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NCERT

DIPLOMA PROGRAMME IN SCIENCE EDUCATION AT SECONDARY LEVEL

PAC: 23.37

SESSION- 2024-25

Programme Coordinators

Prof.(Capt.) Rashmi Singhai

Dr. Kalpana Maski

REGIONAL INSTITUTE OF EDUCATION, BHOPAL

(National Council of Educational Research and Training)

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Preface

Science Education is closely related to the dynamic variation of curriculum framework of school education. But both pre- and in-service teacher training programmes in India are not synchronizes or tuned with such curriculum changes. Moreover, the changes in attitude towards teaching learning of science is so rapid, that it is very difficult to design a full-fledged teacher education course curriculum keeping in pace with such changes. In that context this type of short duration course is highly beneficial for upgrading the existing knowledge and skill. These courses can accommodate the new challenges comfortably and act as supplementary and complementary to the main programme. It is true that for becoming an effective science teacher voluntariness to learn is highly desirable rather than compulsion to undergo training. NEP 2020 rightly says, "Each teacher will be expected to participate in at least 50 hours of CPD opportunities every year for their professional development, driven by their own interest." Hence, when teachers volunteer for such programme, they develop the ownership for these.

When training is integrated with their job / profession, they can happily incorporate the training elements in their classroom teaching. India is a country with high population and diversified socio-economic condition. India is also a land of multicultural and multi-language. Hence, bringing such a vast country under the single umbrella of a monolithic standard of science education is an uphill task. Even then millions of untrained science teachers are engaged at government and private schools for science teaching. The teacher's and teacher-educator's training programmes in India are also not uniformly designed. Moreover, these one-time pre-service programmes are not enough to prepare a strong base of school science education. Short term in-service training programmes do not seem to be ideally effective. The participants most of the times become passive listener.

They don't utilize the fruits of their training when they go back to their respective workplaces. Keeping the above facts in view, a diploma programme in science education has been designed for in-service science teachers' in-service science teacher-educators / science graduates / post graduates interested in teaching science and doing research in science education / teacher aspirants. Teachers, non-teachers, untrained teachers, teacher aspirants and researchers can benefit by opting for a few such short duration programmes. This two-semesters duration contact-cum-distance programme provides opportunities to develop multicultural and contextual perspectives through various inputs. Hence, such self-guided programme is highly desirable for enhancement of teaching performance of in-service teachers and motivate science graduates, postgraduates and other teacher aspirants (trained and untrained) to opt for a teaching career in school science.

We extend our sincere gratitude to all the participants for their dedication to professional development and their willingness to embrace change in service of student success.

Together, let us embrace the transformative potential of art-integrated, activity-based innovative learning-teaching pedagogical approaches in science education, empowering educators to inspire curiosity, foster creativity, and cultivate a lifelong love for learning science among their students.

Prof. (Capt.) Rashmi Singhai
Dr. Kalpana Maski
(Programme Coordinators)

Acknowledgement

We humbly acknowledge the grace and blessings of Almighty God, whose guidance and support have been ever-present throughout our journey. We are grateful for the strength, wisdom, and providence bestowed upon us, enabling us to undertake this endeavor with purpose and determination.

We are deeply grateful to Professor Dinesh Prasad Saklani, Director, NCERT, New Delhi, India whose guidance and visionary leadership throughout the Diploma Programme have been invaluable

We also extend our sincere thanks to Professor Jaydip Mandal, Principal of RIE, Bhopal for their unwavering support and commitment to excellence, which has been fundamental in realizing the objectives of this initiative.

We extend our sincere gratitude to Professor Chitra Singh, Head Extension Education, for her kind support throughout the capacity-building program. Her invaluable assistance has been instrumental in ensuring the success of this endeavor.

We extend our heartfelt appreciation to all the resource persons who generously shared their expertise and insights during the orientation sessions as well as online sessions in both the semesters/phases of diploma programme in science education at secondary level. Their invaluable contributions have enriched the learning experience and empowered educators to embrace innovative teaching methodologies. We are deeply grateful for their dedication and commitment to enhancing science education.

We extend our sincere gratitude to the resource persons/experts of RIE, Bhopal for their dedicated support and seamless coordination throughout the diploma programme in science education. Their efficiency and professionalism have been instrumental in ensuring the smooth execution of various aspects of the program, contributing significantly to its success. We deeply appreciate their hard work and commitment to excellence.

We also extend our heartfelt appreciation to all the participants who actively attended the programme with great enthusiasm in both online as well as offline mode.

Prof. (Capt.) Rashmi Singhai

Dr. Kalpana Maski

(Programme Coordinators)

DIPLOMA PROGRAMME IN SCIENCE EDUCATION AT SECONDARY LEVEL (DPSE)

Session: 2024-25

List of Resource Persons

1. Prof. C. K. Ghosh, Former Director, NCIDE, IGNOU, New Delhi
2. Dr. R. P. Prajapati, Regional Institute of Education, NCERT Bhopal
3. Dr. Rashmi Sharma, Regional Institute of Education, NCERT Bhopal
4. Dr. Shivalika Sarkar, Regional Institute of Education, NCERT Bhopal
5. Dr. Daksha Parmar, Regional Institute of Education, NCERT Bhopal
6. Dr. Santosh Kumar, Regional Institute of Education, NCERT Bhopal
7. Dr. Ramesh Sethy, Regional Institute of Education, NCERT Bhopal
8. Dr. Kusum, Regional Institute of Education, NCERT Bhopal
9. Mr. L.S. Chouhan, Regional Institute of Education, NCERT Bhopal
10. Dr. J.P. Ahirwar, DMS, NCERT Bhopal
11. Prof. Rashmi Singhai, Regional Institute of Education, NCERT Bhopal
12. Dr. Kalpana Maski, Regional Institute of Education, NCERT Bhopal

CONTENT

1. Introduction

In today's era, where the Education system going through a dynamic change along with the globalization, the role of a teacher has also been changes, as discussed in NEP 2020, teachers must be at the centre of the fundamental reforms in the education system, teachers should be equipped with the 21st century skills needed for this paradigm shift in learning and teaching process. So, to inculcate scientific temperament and creativity, teachers should also upgrade their knowledge with new and innovative pedagogy as well as develop their professional skills and can enhance science education with transformative goals of National Education (NEP) 2020. This program serve as essential platforms for science educators, Science education researchers, aspiring teachers to acquire the requisite knowledge, skills, and strategies to harness the potential of innovative pedagogical strategies in enriching the learning and teaching of science subjects. The NEP 2020, with its emphasis on fostering holistic and experiential learning experiences, critical thinking, art integrated learning as a catalyst for innovation and inclusivity in science education. As such, diploma programme in science education acts as an initiatives adaptation to the principles of NEP 2020 play a crucial role in empowering science educators to adapt to the evolving educational system and equip students with the competencies needed to thrive in the digital age.

This program, aimed to the commitment towards enhancing science education in alignment with the visionary National Education Policy (NEP) of 2020. And to train in-service science teachers (both trained and untrained), aspiring teachers, science teacher educators, science education researchers for enrichment of their professional competences as well as enhancement of their academic careers, and also equip science educators with innovative strategies and tools to effectively integrate into science teaching practices. This is a blended mode programme in which both online as well as face-to-face interaction had been given to the trainees/participants. The duration of the programme was one year with two semester each with two phases (Guided Self-learning and Assignments/practical/ assessment and evaluation).

Through interactive online teaching sessions in Phase I and Phase II, hands-on sessions, and insightful discussions, participants embarked on a journey to explore the transformative potential of new aged innovative teaching pedagogical approach in enriching science learning-teaching experiences. Under the guidance of esteemed experts and facilitators, attendees delved into various facets of activity-based learning, art integration, fostering a collaborative learning environment for nurturing critical thinking, inquiry-based learning, and scientific literacy among students as well as conducive to professional growth and development. Total twenty-six lecture sessions took place during the Diploma Programme. These sessions collectively provided participants with a comprehensive understanding of ICT

tools, art integrated learning, activity-based learning teaching and innovative teaching methodologies tailored for science education, empowering them to enhance their teaching practices in alignment with contemporary educational paradigms.

Unique Features of the Programme

i. Focus on Needs of Indian teachers
ii. Provides opportunity for Culturally Responsive Science Education
iii. Exposure to ICTs in Teaching
iv. Teacher as a Researcher
v. Extension / Holistic Approach / Scientific Temper
vi. The programme is being offered in blended mode for easily accessible to large number of aspirants

Eligibility

Any Science Graduate (with: Physics, Chemistry and *Biology or any branch of Life Sciences as subjects of study at +2 level)

Number of Seats

The maximum number of seats at each centre is 50 (fifty). Reservation of seats for different categories will be applicable as per the Government of India rules.

Duration

The duration of the Programme is one year, spread over two semesters. Each semester has 2 (two) phases. Minimum time to complete the Programme is one year and maximum time to complete the Programme is two years.

Table 1: Semester wise break-up activities

Semester	Phase	Details
Semester I	I	Guided Self-learning
	II	Assignments / Practical / Contact /Assessment and Evaluation
Semester II	III	Guided Self-learning
	IV	Assignments / Projects / Practical / Contact /Assessment and Evaluation

Medium of Instruction

The medium of instruction is bilingual **English/ Hindi**.

2. Curriculum Formulation

Teaching is a two-way interaction between the students and the teachers. And effectiveness of teaching as well as learning is highly influenced by social, cognitive, emotional, cultural and philosophical elements. One of the main facets of science education is understanding the Nature of Science (NOS). It includes knowledge of the scientific worldview. From time-to-time new standards and pedagogical strategies have been evolved by each nation to face the challenges of sustainable science education. These standards also describe what students should know about science and be able to do on completion of secondary education. In a recent need assessment exercise, most of the teachers opined that if training is integrated with their own job/ profession, they can happily incorporate those elements in their teaching. Hence, it is highly imperative that well-designed programmes, such as this, enhance their continuous professional development. Teachers, non-teachers, untrained teachers and researchers can benefit by opting for a few such short duration programmes. Hence, the Programme structure, content, pedagogy, evaluation and other related activities have been identified for a trainee towards fulfilling her/his objectives of performing as a secondary level science teacher, evaluator, teacher educator, researcher in science education. The curriculum is structured on the contextual and contemporary needs of secondary level school science.

The study materials of the DPSE are so designed that these provide appropriate direction and right answers to queries hitherto unexpressed. Besides, the interactions envisaged should help them assess their own understanding and knowledge and reflect on their own performance without any inhibition. Moreover, one-time pre-service programmes are not enough to prepare a strong base of school science education. Short term in-service training programmes do not seem to be ideally effective. That is, trainees are, in general, not able to utilize the benefits of their training when they go back to their respective workplaces. This Diploma Programme is an attempt to overcome such limitations.

3. Programme Structure

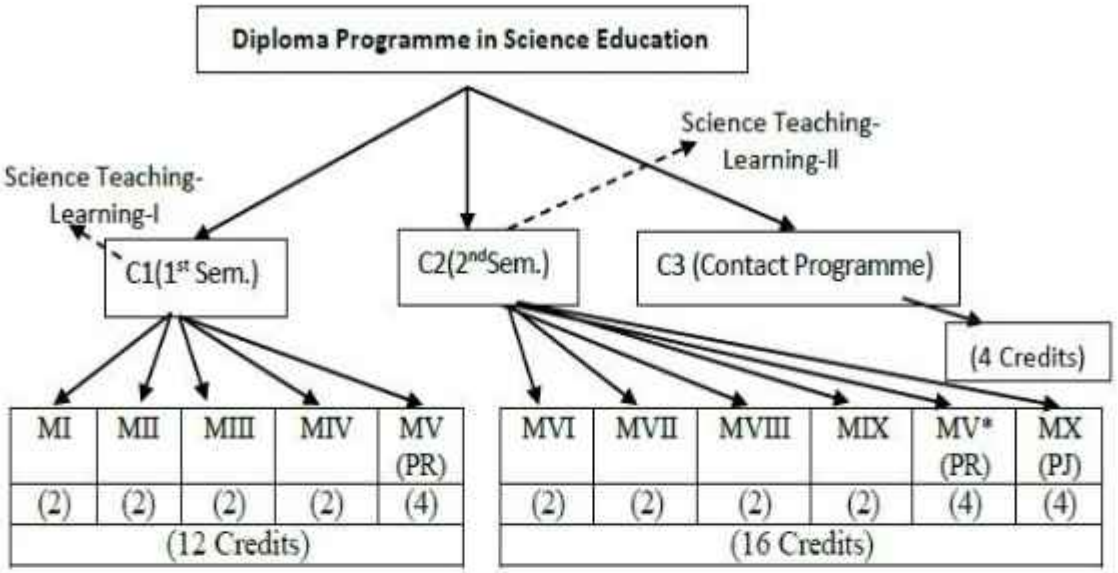
The Diploma Programme in Science Education comprises three components: theoretical instruction, practical work and project. The theory component is in line with the basic elements required for training teachers, teacher educators, and researchers in science education. The Programme structure focuses on content analysis, content organization, conceptual clarity, content enrichment and applications of Pedagogical Content Knowledge (PCK) through ICTs and TPCK. It helps in acquiring competencies in process skills for

- *learning outcomes,*
- *principles of approaches to student evaluation,*
- *outreach programmes/activities,*
- *self-reflection/motivation/attitudes,*
- *research methodology,*
- *teaching as research,*
- *development of test items,*
- *research paper writing,*
- *awareness about online programmes, Massive Open Online Courses (MOOCs) and ICT resources,*
- *development of professional ethics, and programme planning and management.*

Modules and Guides

One Credit is equivalent to 30 hours of study time for this programme which is inclusive of all learning activities from the point of view of a standard learner. The total number of credits associated with the Programme is 32. Each Unit has been designed so as to be covered by a standard learner in five to six hours of reading time. These hours will include reading and comprehension of the contents.

