P.M.=28

Time=3Hrs.

General Instructions:

- Group A** carries very short answer type compulsory questions.
- Answer 4 out of 6** subjective/ descriptive questions given in **Group B**.
(खंड 'B' के छः में से किन्हीं चार विषयों में उ/ वर्णनात्मक प्रश्नों के उत्तर दें।)
- Answer in your own words as far as practicable.
(यथासंभव अपने भावों में उत्तर दें।)
- Answer all sub parts of a question at one place.
(एक प्रश्न के सभी भागों के उत्तर एक साथ लिखें।)
- Numbers in right indicate full marks of the question.
(पूर्णांक दाहिनी ओर लिखे गये हैं।)

Group A

1. [5x1=5]
-
 -
 -
 -
 -

2. [5]

Group B

3. [15]
4. [15]
5. [15]
6. [15]
7. [15]
8. [15]

Note: There may be subdivisions in each question asked in Theory Examination.

Rami
28/3/22

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Suman Gyungam Saha
26/3/22

Abhinav
26/3/22

Prakash
28/3/22