Distribution of Courses (C) and Credits

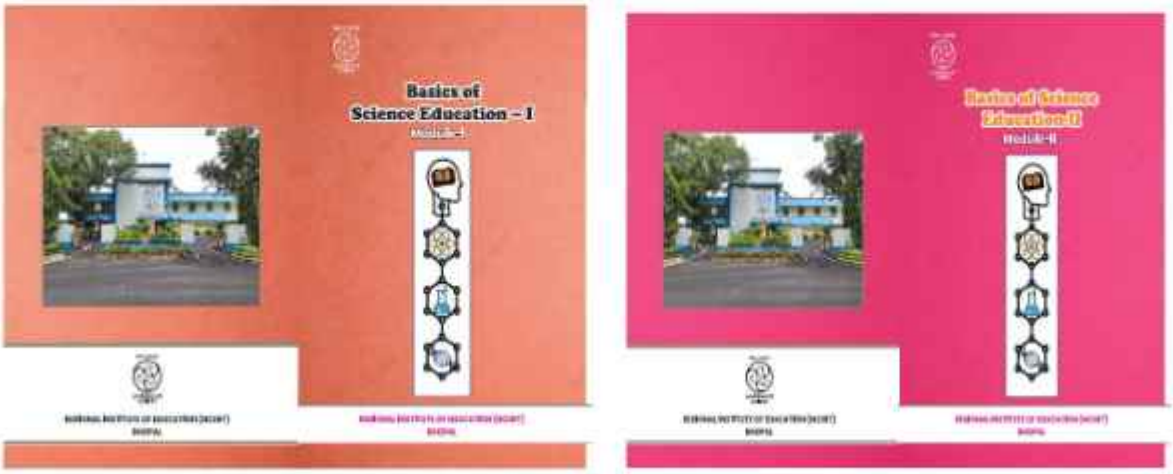


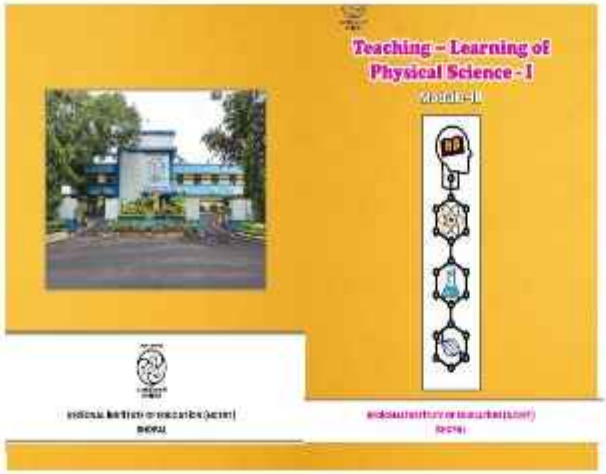
Total Credits = 12 + 16 + 4 = 32

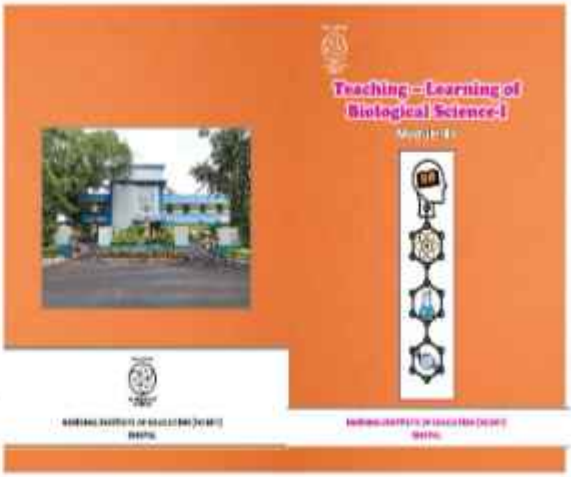
C1- Course One, C2 – Course Two, C3 – Contact Programme, M – Module, PR – Practical, PJ – Project

*** Module V (MV) appears in both the semesters. There is one Practical Manual covering activities spread over two semesters. The students will get ONE manual and work with it for four credits each in the two semesters.**

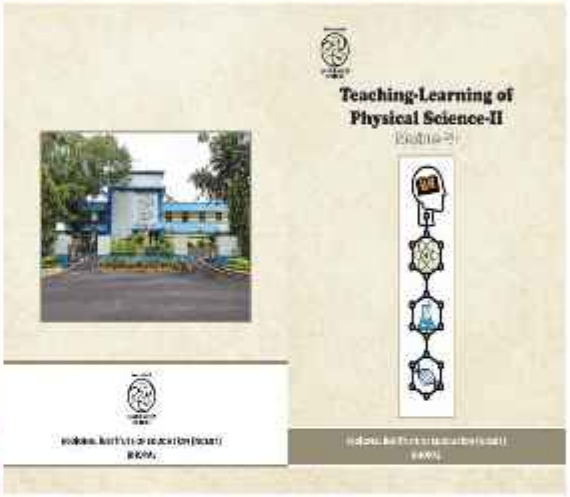
Figure 1: DPSE Course Modules I to X

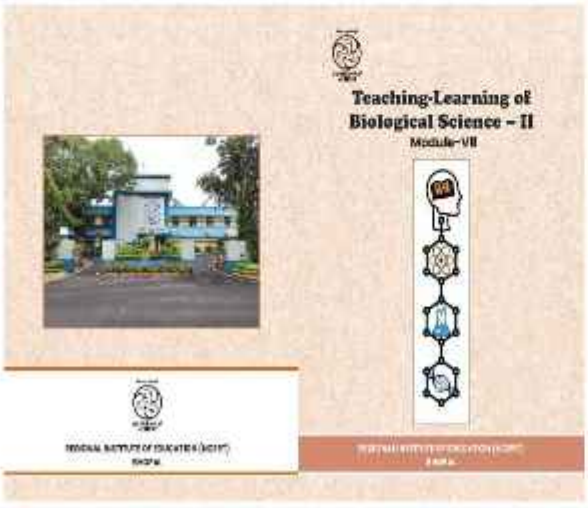


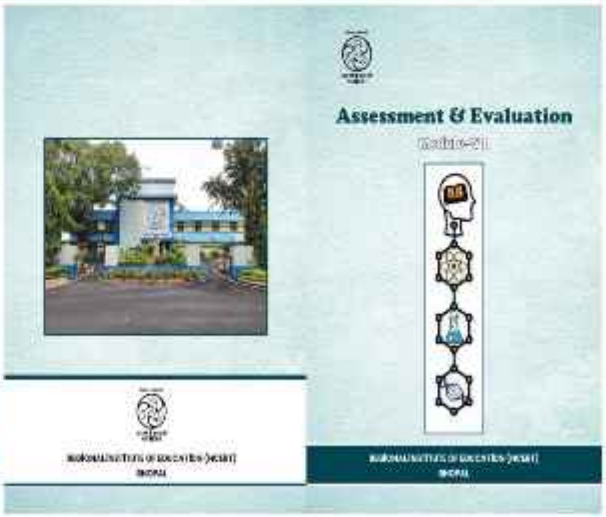

Teaching – Learning of
Physical Science - I
Module-II

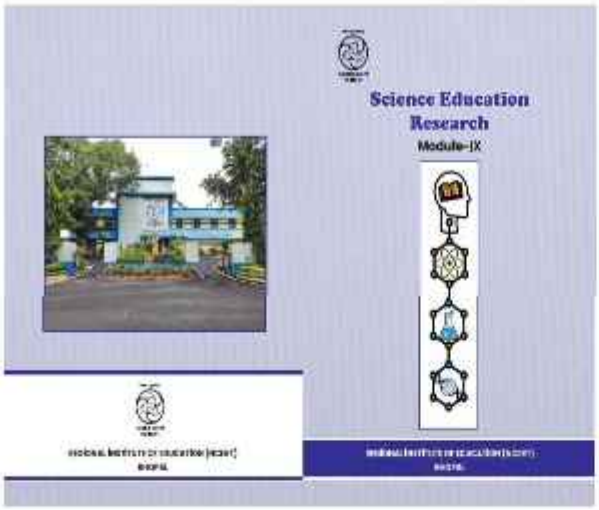

Teaching – Learning of
Biological Science-I

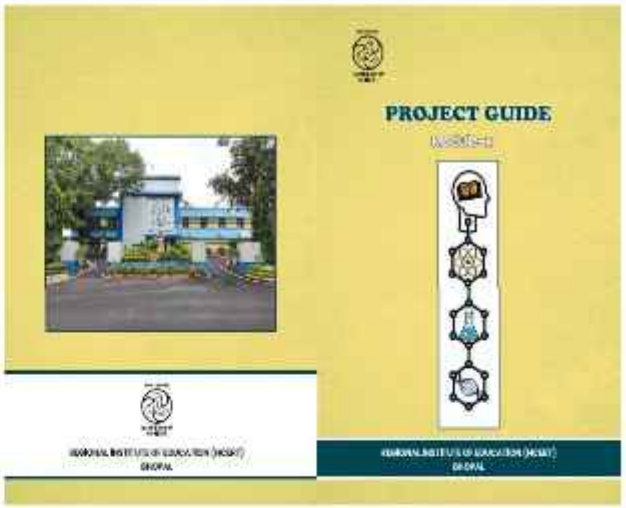

PRACTICAL MANUAL
Module-V


Teaching-Learning of
Physical Science-II


Teaching-Learning of
Biological Science – II
Module-VII


Assessment & Evaluation





Admission Procedure

Candidates desirous of seeking admission in the Programme will be required to fill in the prescribed application form. The form should be downloaded well before the last date of submission from the NCERT website (www.ncert.nic.in) or from the respective RIE websites after the advertisement. The form has to be submitted online as well as in hardcopy. After filling the application form, please take its print out and sent to the study centre under whose jurisdiction your residential/working place falls. You should refer to the addresses of the Study Centres and their respective jurisdictions

A deputed candidate should submit her/his application through proper channel. Getting the deputation from the competent authority is the solely your responsibility and the study centre will not be responsible for this in any way. Applications complete in all respects should be submitted electronically within the last date mentioned in the advertisement to the study centre chosen by applicants. A printed version of the electronically submitted application form along with the self-attested copies of marks /grade sheets /degrees/certificates in support of qualifications and work experience should be sent to the study centre concerned by Speed Post.

Selection Procedure

Screening was done according to the criteria laid down by the NCERT/. After collection of application forms, selection procedures started where eligible candidates were given question paper in google form through Email for a selection test procedure. List of selected candidates was notified on the website. Selected candidates as per the rules came with all required certificates / documents which was verified against the originals in the Regional Institute of Education (RIE, NCERT, Bhopal as study centres within the time stipulated in the selection list. ***The admission remains valid for a period of two years from the date of admission.***

Google form link of Selection test paper for DPSE 2025 Applicants:

https://docs.google.com/forms/d/e/1FAIpQLSdlepVRGJFl8KlNiQfxXeXaG61ClHIjV_rqpgViVFRVk8EJPw/viewform

4. Transaction Of the Programme

The Programme was transacted in the ***blended mode*** *(Distance mode plus Face-to-face Mode) comprising* out of campus self-study as in distance mode and face-to-face contact during the Contact Programme.

a. Distance Mode

In the **Distance Mode (off Campus),** the trainees are expected to acquire comprehension skills of the self-learning materials and answering the self-check exercises. A trainee will learn from the teacher in-built in the course materials.

b. Face- to- Face Mode

In the **Face-to-Face Mode (On Campus Contact Programme),** the trainees/ participants go the opportunity to interact with the coordinators and other resource persons at the study centres for four-fold purposes:

- Clarification of their doubts/queries concerning the content of self-learning materials.
- Reporting about the practical work and submitting the final report thereof.
- Discussion and presentation about the projects and submission of final report thereof.
- Appearing in Theory Examinations and attending Grand Viva-voce.

Study Materials

The Programme used print and ICT resources as tools of instruction. The printed study material in self-learning format was prepared by eminent experts from within NCERT from outside with long standing experience in teaching science, preparation of teachers and teacher educators, science education research and programme designing. The preparation of materials had been an extensive exercise undertaken by a team of experts pooled by RIE, Bhopal, NCERT, India. The distinctive feature of the print materials is simple and easy to comprehend language. In all there are 46 Units* across eight (out of a total of eleven) Modules*. In addition, there is a

Programme Guide, Practical Manual and a Project Guide.

Practical

Practical is an integral component of every science programme. Likewise, DPSE also has a significant hands-on component in this Programme. Trainees will have to do Practical in both semesters. The experiments are so planned that these can be performed at their schools/workplaces or even at their homes. The details about conduct, reporting and evaluation of practical in both semesters are provided through the Practical Manual (Module V).

Project

In addition to Theory and hands-on Practical, Project is also an essential component of this Programme. It will help the trainee to prepare themselves for facing real life situations. Project work is to be done in both semesters and the report will have to be submitted during Semester II as per the notified schedule. The trainees are expected to do the Projects based on guidelines provided in the Project Guide (Module X).

As per the protocol of the design of the programme an orientation programme was organized by the programme coordinator, Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski, for the first contact (face-to-face mode) in the RIE campus, Bhopal, where all the participants were orientated about the Diploma programme along with its significance. Total 15 participants/trainees were enrolled in this course/programme for the session 2024-25. The detailed descriptions of the orientation along with lecture sessions are presented below in sequential order.

Orientation Programme in Science Education at secondary level
Session 2024-2025
Date: August 21-23, 2024

Day-1

21 August 2024

Time: 9.30 -11.00 am

Session I: Registration and Inaugural Session

" I never teach my pupil, I only provide the conditions in which they can learn" with this objective to facilitate the learning teaching process in order to promote critical thinking and innovations, curiosity, hand on experiences, A three -day Orientation on Diploma Programme in Science Education (DPSE) at Secondary Level-2024 was organized by Regional Institute of Education, NCERT and coordinated by Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski from August 21-23, 2024.

Commencing with the inauguration ceremony by Dr. Rashmi Singhai, Head and Professor, Department of Education in Science and Mathematics, Regional Institute of Education, NCERT, Bhopal and Dr. Kalpana Maski, Assistant Professor (Physics) followed by a warm welcome of Dr. Jaydip Mandal, Principal of Regional Institute of Education, NCERT, Prof. CK Ghosh, Former Director, NCIDE, IGNOU, New Delhi, Prof. Ashwani Garg, Head DEE, Dr. Daksha Parmar, Assistant Professor (Botany), DESM, RIE and participants attended the orientation programme. Programme began with introducing the significance of Diploma Programme in Science Education (DPSE-2023) by Prof. (Capt.) Rashmi Singhai, Head DESM & Coordinator, discussing the objectives and significance of the programme in the light of National Education Policy (NEP) 2020. With eloquence and insight, Prof. (Capt.) Rashmi Singhai underscored the importance of such initiatives in fostering professional growth and development, as well as training science teachers (trained/ untrained), science teacher educators, science graduates / post graduates, teacher aspirants, researchers to become professionally more competent in science education. She also emphasized how the program aimed not only to enhance pedagogical practices but also to empower educators with the necessary 21st century skills and competencies to effectively integrate Information and Communication Technology (ICT), reflective thinking, inquiry-based learning in science education which inculcate scientific temperament and interest and thereby fostering deeper understanding and retention among students. in science

education. Dr. Maski's remarks set the stage for an engaging and purposeful exchange, highlighting the transformative potential of the program in shaping the educational landscape in alignment with the mandates of the NEP 2020.

In her address, Prof. Rashmi Singhai, representing the Regional Institute of Education Bhopal, elucidated on the necessity of prioritizing the needs and interests of the learners, emphasizing their active engagement and participation in the learning process.

Prof. (Capt.) Rashmi Singhai's insightful discourse underscored the crucial synergy between innovative pedagogical approaches and the overarching goals of the NEP 2020, So in order to upgrade the teaching strategies and techniques, equipping science teachers with quality so that they can overcome the educational challenges and issues and provide quality education to the child. Hence, this Diploma programme in science education has been designed keeping in mind the paradigm shifts in learning teaching in science education, in the light of NEP 2020. During orientation participants were oriented about the how classes/sessions will be taken by our esteemed educational experts/resource persons timely where participants will be trained about how to embrace child-centric learning methodologies, innovative teaching strategies that can be adopted while teaching such that complicated problems can be presented in a simpler way to the students and they can be given opportunity of experiential learning through basic household materials.

The participants also received ten course modules including Biological Science and Physical Science prepared by different educational experts of their fields. These ten course Modules include **Module I:** Basics of Science Education-I, **Module II:** Basics of Science education-II, **Module III**: Teaching-Learning of Physical Science-I, **Module IV:** Teaching-Learning of Biological Science-I, **Module V**: Practical Manual, **Module VI:** Teaching-Learning of Physical Science-II, **Module VII:** Teaching-Learning of Biological Science-II, **Module VIII:** Assessments and Evaluations, **Module IX:** Science Education Research, **Module X:** Project Guide. During their visit, the participants were also taken for a visit to the STEAM Park in the RIE Bhopal campus. Whereas in Online mode participants were given online sessions/classes through Google meet.

Since this diploma programme follow blended mode, hence at the end of the semester-II (phase II) participants/trainees visited RIE, Bhopal for contact mode for final examination which was conducted through pen-paper mode. They also submitted their practical record and project/ research work after the viva-viva. As per the programme guide/norms, participants received Diploma programme certificate along with the Grade report signed by Prof. Dinesh Prasad Saklani, Director, NCERT, New Delhi

Concluding the inaugural session, Dr. Kalpana Maski, extended heartfelt gratitude to all the dignitaries as well as participants for their presence and engagement in the Orientation program session 2024-25. Drawing from his wealth of experience, Dr. Jaydip Mandal emphasized the paramount importance of nurturing experiential learning among students, advocating for a pedagogical approach on "learning by doing."

He underscored the transformative impact of hands-on experiences in fostering deep understanding and mastery of concepts, urging educators to cultivate environments conducive to active exploration and discovery.

His poignant remarks resonated with the audience, inspiring a renewed sense of purpose and determination as they embarked on their journey towards empowering the next generation of learners.

Day-1

21 August 2024

Session-II

Time: 11.15-12.45 pm

Title: Introduction to DPSE-2023 and CBCS

Resource Person: Prof. C.K. Ghosh

Former Director, NCIDE, IGNOU, New Delhi

In the Second session led by Professor C.K. Ghosh from Former Director, NCIDE, IGNOU, New Delhi, the spotlight was firmly on began the first session of the workshop with the Introduction to the Choice Based Credit System and evaluation of the courses following grading system.

Day-1

21 August, 2024
Session-III
Time: 2.00 – 3.30 pm

Title: Basics of Physical Science (Chemistry)
Resource Person: Dr. R. P. Prajapati
Associate Professor (Chemistry), RIE, NCERT, Bhopal

The next session post lunch was addressed by Dr. R. P. Prajapati, Associate Professor (Chemistry), RIE, NCERT Bhopal, where he discussed about " **Basics of Physical Science (Chemistry)**,"

Throughout his presentation, he discussed about the concepts of basic chemistry, molecular mass, atomic mass, and molar concepts and at the end participants actively participated in ICT based MCQs quiz conducted by sir. Demonstrating participants how small quiz can lead to active participation of children in their classroom integrating digital approach.

Day-1

21 August, 2024

Session-IV

Time: 3.45 – 5.15 pm

Title: Basics of Biological Science

Resource Person: Dr. Daksha Parmar

Assistant Professor (Botany), RIE, NCERT, Bhopal

Dr. Daksha Parmar, Assistant Professor (Botany), RIE, Bhopal, took the reins for the fourth session of the day, titled " Basics of Biological Science" where she discussed the need and scopes of Biological Science in today's changing era, interdisciplinary nature of science and pedagogical various teaching-learning strategies/ approaches to introduce the Basic concepts of Biological Sciences and how to inculcate scientific temperament in the students and also encourages the participants to think beyond the box. The session became interesting when participants started discussing their issues and concern by them while transacting the concepts at secondary level while teaching science.

Day-2

22 August, 2024

Session-I: Introduction to Physical Science (Physics)

Time: 9.30 – 11.00 am

Resource Person: Prof. C.K. Ghosh

Former Director, NCIDE, IGNOU, New Delhi

In the opening session of second day, Prof. CK Ghosh discussed the Basics of Physical Science explaining the physical laws through assumptions, analogies and hypotheses.
He discussed the Four Pillars of Delor's Report with the participants.

Prof. CK Ghosh underscored the importance of shifting the educational paradigm towards a learner-centric approach, emphasizing the need for flexibility in teaching and learning processes. Teachers need to be active to make students active, they should also understand psychology of student to make the learning process to go with their pace of understanding and also should build a good relationship with them to make the entire process effective.
His insights served as a catalyst for educators to reflect on their pedagogical practices and explore innovative strategies for empowering learners in the digital age.

Day-2

22 August, 2024

Session-II: Introduction to Project (Physical Science)

Time: 11.15 -12.45 pm

Resource Person: Prof. C.K. Ghosh

Former Director, NCIDE, IGNOU, New Delhi

Second session continued by Prof. CK Ghosh with the discussion on project related to physical science, outline of projects cum research work/synopsis. He also explained the importance of project work in providing meaningful insights into the subjects' content to the students in teaching-learning process.

His focus was on harnessing the power of research practices to enhance the teaching-learning process. As this help in diagnosing the problems faced by students in learning as well as during learning and a teacher can solve the problems with proper remedial teaching strategies to overcome the challenges.

The Programme strives to make the trainees appreciate that research and teaching are complementary to each other and research investigation enhances capacity and competency. The inbuilt research component of the programme is an indispensable element for self-motivation to teach science.

Day-2

22 August, 2024

Session-III

Time: 2.00-3.30 pm

Title: Discussion on Project (Biological Science)

Resource Person: Dr. Daksha Parmar

Assistant Professor (Botany), RIE, NCERT, Bhopal

During the session led by Dr. Daksha Parmar, Assistant Professor (Botany), RIE, Bhopal, discussed various themes in Biological Science for the Project selection by participants that focuses on an active research outlook. Participants were shown some previous year research project work for their better understanding. an interactive session was conducted in which the participants discussed their queries regarding Project selection. She also provided educators with valuable insights by making them understand that, teaching and research mutually supporting. This Programme strives to provide this orientation and help in capacity and competency building of participants for fruitful learning teaching of science. As a matter of fact, research in science education is a big activity these days. Therefore, a well-designed programme such as this can establish a base for research in science education.

In addition to this, she also explained why this programme includes project cum research work, as its essential for students also to get opportunities for hands-on experiences, Hence, Project is also an essential component of this Programme. It will help the participants/trainees to prepare themselves for facing real life situations. Project work report will have to be submitted during Semester II as per the notified schedule. The trainees/participants were expected to do the Projects based on guidelines provided in the Project Guide under the guidance of their selected Project Guide.

Day-2

22 August, 2024

Session-IV

Time: 3.45 – 5.15 pm

Title: Visit to STEAM Park

Resource Person: Dr. Shivalika Sarkar

Assistant Professor (Physics), RIE, NCERT, Bhopal

In the fourth session, participants embarked on a short trip to the STEAM Park in RIE, Bhopal, as part of a field trip aimed at providing hands-on learning experiences. This excursion provided an opportunity for trainees/participants to observe and engage with the exhibits firsthand, fostering a deeper understanding of scientific concepts in a real-world context. Throughout the session, Dr. Shivalika Sarkar, Assistant Professor (Physics) from RIE, NCERT, Bhopal delved into various aspects of multidisciplinary approach for better and quality science education as per NEP 2020 and its implications for enhancing learning experiences in school education in an interactive way which will in turn cater the diverse needs of students, including those with special needs, thereby fostering inclusivity and accessibility in education.

By delving into the realm of nature, showcasing various models, such as Law of conservation of energy (Newtons Craddle), Blast Furnace Model, Periodic Table, etc. led participants gained a deeper understanding of the transformative potential of integrating different subjects in shaping the future of science education.

Day-3

23 August, 2024

Session-I

Time: 9.30 – 11.00 am

Title: Research Methodology

Resource Person: Prof. C.K. Ghosh

Former Director, NCIDE, IGNOU, New Delhi

Day 3 of the orientation on Diploma programme in science education commenced with a warm welcome from Prof. C.K. Ghosh, setting the tone for an enriching and productive day ahead. He explained how doing a research work can develop ability to acquire and use the method of science. This includes observing; questioning; planning investigations; hypothesizing; collecting relevant samples and preserving them in pure forms, comparing and grouping, analyzing and interpreting data obtained from different sources.

And how to draw scientific inferences and provide explanations with evidences and justifications while thinking critically to address and evaluate alternative explanations, providing trainees/participants with valuable insights and resources to enhance the teaching and learning experience. The session was hailed as interactive and knowledgeable, leaving attendees inspired and equipped with the knowledge and skills to integrate technology and multidisciplinary approach for effective use into their science classrooms. Participants were got the experiential learning experience when taken to physics lab for performing various experiments explained by sir.

Day-3

23 August, 2024

Session-II

Time: 11.15 – 12.45 pm

Title: Basics of Practical (Chemistry/Physics/Biology)

Resource Persons: Dr. R.P. Prajapati, Associate Professor (Chemistry), RIE, NCERT, Bhopal

Dr. Kusum, Assistant Professor (Zoology), RIE, NCERT, Bhopal

and Dr. Ramesh Sethy, Assistant Professor (Zoology), RIE, NCERT, Bhopal

In the following session led by In Chemistry laboratory, Dr. R.P. Prajapati, Associate Professor (Chemistry), RIE, Bhopal demonstrated few practicals like separation of immiscible liquid and sublimation: crystal formation of Iodine, it was observed that participants were very excited and attentive while he was demonstrating the practical.

Participants were tasked to perform the experiment, allowing them to explore the practical application and got hand on learning experience.

Dr. Kusum, Assistant Professor (Zoology) and Dr. Ramesh Sethy, Assistant Professor (Zoology) explained as well as demonstrated the procedure of DNA separation techniques and Tissue culture. Participants also discussed their queries related to the practicals. The session was very interactive and informative for the participants.

Day-3

23 August, 2024

Session-III

Time: 2.00 -3.30 pm

Title: Discussion with the Participants

Resource Persons: Prof. (Capt.) Rashmi Singhai, Professor of Chemistry, Head of the Department DESM, Programme Coordinator, RIE, NCERT, Bhopal

Dr. Kalpana Maski, Assistant Professor (Physics), Programme Coordinator, RIE, NCERT, Bhopal

In the third session first participants were taken for a visit to Library in the RIE Bhopal campus where they got the opportunity to know the latest facilities provided to the students for their self-study, digital resources for enhancement of learning experiences for students.

In the last session, an interactive discussion with the participants conducted by Prof. (Capt.) Rashmi Singhai, Head DESM & Coordinator and Dr. Kalpana Maski, Assistant Professor (Physics), RIE, Bhopal where the participants shared their experiences during the orientation programme as they got the opportunity to know various pedagogical approaches for teaching science and how to enhance scientific temperament among the students. They also discussed different challenges faced by them while teaching science in the classroom. The participants gave valuable feedback and appreciated the programme, they expressed their appreciation for the program coordinators as well as resource persons from RIE Bhopal.

Day-3

23 August, 2024

Session-IV

Time: 3.45 -5.15 pm

Title: Valedictory

Resource Persons: Prof. (Capt.) Rashmi Singhai, Professor of Chemistry, Head of the Department DESM, Programme Coordinator, RIE, NCERT, Bhopal

Dr. Kalpana Maski, Assistant Professor (Physics), Programme Coordinator, RIE, NCERT, Bhopal

At the end of the orientation program, programme Coordinator Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski gave vote of thanks and appreciated the active participation of all the participants as well as all the resource persons, who made the programme successful and interactive. Prof. (Capt.) Rashmi Singhai, in her closing remarks, extended gratitude to the entire team at RIE Bhopal for their unwavering support and dedication.

Diploma Programme in Science Education at Secondary Level (DPSE) Semester I (Online Mode)

The Diploma Programme in Science Education comprises three components: theoretical instruction, practical work and project. There will be an additional component of school exposure for trainees not having any professional qualification in Teacher Training. The theory component is in line with the basic elements required for training teachers, teacher educators, and researchers in science education. The Programme structure focuses on content analysis, content organization, conceptual clarity, content enrichment and applications of Pedagogical Content Knowledge (PCK) through ICTs and TPCK.

It helps in acquiring competencies in process skills for:

- learning outcomes,
- principles of approaches to student evaluation,
- outreach programmes/activities,
- self-reflection/motivation/attitudes,
- research methodology,
- teaching as research,
- development of test items,
- research paper writing,
- awareness about online programmes, Massive Open Online Courses (MOOCs) and ICT resources,
- development of professional ethics, and
- programme planning and management.

Table 1: Detail breakup of DPSE 2024-25 Semester I

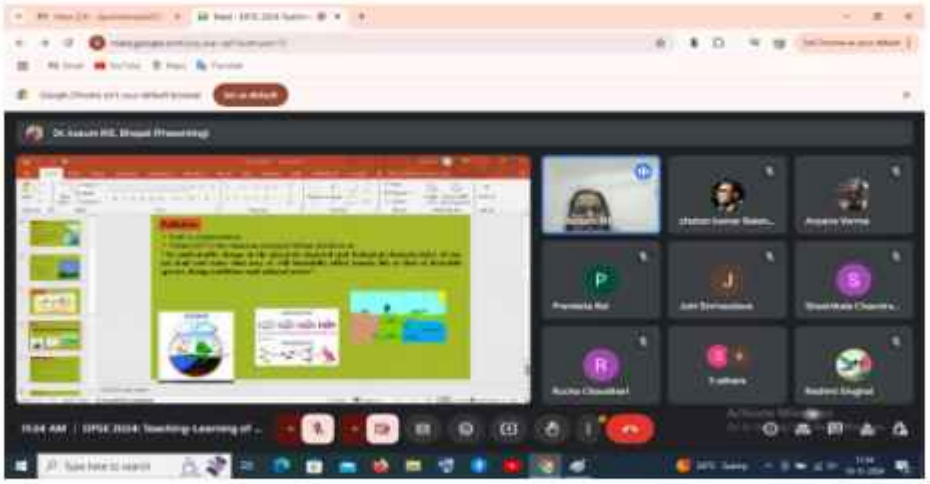
Semester – I	
Phases	**Activities**
Phase – I	**A. (5- Day Contact Programme)** a. Distribution of Materials b. Orientation on Modules I to IV, Practical Guide (Module V) c. Preparation of assignment sheets and its validation by experts
Phase	**Online Mentoring**

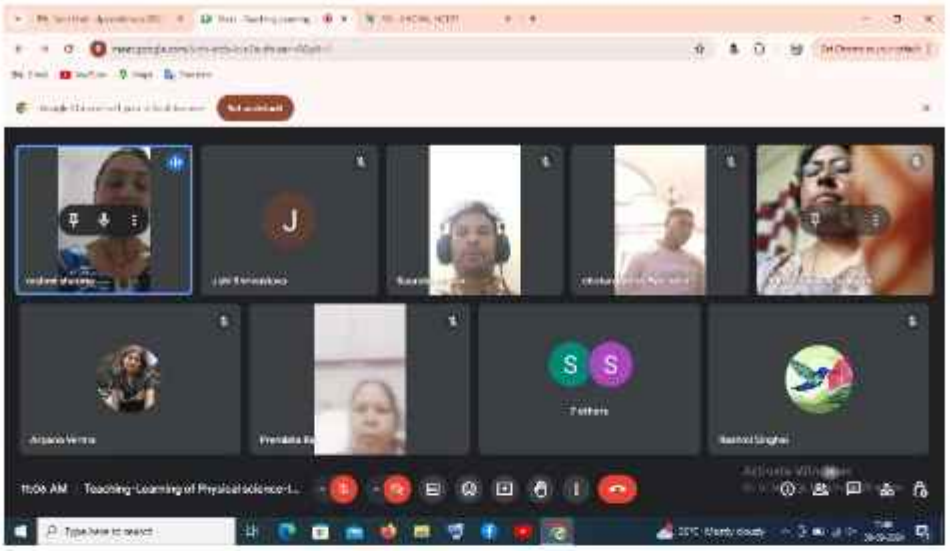
– II	a. Doubt clearing classes for Module I to IV b. Theory Examination c. Evaluation of Assignments, evaluation of exam papers, evaluation of practical procedures and reports etc.

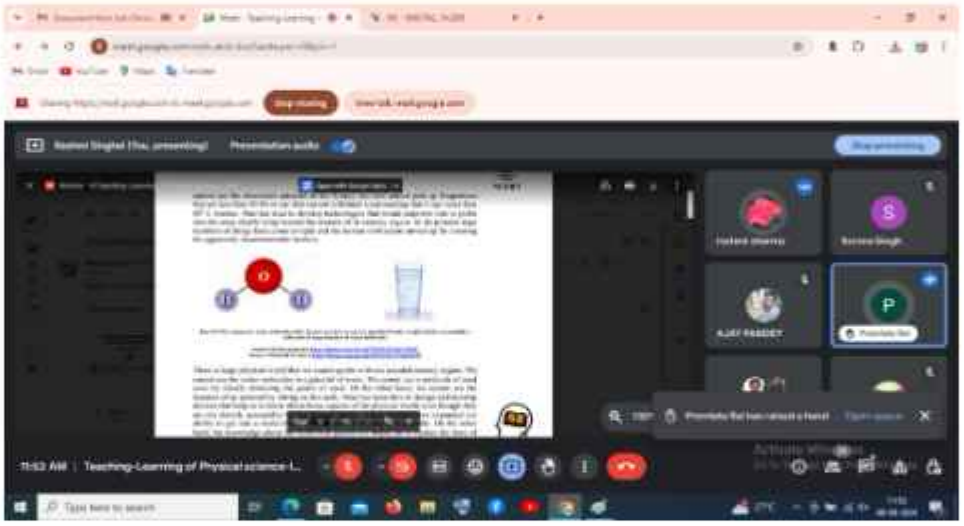
Transaction of Programme

The Programme will be transacted in the ***blended mode*** comprising out of campus self-study as in distance mode and face-to-face contact during the Contact Programme. In online mode, classes were taken through google meet as per the prepared time table, where medium of transaction used was bilingual (English as well as Hindi). Given below is the detailing of classes conducted through online mode following the blended mode as per the design of the programme.

This semester I was comprehensive coverage of the program, which comprised 13 Lecture sessions (these sessions were on four course modules including Biological Science and Physical Science. They are **Module I:** Basics of Science Education-I, **Module II:** Basics of Science education-II, **Module III**: Teaching-Learning of Physical Science-I, **Module IV:** Teaching-Learning of Biological Science-I, **Module V**: Practical Manual.) dedicated to demonstrating and elucidating the significance of various innovative pedagogical and multidisciplinary approaches in science learning and teaching, enabling participants to create dynamic and interactive learning environments that cater to the diverse needs of the students, and also the transformative potential of ICT, art integrated learning, activity based learning in enhancing conceptual understanding, fostering critical thinking skills, and promoting experiential learning in science education as per the National Education Policy (NEP) 2020. Practical work was also started by the participants which included 5 practicals each for Biology, Chemistry and Physics.







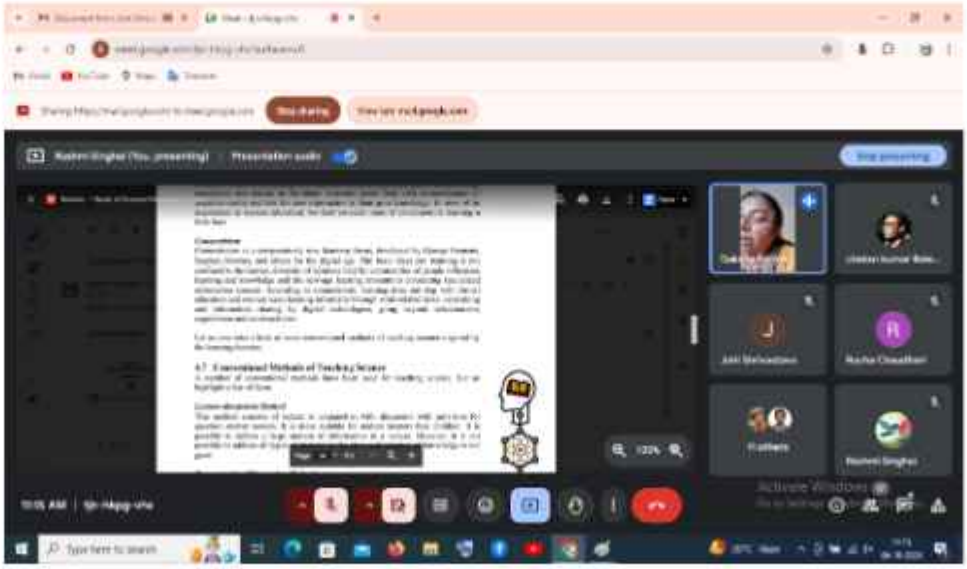


Table 2: Given below is an overview of the lectures conducted in semester I (Online Mode)

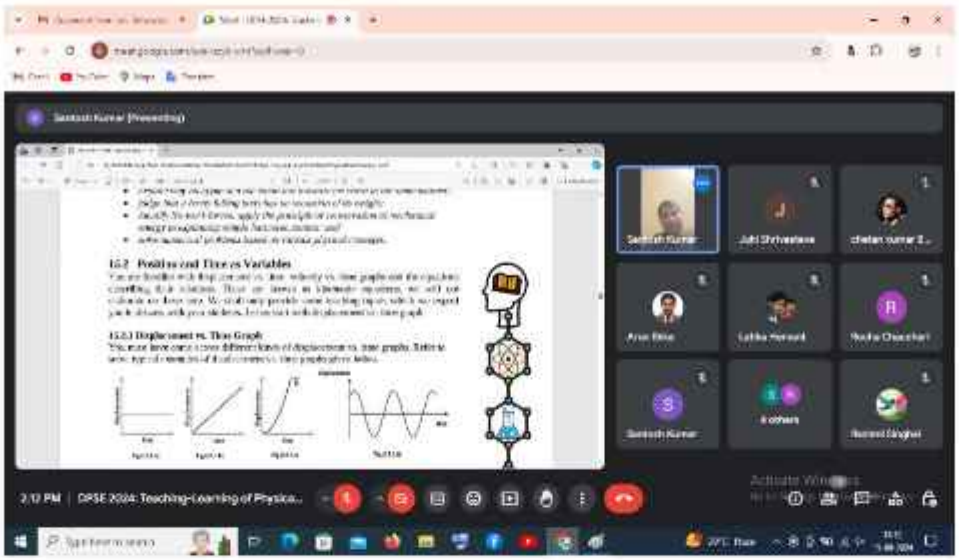
S. No	Dates	Course Modules	Units covered	Resource Person
1.	08-09-24	**Module-III**: Teaching-Learning of Physical Science-I	**UNIT- 13:** Prelude 1: Teaching-learning of Physical Science–I **UNIT 14**: Prelude 2: Teaching-learning of Physical Science – I	Dr. Rashmi Sharma
2.	15-09-24	**Module-III:** Teaching-Learning of Physical Science-I	**UNIT- 15:** Core Essentials-I: Physical Science **UNIT 16**: Core Essentials -II: Physical Science	Dr. Santosh Kumar
3.	22-09-24	**Module-IV:** Teaching-Learning of Biological Science-I	**UNIT- 19:** Prelude 1: Teaching-learning of Biological Science-I **UNIT 20**: Prelude 2: Teaching-learning of Biological Science-I	Dr. Daksha Parmar
4.	29-09-24	**Module-I:** Basics of Science Education-I UNIT- 1,2,3	**UNIT- 1:** Evolution of Science **UNIT 2:** A Broad Perspective of Science Education **UNIT- 3:** Features of Curriculum for School Science Education	Dr. J.P. Ahirwar
5.	06-10-24	**Assignments**- 5E Lesson Plan & Teaching Video	Explaining 5E Model based lesson planning in science and its importance in learning teaching process.	Dr. Kalpana Maski
6.	13-10-24	**Module-I:** Basics of Science Education-I	**UNIT- 4:** Paradigms of Science Education **UNIT 5:** Pedagogy of Science Teaching-learning	Dr. Daksha Parmar

7.	20-10-24	**Module-III**: Teaching-Learning of Physical Science-I UNIT- 17 & 18	**UNIT- 17:** Core Essentials -III: Physical Science **UNIT 18:** Core Essentials -IV: Physical Science	Prof. (Capt.) Rashmi Singhai
8.	27-10-24	**Module-I:** Basics of Science Education-I	**UNIT- 6:** Basic Skills for Science Teaching	Mr. L.S. Chouhan
9.	10-11-24	**Module-II:** Basics of Science Education-II	**UNIT- 7:** Planning in Learning Science **UNIT 8**: Use of ICTs in Learning Science **UNIT 9:** Activity Based Learning (ABL)	Dr. R.P. Prajapati
10.	17-11-24	**Module-II:** Basics of Science Education-II	**UNIT- 10:** Science Beyond Textbooks **UNIT 11**: Science Process Skills and Learning Outcomes **UNIT 12:** Understanding Environment	Dr. Shivalika Sarkar
11.	24-11-24	**Module-IV:** Teaching-Learning of Biological Science-I	**UNIT- 21:** Core Essentials-I: Biological Science **UNIT 22**: Core Essentials -II: Biological Science	Dr. J.P. Ahirwar
12.	1-12-24	**Module-IV:** Teaching-Learning of Biological Science-I	**UNIT- 23:** Core Essentials -III: Biological Science	Dr. Ramesh Sethy
13.	08-12-24	**Module-IV:** Teaching-Learning of Biological Science-I	**UNIT- 24:** Core Essentials -IV: Biological Science	Dr. Kusum

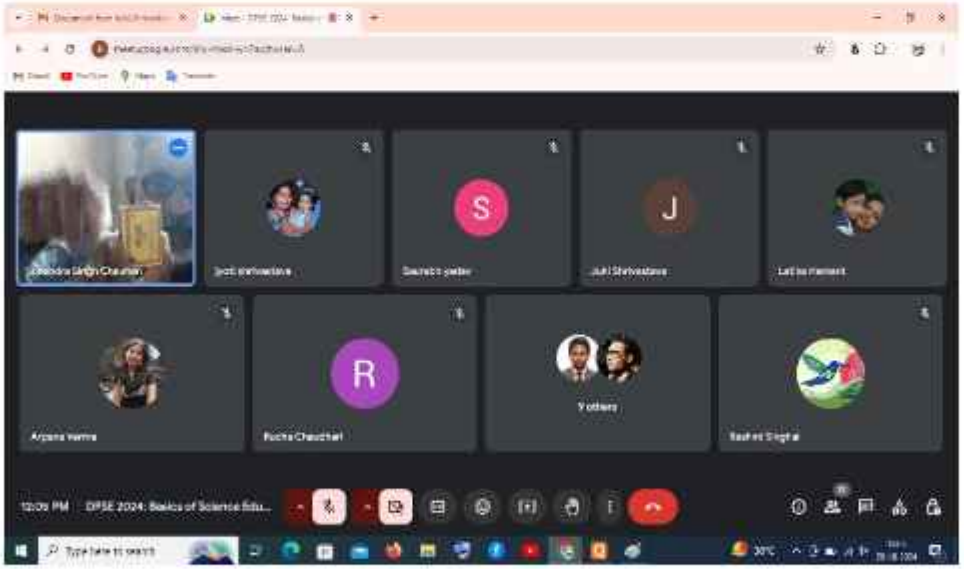
Overall, the session was characterized by its interactivity and depth of knowledge, leaving participants invigorated and equipped with valuable insights into the transformative potential of digital resources, activity-based learning and art integrated learning in education. All the lecture taken by our esteemed resource persons of RIE, NCERT, Bhopal, were remarkable, these lectures fulfilled the concept of holistic development in education, emphasizing the value of experiential learning approaches.

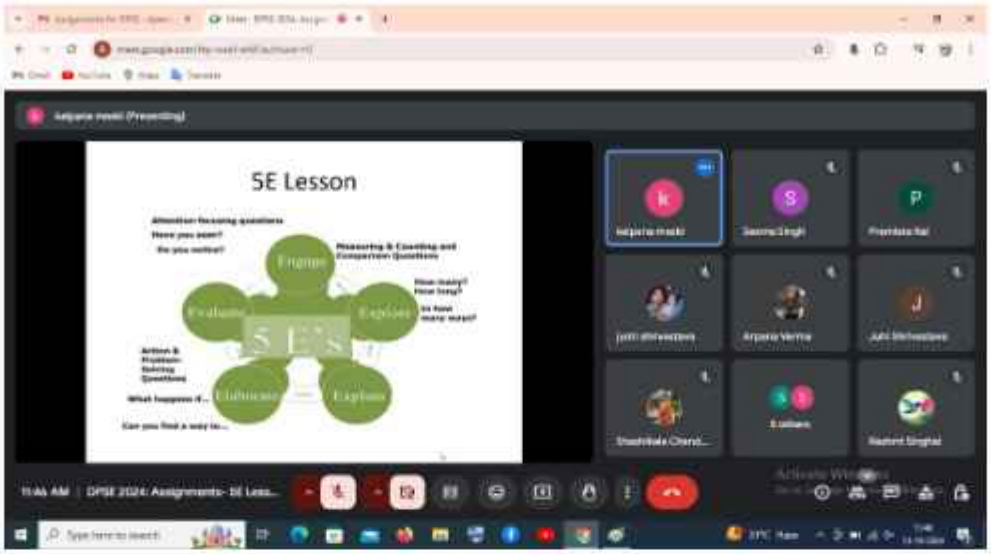
Elucidated how learning through experiences, such as hands-on activities and sports-integrated education, fosters deeper understanding and engagement among students. By providing opportunities for experiential learning, educators can cater to diverse learning styles and promote the holistic development of students, nurturing their cognitive, emotional, and physical well-being.

Through all these insightful sessions, highlighted the foundational principles and transformative potential of the NEP 2020, underscoring the importance of prioritizing literacy, numeracy, and holistic development in shaping the educational landscape. Since teaching the concepts by providing experiential learning echoed the NEP's vision of fostering a dynamic and inclusive education system that equips students with the skills and knowledge needed to thrive in an ever-evolving world.

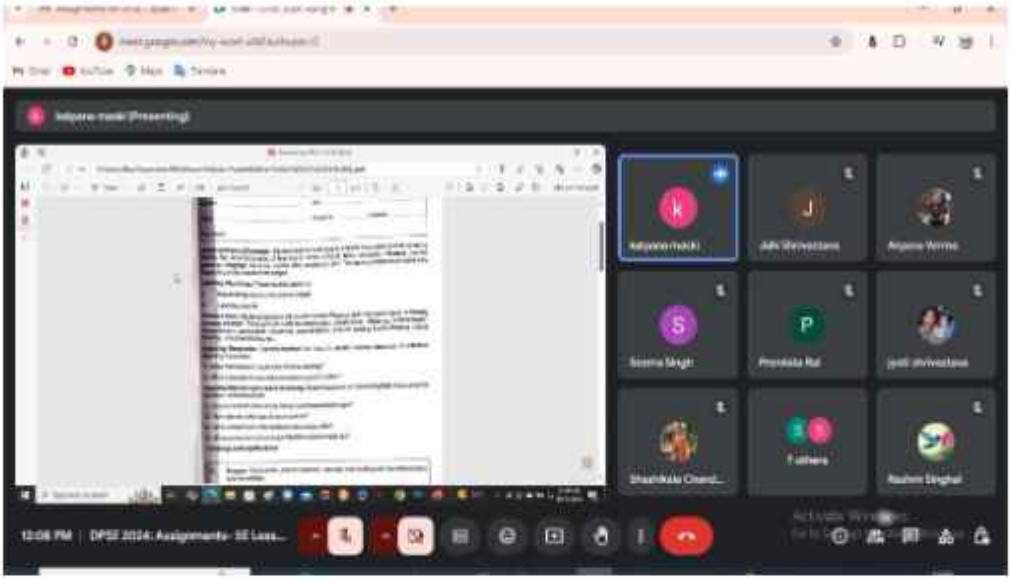


Content analysis, pedagogical content knowledge, simple applications of ICT resources for teaching–learning of science, selection of appropriate media and technologies, development of simple ICT resources like audio/video, taking digital photographs, smart phone/web Apps, are some of the key features for the success in the programme. Hence keeping these points in mind our experts/resource persons demonstrated few science concepts like Lens/mirror, reflection, motion, echo etc. using easily available and low-cost material to the participants.





Understanding the need of today's era, teachers also need to upgrade their professional competencies for which teachers need to develop ability to acquire and use the method of science. This includes observing; questioning; planning investigations; hypothesizing; collecting relevant samples and preserving them in pure forms, comparing and grouping, analyzing and interpreting data obtained from different sources. So that teacher can identify or digonoses the problem faced by the learners and can mold the teaching pedagogy as per the learners need and ability. For this , participants also got to know the 5E concept of lesson planning in science education and its importance in enhancing active participation in classroom, curiosity, creativity and interest in learning teaching process, as per the NEP 2020 recommendations. Given below is a sample given by the experts for proper understanding of the participants, since they were asked to prepare 5E model based lesson plan of science as their assignment.



Scheme of Evaluation

Table 3: DPSE 2024-25 Courses in Semester I

Science Teaching-learning- I Code	Module Title	No. of Units
Module-I	Basics of Science Education–I	6
Module-II	Basics of Science Education–II	6
Module-III	Teaching-learning of Physical Science-I	6
Module-IV	Teaching-learning of Biological Science-I	6
Module- V	Practical Manual	One manual for 2** Semesters
Total	**Five Modules**	**24 Units plus on**

After completion of semester I, all trainee/ participants were evaluated on all components – Theory and Assignments in the Online mode of the Programme where assignments were collected through the mail and Theory paper was sent to their mail where one day was given to the participants for submitting their answer sheet as soft copy through mail and hard copy through speed post on same day. Scheme of evaluation, was based on proportionate credit break-up of the components. Theory Question paper semester I and attendance sheet semester I is given in the annexture.

Table 4: Schedule of Execution and Evaluation (Semester I Paper)

Components	*Credits*	*Mode of Evaluation (Online)*
Theory (Th)	16	Marks = 80 * (0.25) Scaling factor
Assignments (AS)	-	Two Assignments each (AS 1 + AS 2) = 20* 0.5 (Scaling factor)

Diploma Programme in Science Education at Secondary Level (DPSE) Semester II (Online Mode)

It is well known that, teaching and research mutually supporting. This Programme strives to provide this orientation and help in capacity and competency building of trainees. As a matter of fact, research in science education is a big activity these days. Therefore, a well-designed programme such as this can establish a base for research in science education. Any research scholar can opt for this Programme to get acquainted with the basics of Science Education Research (SER). Those involved in science teaching or development of teaching-learning materials in an un-organized / private sector can also derive benefit from this Programme.

Teaching is a two-way interaction between the students and the teachers. And effectiveness of teaching as well as learning is highly influenced by social, cognitive, emotional, cultural and philosophical elements. One of the main facets of science education is understanding the Nature of Science (NOS). It includes knowledge of the scientific worldview. From time-to-time new standards and pedagogical strategies have been evolved by each nation to face the challenges of sustainable science education. These standards also describe what students should know about science and be able to do on completion of secondary education.

Table 5. Detail breakup of Semester II DPSE 2024-25

Semester – II
Activities
Online Mentoring a. **Orientation on Module 6 to 9, Practical Guide (B)** b. **Orientation on Project Guide**
5 days Contact Programme a. **Doubt clearing classes for Module 6 to 9** b. **Practical Practice, demonstration** c. **Theory Examination** d. **Practical Examination** e. **Project Evaluation** f. **Evaluation of Assignments, evaluation of Projects reports, Evaluation of Practical procedures and reports, evaluation of Exam Papers**

Transaction of Programme

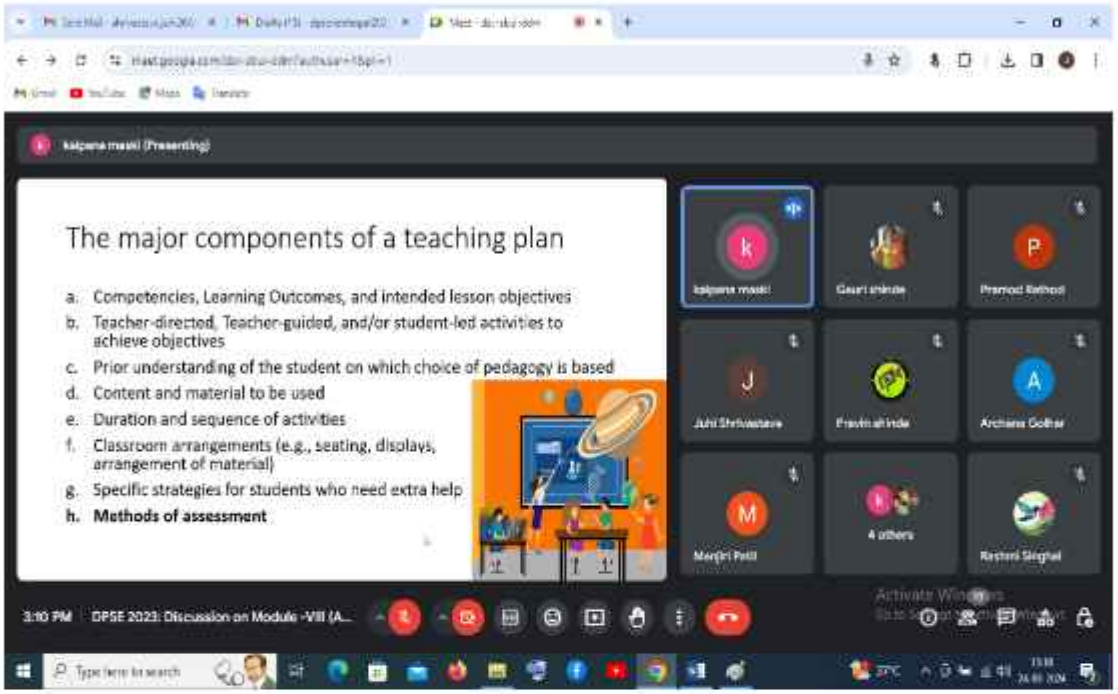
This semester II was comprehensive coverage of the program, which comprised 13 Lecture sessions (these sessions were on four course modules including Biological Science and Physical Science. They were **Module VI:** Teaching-Learning of Physical Science-II, **Module VII:** Teaching-Learning of Biological Science-II, **Module VIII:** Assessments and Evaluations, **Module IX:** Science Education Research, **Module X:** Project Guide).

Table 6: Given below is an overview of the lectures conducted in semester II (Online Mode)

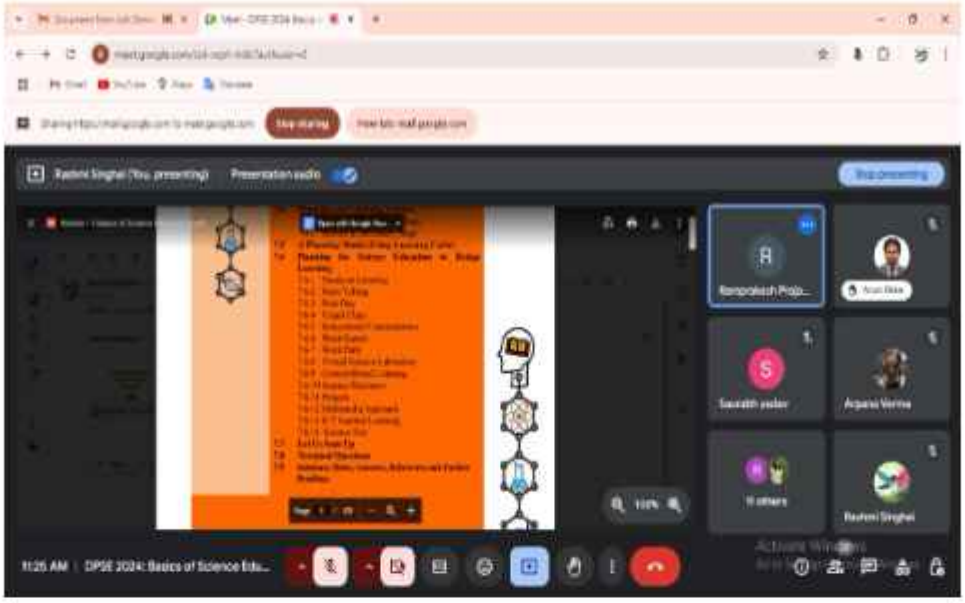
S. No	Dates	Course Modules	Units Covered	Resource Person
1.	29-12-24	**Module – VI**: Teaching-learning of Physical Science-II (chemistry)	**Units: 27** Core Essentials -VII: Physical Science **Units: 28** Core Essentials -VIII: Physical Science	Dr. R.P. Prajapati
2.	05-01-25	**Module – VI**: Teaching-learning of Physical Science-II (physics)	**Units: 25** Core Essentials -V: Physical Science **Units: 26** Core Essentials -VI: Physical Science	Mr. L.S. Chouhan
3.	12-01-25	**Module – VI**: Teaching-learning of Physical Science-II (physics)	**Unit: 29** Dealing with Real Life Situations-I	Dr. Santosh Kumar
4.	19-01-25	**Module – VI:** Teaching-learning of Physical Science-II (chemistry)	**Unit: 30** Dealing with Real Life Situations-II	Dr. R.P. Prajapati

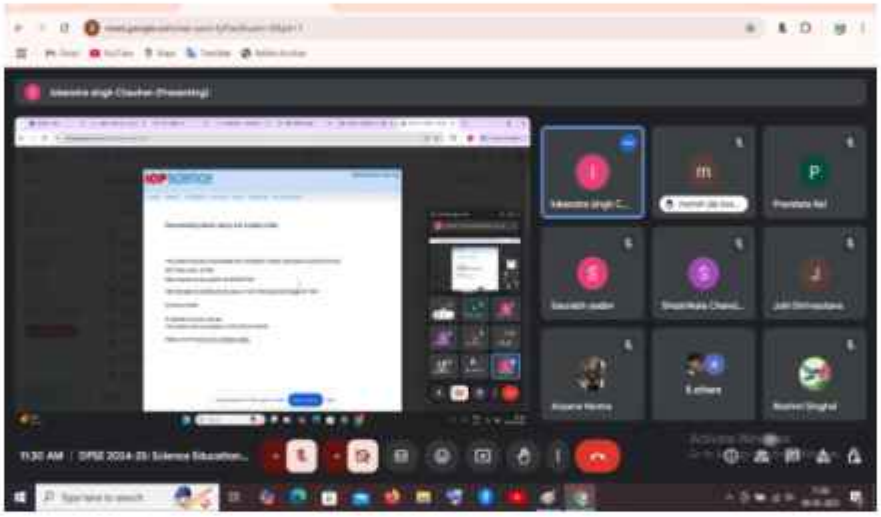
5.	26-01-25	**Module – VII**: Teaching-learning of Biological Science-II	**Units:31** Core Essentials -V: Biological Science **Units: 32** Core Essentials -VI: Biological Science	Dr. Ramesh Sethy
6.	02-02-25	**Module – VII**: Teaching-learning of Biological Science-II	**Units:33** Core Essentials -VII: Biological Science **Units: 35** Dealing with Real Life Situations-I	Dr. Daksha Parmar
7.	09-02-25	**Module – VII**: Teaching-learning of Biological Science-II	**Units:34** Core Essentials -VIII: Biological Science **Units: 36** Dealing with Real Life Situations-II	Dr. Kusum
8.	16-02-25	**Module –VIII:** Assessments and Evaluations	**Units:37** Assessments and Evaluations in Learning Science **Units: 38** Dimensions and Levels of Learning	Dr. Shivalika Sarkar
9.	23-02-25	**Module –VIII:** Assessments and Evaluations	**Units: 39** Assessment and Evaluation Tools – I **Units: 40** Assessment and Evaluation Tools - II	Dr. Kalpana Maski
10.	02-03-25	**Module –VIII:** Assessments and Evaluations	**Unit: 41** Statistical Analysis of Evaluation Data	Dr. J. P. Ahirwar
11.	09-03-25	**Module –IX:** Science Education Research	**Units: 42** Needs for Science Education Research (SER) **Units: 43** Evolution of Science Education Research	Mr. L.S. Chouhan
12.	16-03-25	**Module –IX:** Science Education Research	**Units: 44** Areas in Science Education Research (SER) **Units: 45** Conducting Research in Science Education	Dr. Kalpana Maski

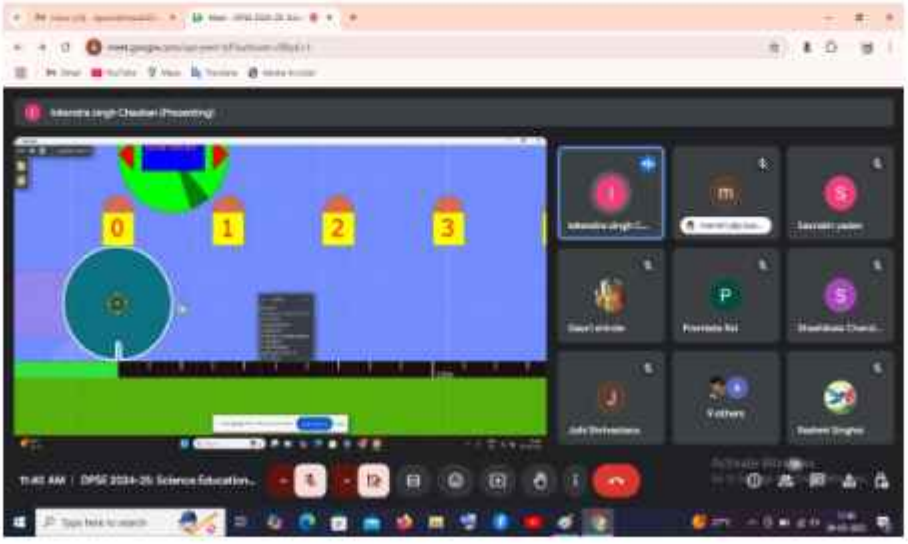
13.	23-03-25	**Module –IX:** Science Education Research	**Unit: 46** Quantitative and Qualitative Research in Science Education	Prof. (Capt.) Rashmi Singhai



Through interactive discussions and informative presentations, All the lecture facilitated an engaging and effective session, equipping participants with the knowledge and skills necessary to harness the potential of E-content, various teaching software, innovative teaching strategies to enhancing teaching and learning experiences. The session served as a valuable foundation for educators seeking to integrate digital resources into their educational practices, fostering innovation and engagement in the digital age, aligned with NEP 2020 recommendations.







Participants were orient about some effective and interesting science software by the resource persons like Algodoo (2D stimulation software), PhET, AR/VR techniques, Olabs (Virtual Lab) that can be integrated in learning teaching process to enhance concept clarity, critical analyzing ability in students.

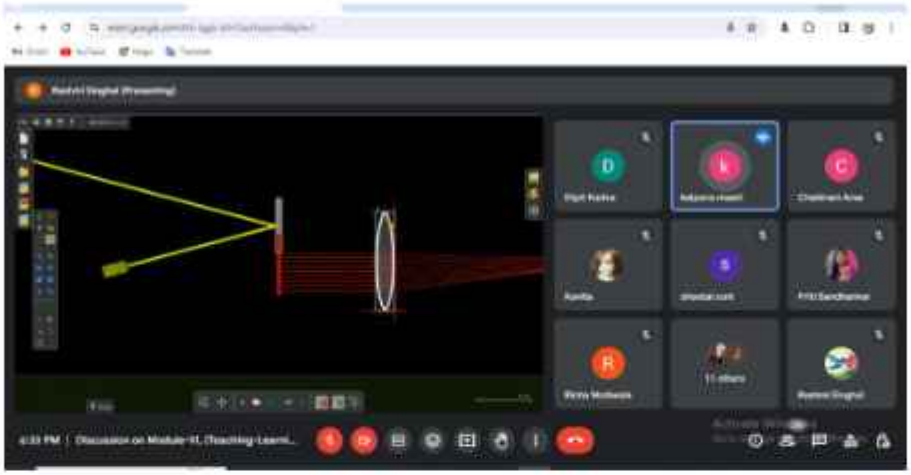


Table 7: Detail of Courses in Semester – II

Science Teaching–learning-II Code	**Module Title**	**No. of Units**
Module-VI	Teaching-learning of Physical Science-II	6
Module-VII	Teaching-learning of Biological Science-II	6
Module-VIII	Assessment and Evaluation	5
Module-IX	Science Education Research	5
Module –X	Project Guide	One Guide**
Total	**Six Modules**	**22 Units plus one**

In the II semester, participants from previous session 2023-24 also joined in this session as there is a provision that **admission remains valid for a period of two years from the date of admission**. So as to complete their DPSE course. Hence total participants were 23 in number at the end of the programme. List of participants is given below;

Table 8: DPSE session 2023-24 list of Participants

S. No.	Participants Name
1.	Gauri Shinde
2.	Pravin Shinde
3.	Swarda Khedekar
4.	Rupesh Thakur
5.	Pramod Rathod
6.	Archana Golhar
7.	Manjiri Patil
8.	Sandeep Chaudhari

All the participants selected their project guide for Project/ Research work, as experience in research plays very essential role in learning teaching process at any stage of school education. So, to give hand-on experience in research work a small project work was prescribed along with the suggested list of project topics. Participants selected their guide for guidance in project work and Different groups were made on the bases of the number of project guide, so that guide can mentor/ facilitate a well as guide them during their research/ project work. So that at the time of final examination participants has to submit their practical as well as project report, in the RIE campus. List of participants with their project guide and selected topics is given below;

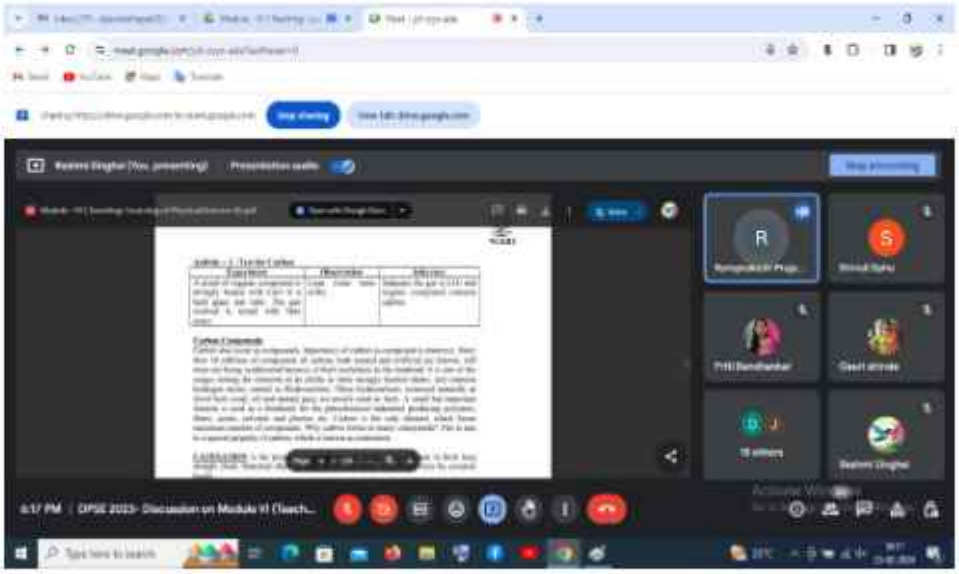
Table 9: Diploma Programme in Science Education at secondary level (DPSE 2024-25)

List of Project topics selected by participants with Project Guide

S. No.	Participants' Name	Topics	Project Guide
1.	AJAY PANDEY	अवधारणा सीखने में छात्रों के हार्ड स्पॉट का निदान जैसे फोर्स और ग्रेविटेशन	Dr. Santosh Kumar
2.	AKHIL PRATAP SINGH	Study the effect of ICT based OERs on secondary level science concepts and analyze	Dr. Daksha Parmar

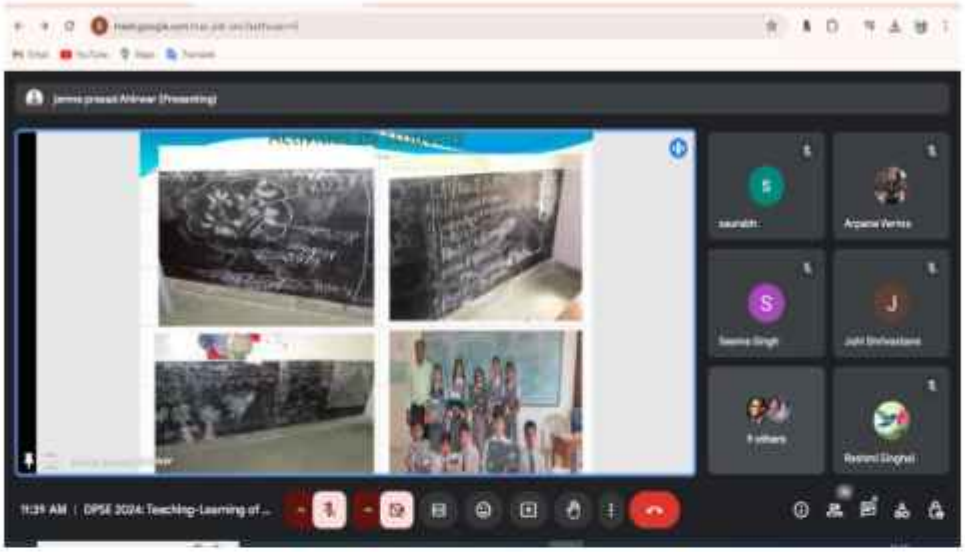
		its effectiveness in teaching-learning of science	
3.	ARPANA VERMA	Eyesight survey of class 11 the students	Dr. Daksha Parmar
4.	ARUN EKKA	A study of effectiveness of Lecture Method and Demonstration Method	Dr. Daksha Parmar
5.	CHETAN KUMAR BALENDRA	पौधों की रहिछ पर खाय एवं उर्वरक क तुलनात्मक अध्ययन करते हुए नाइट्रोज स्वरीकरण करने वाले पौधे की पह कर जड़, पिंड की आकृति और माप अध्ययन करना	Dr. J. P. Ahirwar
6.	JYOTI SHRIVASTAVA	Electricity production from plant waste using zinc and copper electrodes	Dr. J. P. Ahirwar
7.	MANISH KUMAR AHIR	अपने आस पास के पौधे के स्थानीय समुदाय द्वारा उपयोग एवम् महत्व	Dr. J. P. Ahirwar
8.	PREMLATA RAI	मंदिरों से उपयोग किए गए फूलों का संग्रह और उसका विभिन्न उपयोग करना	Dr. J. P. Ahirwar
9.	RUCHA CHAUDHARI	Study of low height and weight in adolescent students of classes 7, 8 and 9 in Reliance Foundation School, Mouda (Inquiry Based research)	Dr. Daksha Parmar
10.	SAURABH YADAV	Investigate the effect of yoga and exercise on human blood sugar	Dr. Daksha Parmar
11.	SEEMA SINGH	Investigate of the effect colour light on plant growth	Dr. J. P. Ahirwar
12.	ASHTEE SHARNAGAT	Visit the nearby zoo and group the animals as endemic species, endangered species and threatened species etc	Dr. J. P. Ahirwar
13.	SHASHIKALA CHANDRAKAR	प्रकाशकीअवधारणापरदीवारपत्रिकाकानिर्माण औरछात्रोंपरइसकेप्रभावकोदेखना	Prof. (Capt.) Rashmi Singhai
14.	LATIKA SURYAVANSHI	Survey of Plants with High CO2 Absorption Potential for a Sustainable Future in Bhopal's Chunabhatti Region	Dr. Daksha Parmar
15	SUMAIYA KHAN	Study of Nutritional Deficiencies in students and their causes (including disabilities)	Dr. J. P. Ahirwar

16	ARCHANA GOLHAR	Study of Nutritional Deficiencies in students and their Causes	Dr. Kalpana Maski
17.	GAURI SHINDE	Identifying the difficulties faced by students while writing chemical equations and implementing solutions	Prof. (Capt.) Rashmi Singhai
18.	MANJIRI PATIL	विज्ञानसीखनेपरआईसीटीएकीकृतशिक्षणकाप्रभाव	Prof. (Capt.) Rashmi Singhai
19	PRAMOD RATHOD	Investigation of students in understanding of image formation in mirrors and lenses	Dr. Santosh Kumar
20	PRAVIN SHINDE	Develop and assess the effectiveness of the Activity Based Learning Kit for Sound and Light	Dr. Kalpana Maski
21.	RUPESH THAKUR	To study the challenges in Writing Chemical Equations and Balancing Them	Dr. Kalpana Maski
22.	SANDEEP CHAUDHARI	Life and chemistry - an inseparable bond (chemistry in everyday life)	Prof. (Capt.) Rashmi Singhai
23.	SWARDA KHEDEKAR	Spices They find herbs in it Their scientific names usage Chemicals contained in it and their molecular formulas	Prof. (Capt.) Rashmi Singhai

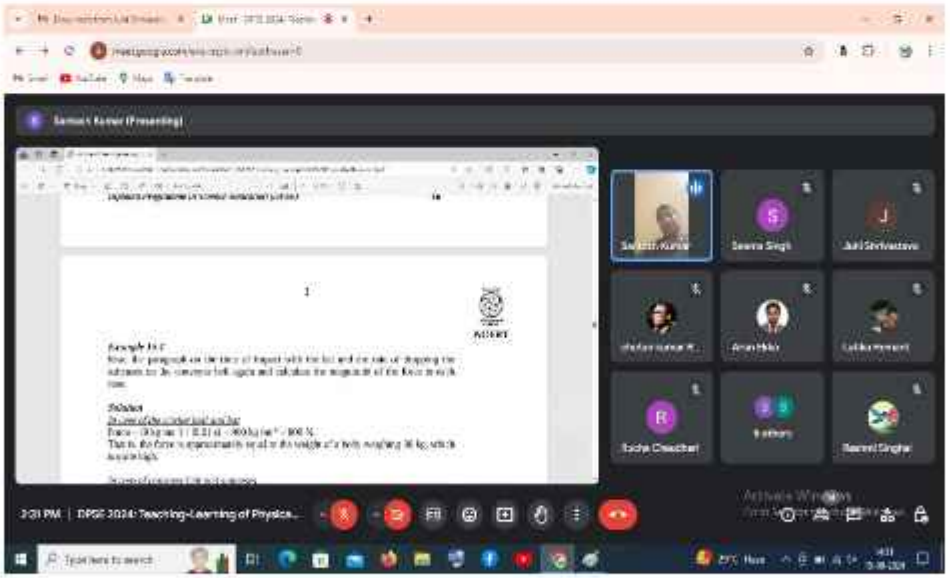


After completion of semester II online lecture sessions, all trainee/ participants were evaluated on all components – Theory, Practical and Project record and Viva-voce in the Face-to-face (on campus

contact) mode of the Programme where participants visited RIE campus for their final examination along with their practical / project record submission and viva-voce.



Participants were given practical topics at the time of their practical examination before final theory examination paper, out of which participants performed one practical each in Chemistry, Physics and Biology. Scheme of evaluation, was based on pen paper mode in RIE campus, Bhopal.



Theory Question paper semester II and Attendance list of Semester II along with prototype of certificate and marksheet is given in the annextures.

Scheme of Evaluation

Table 10: Schedule of Execution and Evaluation (Semester II Paper)

Components	*Credits*	*Mode of Evaluation (Face-to-Face)*
Theory (Th)	16	Marks = **80 * (0.25)** Scaling factor
Practical (Pr)	8	Two Practical Exams in two semesters **[Marks =30 (Report) + 20 (Viva-Voce)] for each semester** SF = 0.5, **Total Marks = 50 x 0.5 = 25**
Project (Pj)	4	Project in Semester II Marks = **[30(Report) + 20 (Viva-Voce)]**

Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski, the programme coordinators, opening remarks, reflected on the comprehensive coverage of the program, which comprised approximately 26 lecture sessions dedicated to demonstrating and elucidating the significance of various ICT tools, innovative pedagogical approaches keeping learner in the center in science teaching and learning. DPSE also underscored the pivotal role of the resource personnel, including those from RIE Bhopal, in facilitating the success of the completion of program. Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski also emphasized that with the knowledge imparted during the DPSE program, the responsibility now rests on the participants/trainees to disseminate this knowledge to their students and colleagues, thereby effecting lasting change in the educational landscape. Participants were also assured that their certificate along with score card will be send through speed post signed by our respected Dr. Dinesh Prasad Saklani, Director, NCERT, New Delhi. Certificate symbolized their commitment to embracing innovative teaching methodologies and their readiness to implement them in their respective educational settings. Marksheet prototype of DPSE is given in the annexure.

Annexure 1 (a)

DPSE Application Form Session 2024-25

Regional Institute of Education (NCERT), Bhopal
Shyamla Hills, Bhopal - 462002

APPLICATION FORM

Diploma Programme in Science Education at Secondary Level (2024-25)

01. Full Name: Dr./Ms./Mrs./Mr. _____
(in CAPITAL LETTER)

Affixed Passport size self-attested Photographs

02. Date of Birth (DD/MM/YYYY): _____

03. Gender: Female:_____Male:_____Others: _____

04. Disability, if any (extent may be mentioned): _____
(Attach self-attested certificate)

05. Category: General/SC/ST/OBC/EWS: _____
(Attach self-attested certificate)

06. Nationality: _____

07. State: _____

08. Permanent Address: _____

_____

_____

09. Present Address: _____

_____

_____

10. Contact Details: Mobile No. _____

Email ID: _____

Annexure 1(b)

11. Present Occupation: _____

and Official Address: _____

_____

_____

12. Details of Educational and Professional Qualifications (final school examination onwards) (Attach self-attested copies)

Examination Passed	Board / University	Year	Percentage of Marks or Grade Point Average	Subjects

13. Details of any other Qualifications (Attach self-attested copies)

Examination Passed	Board / University	Year	Percentage of Marks or Grade Point Average	Subjects

14. Professional / Research Experience (Attach self-attested copies)

Sl. No.	Employer	Position Held	From	To	Nature of Duties

Annexure 1(c)

Declaration:

1. I hereby declare that above information is true to the best of my knowledge.
2. I hereby declare that I am fit in all aspects to meet all the requirements of the programme.

Place: **(Signature of the Applicant)**

Date:

List of Enclosures:

Certification by the Head of the School / Institution (for presently employed candidates)

It is certified that no disciplinary matter is pending / contemplated against Dr. /Ms./Mrs./Mr. _____and she/he bears a good character. She/he is permitted to undergo Diploma Programme in Science Education at Secondary Level organized by RIE, Bhopal as per the programme requirements.

Signature of the Head of the School/Institution with Stamp

Name: _____

Designation: _____

Address: _____

_____

Note: For any query contact 07552522023 / 07552522024

Annexure 2

Orientation on Diploma Programme in Science education at secondary Level, Session- 2024-202:
Date: August 21- 23, 2024
Venue: Regional Institute of Education, NCERT, Bhopal, Madhya Pradesh
Room No: 30

Dates	**Session- I** **Time: 9:30 – 11:00am**	**Session- II** **Time: 11:15 – 12:45 pm**	**Session- III** **Time: 2:00 – 03:30 pm**	**Session-IV** **Time: 3:45 – 05:15 pm**
21-08-2024	Registration Admission Inauguration	Introduction to DPSE-2023 and CBCS **Prof. C.K. Ghosh**	Basics of Physical Science (Chemistry) **Dr. R.P. Prajapati**	Basics of Biological Science **Dr. R. Setty**
22-08-2024	Introduction to Physical Science (Physics) **Prof. C.K. Ghosh**	Introduction to Project **Prof. C.K. Ghosh**	Discussion on the Project **Dr. Daksha Parmar**	Visit to STEAM Park **Dr. Shivalika Sarkar**
23-08-2024	Research Methodology **Prof. C.K. Ghosh**	Basics of Practical (Chemistry, Physics and Biology) **Prof. Rashmi Singhai / Dr. Kalpana Maski / Dr. Kusum**	Discussion with the participants **Prof. Rashmi Singhai & Dr. Kalpana Maski**	Valedictory

Tea Break: 11:00 – 11:15 am
Lunch Break: 12:45 – 2:00 pm
Tea Break: 03:30- 03:45 pm

Annexure 3

List of shortlisted candidates

Regional Institute of Education, NCERT, Shyamla Hills, Bhopal- 462002
Diploma Programme in Science Education- 2024

The Result of Entrance Exam held on 04-08-2024, the following candidates have been shortlisted/ selected for the Diploma Programme in Science Education at secondary stage for the session 2024-25

S.No.	Gender	Applicants' Name	Remark	State
1.	M	AJAY PANDEY	SELECTED	CHHATTISHGARH
2.	M	AKHIL PRATAP SINGH	SELECTED	CHHATTISHGARH
3.	F	ANJALI MOURYA	SELECTED	CHHATTISHGARH
4.	F	ARPANA VERMA	SELECTED	CHHATTISHGARH
5.	M	ARUN EKKA	SELECTED	CHHATTISHGARH
6.	F	ASHTEE SHARNAGAT	SELECTED	MADHYA PRADESH
7.	M	BABU LAL PRAJAPATI	SELECTED	CHHATTISHGARH
8.	M	BHUPENDRA KUMAR	SELECTED	CHHATTISHGARH
9.	M	CHETAN KUMAR BALENDRA	SELECTED	CHHATTISHGARH
10.	M	DEEPAK KUMAR	SELECTED	CHHATTISHGARH
11.	F	DEEPSHIKHA CHANDRAKAR	SELECTED	CHHATTISHGARH
12.	F	GEETA KOTHARI	SELECTED	CHHATTISHGARH
13.	F	JUHI SAKSHI KUJUR	SELECTED	CHHATTISHGARH
14.	F	JYOTI SHRIVASTAVA	SELECTED	CHHATTISHGARH
15.	M	MANGESHWAR KUMAR SAHU	SELECTED	CHHATTISHGARH
16.	M	MANISH KUMAR AHIR	SELECTED	CHHATTISHGARH
17.	F	PARMESHWARI YADAV	SELECTED	CHHATTISHGARH
18.	F	POOJA SINGH	SELECTED	CHHATTISHGARH
19.	F	PREMLATA RAI	SELECTED	CHHATTISHGARH
20.	F	PURNIMA DEWANGAN	SELECTED	CHHATTISHGARH
21.	M	RAJESH KUMAR DHURANDHAR	SELECTED	CHHATTISHGARH
22.	F	RICHA SINGH	SELECTED	CHHATTISHGARH
23.	F	RUCHA CHAUDHARI	SELECTED	MAHARASHTRA
24.	M	SAURABH YADAV	SELECTED	CHHATTISHGARH
25.	F	SEEMA SINGH	SELECTED	MADHYA PRADESH
26.	F	SHASHIKALA CHANDRAKAR	SELECTED	CHHATTISHGARH
27.	F	SOUMYA SATVATIRTHA	SELECTED	ODISHA
28.	M	SUKHNANDAN SAW	SELECTED	CHHATTISHGARH
29.	F	SUMAIYA KHAN	SELECTED	MADHYA PRADESH
30.	F	UDAY CHANDRIKA	SELECTED	CHHATTISHGARH
31.	F	LATIKA SURYAVANSHI	SELECTED	MADHYA PRADESH

Principal 8/8/24
क्षेत्रीय शिक्षा संस्थान
Regional Institute of Education
भोपाल-13 (म.प्र.)/ Bhopal-13 (M.P.)

8/8/24 Kalpana 5/8/24

Annexure 4

List of Selected Candidates of DPSE session 2024-25

Diploma Programme in Science Education at Secondary Level (DPSE 2024-25)

S. No	Name of the Participants	Gender	Module Language	Enrollment No.	Roll No.
1.	AJAY PANDEY	M	HINDI	DPSE2024AP01	2024066001
2.	AKHIL PRATAP SINGH	M	ENGLISH	DPSE2024AS02	2024066002
3.	ARPANA VERMA	F	ENGLISH	DPSE2024AV03	2024066003
4.	ARUN EKKA	M	ENGLISH	DPSE2024AE04	2024066004
5.	ASHTEE SHARNAGAT	F	ENGLISH	DPSE2024AS05	2024066005
6.	CHETAN KUMAR BALENDRA	M	HINDI	DPSE2024CB06	2024066006
7.	JYOTI SHRIVASTAVA	F	ENGLISH	DPSE2024JS07	2024066007
8.	LATIKA SURYAVANSHI	F	ENGLISH	DPSE2024LS08	2024066008
9.	MANISH KUMAR AHIR	M	HINDI	DPSE2024MA09	2024066009
10.	PREMLATA RAI	F	HINDI	DPSE2024PR010	2024066010
11.	RUCHA CHAUDHARI	F	ENGLISH	DPSE2024RC011	2024066011
12.	SAURABH YADAV	M	HINDI	DPSE2024SY012	2024066012
13.	SEEMA SINGH	F	ENGLISH	DPSE2024SS013	2024066013
14.	SHASHIKALA CHANDRAKAR	F	HINDI	DPSE2024SC014	2024066014
15.	SUMAIYA KHAN	F	ENGLISH	DPSE2024SK015	2024066015

Annexure 5

Time Table Semester I

Regional Institute of Education, NCERT, Bhopal

Diploma Programme in Science Education (DPSE: 2024-25)

Tentative **Time Table for Online Classes**

S. No	Dates	Time	Course Modules	Resource Person
1.	08-09-24	11:00 am-12:00 noon	Teaching-Learning of Physical Science-I (**Module-III**) UNIT- 13 & 14	Dr. Rashmi Sharma
2.	15-09-24	11:00 am-12:00 noon	Teaching-Learning of Physical Science-I (**Module-III**) UNIT- 15 & 16	Dr. Santosh Kumar
3.	22-09-24	11:00 am-12:00 noon	Teaching-Learning of Biological Science-I (**Module-IV**) UNIT- 19 & 20	Dr. Daksha Parmar
4.	29-09-24	11:00 am-12:00 noon	Basics of Science Education-I (**Module-I**) UNIT- 1,2,3	Dr. J.P. Ahirwar
5.	06-10-24	11:00 am-12:00 noon	**Assignments**- 5E Lesson Plan & Teaching Video	Dr. Kalpana Maski
6.	13-10-24	11:00 am-12:00 noon	Basics of Science Education-I (**Module-I**) UNIT- 4 & 5	Dr. Daksha Parmar
7.	20-10-24	11:00 am-12:00 noon	Teaching-Learning of Physical Science-I (**Module-III**) UNIT- 17 & 18	Prof. (Capt.) Rashmi Singhai
8.	27-10-24	11:00 am-12:00 noon	Basics of Science Education-I (**Module-I**) UNIT- 6	Mr. L.S. Chouhan
9.	10-11-24	11:00 am-12:00 noon	Basics of Science Education-II (**Module-II**) UNIT- 7, 8 & 9	Dr. R.P. Prajapati
10.	17-11-24	11:00 am-12:00 noon	Basics of Science Education-II (**Module-II**) UNIT- 10,11 & 12	Dr. Shivalika Sarkar
11.	24-11-24	11:00 am-12:00 noon	Teaching-Learning of Biological Science-I (**Module-IV**) UNIT- 21 & 22	Dr. J.P. Ahirwar
12.	1-12-24	11:00 am-12:00 noon	Teaching-Learning of Biological Science-I (**Module-IV**) UNIT- 23	Dr. Ramesh Sethy
13.	08-12-24	11:00 am-12:00 noon	Teaching-Learning of Biological Science-I (**Module-IV**) UNIT- 24	Dr. Kusum

29/8/24

Annexure 6

DPSE Semester I Online Class Attendance Sheet

Attendance List for DPSE 2024-25 Phase I

S. No	Participants' Name	08/09/2024	15/09/2024	22/09/2024	29/09/2024	06/10/2024	13/10/2024	20/10/2024	27/10/2024	10/11/2024	17/11/2024	24/11/2024	01/12/2024
1.	Ajay Pandey	P	A	P	P	P	A	P	P	P	P	A	P
2.	Akhil Pratap Singh	P	A	P	P	P	A	P	P	P	A	P	P
3.	Arpana Verma	P	A	P	P	P	P	P	P	P	P	P	P
4.	Arun Ekka	P	P	P	P	P	P	P	P	P	P	A	A
5.	Ashtee Sharnagat	P	A	P	P	P	A	P	P	P	P	P	P
6.	Chetan Kumar Balendra	P	P	P	P	P	P	P	P	P	P	P	P
7.	Jyoti Shrivastava	P	P	P	P	A	P	P	P	P	P	A	P
8.	Latika Suryavanshi	P	P	P	A	P	P	P	P	P	P	P	A
9.	Manish Kumar Ahir	P	P	P	P	P	P	P	P	P	P	P	P
10.	Premlata Rai	P	P	A	A	P	P	A	A	P	P	P	P
11.	Rucha Chaudhari	P	P	P	P	P	A	P	P	P	P	P	P
12.	Saurabh Yadav	P	A	P	P	P	P	P	P	P	P	P	P
13.	Seema Singh	P	P	P	P	A	P	P	P	P	P	P	P
14.	Shashikala Chandrakar	P	A	P	P	P	P	P	P	P	P	P	P
15.	Sumaiya Khan	P	P	P	P	P	P	P	P	A	P	P	P

Annexure 7

DPSE 2024-25 : Semester I Theory Paper Examination

REGIONAL INSTITUTE OF EDUCATION, BHOPAL

(NCERT)

DIPLOMA PROGRAMME IN SCIENCE EDUCATION

(FIRST PHASE I, THEORY EXAMINATION, DECEMBER 2024)

Time 3 hours Full Marks: 80

Questions from four modules (I, II, III, IV) have been given separately in Groups A, B, C, D respectively. Answer eight questions taking two questions from each Group. All questions carry equal marks.

Group A

1. a) Describe UNESCO four pillars of education.

   b) How has ISRO's work facilitated learning of science?

   c) Why is experimentation and hypothesis justification termed to be effective for teaching/learning science?

   d) What is Integrated Approach of Curriculum in Science Education. List out two advantages of integrated curriculum.

[4+ 3+ 2+1=10]

2. a) Explain the interdependence of discipline science education with reference to 'Cardiovascular System and Physics'.

   b) Define Plagiarism? What precautions would you take to avoid plagiarism?

   c) Explain basics science teaching skills with suitable example.

   d) Discuss briefly any one type of learning styles.

[4+ 3+ 2+1=10]

3. a) Justify 'Learning without reflection is eating without digestion' in your own words.

b) Explain 'Skills of Probing Questions'. Also describe various components of 'Skills of Probing Questions'.

c) Differentiate between an observation and an inference

d) Write down the roles of Learner and Teacher in Constructivist Scenario (at least six)

[4+ 3+ 2+1=10]

Group B

4. a) What are the stages involved in planning of a science lesson?

b) Why MOOC is important? List out major MOOC providers.

c) Name the following;

i. A program launched by CBSE to enable contributions to improve teaching & learning.

ii. A vocational education programme set up by Ministry of Human Resource Development (now Ministry of Education) Government of India.

iii. A web-based application designed to conduct experiments in a safe and interactive manner.

d) What is Ramanujan's Number?

[4+ 3+ 2+1=10]

5. a) Describe how science teacher can be a facilitator in ABL (Activity-based Learning)

b) What are limericks? Compose a Limericks on any concept of physical science or biological science using any language (Hindi, English)

c) Name a discovery that happened in the same year in which 'The Mosquito Day' was first observed and revolutionized the understanding of science.

d) Who is credited with the discovery of Mercurous Nitrite?

[4+ 3+ 2+1=10]

6. a) Science exhibition can help in inculcating collaboration and creativity skills in students. Give your opinion.

b) Write major principle of Sustainable Development (at least six)

c) What are the human induced causes of biodiversity loss?

d) Draw a well labelled diagram of a carbon cycle.

[4+ 3+ 2+1=10]

7. a) Why Planning is Important in Learning Science?

b) How science is associated with its process:

c) Rocket motion is based on which law of motion?

d) What is Crescograph? Who invented it?

[4+ 3+ 2+1=10]

Group C

8. a) What is modelling in physical science? Why do we need it?

b) Why do we need units? Name the SI units for pressure, kinetic energy, electric charge, magnetic flux density.

c) Write down the salient features of v-t graphs.

d) A cricket ball of mass 0.18 kg is travelling horizontally with velocity 45 ms-1. It is driven back horizontally with velocity 5 ms-1. Calculate the change in momentum. What is its direction?

[4+ 3+ 2+1=10]

9. a) What is meant by the structural formula of a chemical and what is its importance?

b) Why do amorphous solid called super cooled liquids?

c) A body of mass 0.5 kg experiences a force of 10 N. Calculate its acceleration.

d) What is Avogadro number?

[4+ 3+ 2+1=10]

10. a) Describe Rutherford's Atomic model and its limitations.

b) Write down Electronic Configuration of following Elements;

i. Carbon ii. Nitrogen iii. Neon iv. Magnesium v. Silicon vi. Phosphorus

c) What are SI Prefixes? Give some examples.

d) What do you understand by the term mole?

[4+ 3+ 2+1=10]

11. a) What are the limitations of J.J. Thomson's model of the atom?

b) Calculate the molar mass of the following compounds. i) urea [$CO(NH_2)_2$] ii) acetone [CH_3COCH_3]

c) Complete the following table: -

Name of the element	Symbol	Name of the compound	Formula
Lithium		Common salt	
Gold		Baking soda	
Iron		Sulphuric acid	

d) Define Simple Pendulum.

[4+ 3+ 2+1=10]

Group D

12. a) Explain the existence of inverted pyramid in an ecosystem.

b) Describe Haemocytometer with a well labelled diagram.

c) Describe the structure of bacteria with diagram.

d) Write full forms of DBH, TDS, BOD, IABMS.

[4+ 3+ 2+1=10]

13. a) What do you understand by biogeochemical cycle. Briefly explain Nitrogen cycle

b) Name the following:

i. Tissue which provides elasticity to the plants.
ii. Tissue which is made of dead cells that lack cytoplasm and nucleus.
iii. Tissue is made of neuron and glial cells.

c) Justify the statement "Grassland degradation is a biotic disturbance".

d) Write Scientific names of-

i) Mango ii. Monkey iii. Tulsi iv. Sunflower

[4+ 3+ 2+1=10]

14. a) Describe the process of muscle contraction in your own words.

b) State the functions of the following;

i. Endoplasmic Reticulum

ii. Mitochondria

iii. Chloroplast

c) Justify that 'Health and Education are prerequisite for national development' in your words.

d) Write down the causative agent of the following diseases;

i. Whooping cough

ii. Typhoid

[4+ 3+ 2+1=10]

15. a) Explain different methods of grain storage.

b) What is micronutrient? Give two examples?

c) Describe Anaphase of Mitosis I with a labelled diagram.

d) Define Eutrophication.

[4+ 3+ 2+1=10]

Annexure 8

Semester II Online DPSE class Time Table

Regional Institute of Education, NCERT, Bhopal

Diploma Programme in Science Education (DPSE: 2024-25) Phase II

Tentative Time Table for Online Classes

S. No	Dates	Time	Course Modules	Resource Person
1.	29-12-24	11:00 am-12:00 noon	Teaching-learning of Physical Science-II (chemistry) **(Module – VI) Units: 27 & 28**	Dr. R.P. Prajapati
2.	05-01-25	11:00 am-12:00 noon	Teaching-learning of Physical Science-II (physics) **(Module – VI) Units:25 & 26**	Mr. L.S. Chouhan
3.	12-01-25	11:00 am-12:00 noon	Teaching-learning of Physical Science-II (physics) **(Module – VI) Unit: 29**	Dr. Santosh Kumar
4.	19-01-25	11:00 am-12:00 noon	Teaching-learning of Physical Science-II (chemistry) **(Module – VI) Unit: 30**	Dr. R.P. Prajapati
5.	26-01-25	11:00 am-12:00 noon	Teaching-learning of Biological Science-II **(Module – VII) Units:31&32**	Dr. Ramesh Sethy
6.	02-02-25	11:00 am-12:00 noon	Teaching-learning of Biological Science-II **(Module – VII) Units:33 & 35**	Dr. Daksha Parmar
7.	09-02-25	11:00 am-12:00 noon	Teaching-learning of Biological Science-II **(Module – VII) Units:34 & 36**	Dr. Kusum
8.	16-02-25	11:00 am-12:00 noon	Assessments and Evaluations **(Module –VIII) Units:37 & 38**	Dr. Shivalika Sarkar
9.	23-02-25	11:00 am-12:00 noon	Assessments and Evaluations **(Module –VIII) Units: 39 & 40**	Dr. Kalpana Maski
10.	02-03-25	11:00 am-12:00 noon	Assessments and Evaluations **(Module –VIII) Unit: 41**	Dr. J. P. Ahirwar
11.	09-03-25	11:00 am-12:00 noon	Science Education Research **(Module –IX) Units: 42 & 43**	Mr. L.S. Chouhan
12.	16-03-25	11:00 am-12:00 noon	Science Education Research **(Module –IX) Units: 44 & 45**	Dr. Kalpana Maski
13.	23-03-25	11:00 am-12:00 noon	Science Education Research **(Module –IX) Unit: 46**	Prof. (Capt.) Rashmi Singhai

Annexure 9

List of Project Guide DPSE 2024-25

DIPLOMA PROGRAMME IN SCIENCE EDUCATION AT SECONDARY LEVEL (DPSE 2024-25)

List of Project Guide

S. No.	Name of the Project Guide	Subject	Contact No.
1.	Prof. (Capt.) Rashmi Singhai	Chemistry	9926322889
2.	Dr. Kalpana Maski	Physics	9893733861
3.	Dr. Santosh Kumar	Physics	7406102055
4.	Dr. R.P. Prajapati	Chemistry	9165569284
5.	Dr. Daksha Parmar	Botany	9425600967
6.	Dr. J.P. Ahirwar	Biology	9754368656

Note:

1. Go through the project guide (Module-X) from first page to last page.
2. Identify the topic on which you are going to carry out your project work.
3. Select your project guide/ supervisor for guidance from the above list. And also, be in touch with your respective Guide/ Supervisor for further suggestions and guidance.
4. Write down the project proposal according to the guidelines given in project guide.
5. Submit the project proposal along with the filled proforma given in the appendix of the project guide (Module-X)

Annexure 10

List of total Participants with their Project Guide

S. No.	Participants' Name	Project Guide
1.	Ajay Pandey	Dr. Santosh Kumar
2.	Akhil Pratap Singh	Dr. Daksha Parmar
3.	Arpana Verma	Dr. Daksha Parmar
4.	Arun Ekka	Dr. Daksha Parmar
5.	Chetan Kumar Balendra	Dr. J. P. Ahirwar
6.	Jyoti Shrivastava	Dr. J. P. Ahirwar
7.	Manish Kumar Ahir	Dr. J. P. Ahirwar
8.	Premlata Rai	Dr. J. P. Ahirwar
9.	Rucha Chaudhari	Dr. Daksha Parmar
10.	Saurabh Yadav	Dr. Daksha Parmar
11.	Seema Singh	Dr. J. P. Ahirwar
12.	Ashtee Sharnagat	Dr. J. P. Ahirwar
13.	Shashikala Chandrakar	Prof. (Capt.) Rashmi Singhai
14.	Latika Suryavanshi	Dr. Daksha Parmar
15.	Sumaiya Khan	Dr. J. P. Ahirwar
16.	Archana Golhar	Dr. Kalpana Maski
17.	Gauri Shinde	Prof. (Capt.) Rashmi Singhai
18.	Manjiri Patil	Prof. (Capt.) Rashmi Singhai
19.	Pramod Rathod	Dr. Santosh Kumar
20.	Pravin Shinde	Dr. Kalpana Maski
21.	Rupesh Thakur	Dr. Kalpana Maski
22.	Sandeep Chaudhari	Prof. (Capt.) Rashmi Singhai
23.	Swarda Khedekar	Prof. (Capt.) Rashmi Singhai

Annexure 11

DPSE Semester II Online Class Attendance Sheet

S. No	Participants' Name	12/01/2025	19/01/2025	26/01/2025	02/02/2025	09/02/2025	16/02/2025	23/02/2025	02/03/2025	09/03/2025	16/03/2025	23/03/2025
1.	Ajay Pandey	P	P	Republic Day	P	Cancelled	A	P	A	A	P	P
2.	Akhil Pratap Singh	P	P		P		A	A	A	P	P	P
3.	Arpana Verma	P	P		P		P	P	P	P	P	P
4.	Arun Ekka	P	P		P		P	A	P	A	P	P
5.	Ashtee Sharnagat	P	P		P		A	A	P	P	P	P
6.	Chetan Kumar Balendra	P	P		P		A	P	P	P	P	P
7.	Jyoti Shrivastava	A	P		P		A	P	P	A	P	P
8.	Latika Suryavanshi	P	P		P		P	P	A	P	P	P
9.	Manish Kumar Ahir	P	P		P		P	A	P	P	P	P
10.	Premlata Rai	p	P		P		P	P	A	P	P	P
11.	Rucha Chaudhari	P	P		P		P	P	P	P	P	P
12.	Saurabh Yadav	A	P		A		A	A	P	P	P	P
13.	Seema Singh	P	P		P		P	P	P	A	P	P
14.	Shashikala Chandrakar	P	P		P		A	P	P	P	P	A
15.	Sumaiya Khan	P	A		P		P	P	P	P	A	P
16.	Gauri Shinde	P	P		A		A	P	P	P	P	P
17.	Pravin Shinde	A	A		A		P	A	A	P	A	P
18.	Swarda Khedekar	P	A		A		A	A	A	A	A	P
19.	Rupesh Thakur	-	P		A		A	A	A	A	P	P
20.	Pramod Rathod	-	A		A		A	A	A	A	A	P
21.	Archana Golhar	-	P		P		P	P	A	P	P	A
22.	Manjiri Patil	-	P		A		A	P	P	A	P	A
23.	Sandeep Chaudhari	-	A		A		A	A	A	A	P	P

Total Participants= 23

Annexure 12

Semester II Theory Paper Examination

REGIONAL INSTITUTE OF EDUCATION, BHOPAL

(NCERT)

DIPLOMA PROGRAMME IN SCIENCE EDUCATION

(PHASE II, THEORY EXAMINATION, MARCH 2024)

Time 3 hours Full Marks :80

Questions from four modules (VI, VII, VIII, IX) have been given separately in Groups A, B, C, D respectively. Answer eight questions taking two questions from each Group. All questions carry equal marks.

चार मॉड्यूल (VI, VII, VIII, IX) के प्रश्न क्रमशः खंड अ, ब, स, ड में अलग-अलग दिए गए हैं। प्रत्येक खंड से दो प्रश्न लेते हुए आठ प्रश्नों के उत्तर दीजिए। सभी प्रश्नों के समान अंक हैं।

GROUP A

1. a) On falling of sunrays, why do we get a spectrum in a prism but not in a glass slab?
b) If the refractive index of glass with respective to air is 1.5 and refractive index of water with respect to air is 1.3 then what will be the refractive index of glass with respect to water?
c) Draw the ray diagrams for image formation by a concave lens, (i) when the object is at infinity, (ii) the object is placed in between f and 2f, (iii) object distance is less than F.
d) What is the power of Lense? What is its unit? Why the power of a convex lens is taken +ve whereas power of concave lens is taken -ve?

क) सूर्य की किरणें पड़ने पर हमें प्रिज्म में स्पेक्ट्रम तो मिलता है, लेकिन कांच के स्लैब में नहीं?

ख) यदि हवा में कांच का अपवर्तनांक 1.5 है और हवा में पानी का अपवर्तनांक 1.3 है तो पानी में कांच का अपवर्तनांक क्या होगा?

ग) अवतल लेंस द्वारा छवि निर्माण के लिए किरण आरेख बनाएं, (i) जब वस्तु अनंत पर हो, (ii) वस्तु f और 2f के बीच रखी हो, (iii) वस्तु की दूरी F से कम हो।

घ) लेंस की शक्ति क्या है? इसकी इकाई क्या है? उत्तल लेंस की शक्ति + ve क्यों ली जाती है जबकि अवतल लेंस की शक्ति - ve क्यों ली जाती है ?

[3+2+3+2=10]

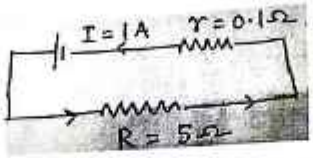
2. a) What is drift velocity? Obtain an expression of current flowing through a conductor of Area 'A' in terms of drift velocity?

1

b) Define electric potential. How do you introduce the concept of electric potential to your students?

c) Draw the variation of V with r for $q>0$ and $q<0$

d) In the given electric circuit what is the EMF of the battery?



क) अनुगमन वेग क्या है? बहाव वेग के संदर्भ में क्षेत्र 'ए' के एक कंडक्टर के माध्यम से बहने वाली धारा की अभिव्यक्ति प्राप्त करें?

ख) विद्युत क्षमता को परिभाषित करें। आप अपने विद्यार्थियों को विद्युत विभव की अवधारणा से कैसे परिचित कराते हैं?

ग) $q>0$ और $q<0$ के लिए r के साथ V का रूपांतर बनाएं

घ) दिए गए विद्युत परिपथ में बैटरी की ईएमएफ क्या है?

[4+3+2+1=10]

3. a) Give two examples each of acidic, basic and amphoteric oxides. Write chemical equation of their preparation.

b) Write down and explain three reactions where both oxidation and reduction occur simultaneously.

c) What do you mean by catenation and what are causes of catenation? Why catenation property of Carbon is maximum?

d) Give examples of isomerization pyrolysis and aromatization reactions with conditions.

क) अम्लीय, क्षारीय और उभयधर्मी ऑक्साइड के दो-दो उदाहरण दीजिए। उनकी तैयारी का रासायनिक समीकरण लिखिए।

ख) ऐसी तीन अभिक्रियाएँ लिखिए और समझाइए जिनमें ऑक्सीकरण और अपचयन दोनों एक साथ होते हैं।

ग) श्रृखंला से आप क्या समझते हैं और श्रृखला के कारण क्या हैं? कार्बन का शृंखलन गुण अधिकतम क्यों होता है?

घ) शर्तों के साथ आइसोमेराइजेशन पायरोलिसिस और एरोमाटाइजेशन प्रतिक्रियाओं के उदाहरण दें।

[3+2+2+3=10]

4. a) Give example of utility of echo, reverberation and resonance.

b) What is meant by action and reaction in Newton's third law? Where do you experience Newton's third law?

c) Mention the wattage of a refrigeration, fan, room heater, induction heater.

d. What is Archimedes principle? Briefly mention the fields of application of Archimedes Principle.

क) गूंज, प्रतिध्वनि और अनुनाद की उपयोगिता का उदाहरण दीजिए।

ख) न्यूटन के तीसरे नियम में क्रिया और प्रतिक्रिया से क्या तात्पर्य है? आप न्यूटन के तीसरे नियम का अनुभव कहाँ कहाँ– कहाँ करते हैं?

ग) रेफ्रिजरेशन, पंखे, रूम हीटर, इंडक्शन हीटर की वाट क्षमता का उल्लेख करें।

घ) आर्किमिडीज़ सिद्धांत क्या है? आर्किमिडीज़ सिद्धांत के अनुप्रयोग के क्षेत्रों का संक्षेप में उल्लेख करें।

[3+2+2+3=10]

GROUP B

5. a) Who proposed the term "Auxin" and what is it?
   b) Name the plant growth regulator and its derivatives?
   c) What is the function of autonomic nervous system. Name the components of autonomic nervous system.
   d) Draw labeled diagrams of main glands in human digestive system and explain their contribution to digestion with a schematic diagram.

   e) Explain how schematization of digestive system helps better learning of students.

   क) "ऑक्सिन" शब्द का प्रस्ताव किसने दिया और यह क्या है?

   ख) पादप वृद्धि नियामक और उसके डेरिवेटिव का नाम बताएं?

   ग) स्वायत्त तंत्रिका तंत्र का क्या कार्य है? स्वायत्त तंत्रिका तंत्र के घटकों के नाम बताइए।

   घ) मानव पाचन तंत्र में मुख्य ग्रंथियों के नामांकित चित्र बनाएं और एक योजनाबद्ध आरेख के साथ पाचन में उनके योगदान की व्याख्या करें।

   ड़) बताएं कि कैसे पाचन तंत्र का योजनाबद्धीकरण छात्रों को बेहतर सीखने में मदद करता है।

   [1+2+2+4+1=10]

6. a) What do you mean by formed elements?
   b) Explain with labeled diagram the mechanism of exchange of gases in lungs leading to gaseous exchange between blood and tissue cells.

   c) Why do plants need to respire?
   d) Explain with labeled diagram the breathing mechanism of birds?
   e) What is genetic drift?

   क) निर्मित तत्वों से आप क्या समझते हैं?

ख) रक्त और ऊतक कोशिकाओं के बीच गैसों के आदान-प्रदान के कारण फेफड़ों में गैसों के आदान-प्रदान की क्रियाविधि को नामांकित चित्र के साथ समझाइए।

ग) पौधों को श्वसन की आवश्यकता क्यों होती है?

घ) पक्षियों के श्वसन तंत्र को नामांकित चित्र सहित समझाइए?

ड़) आनुवंशिक अनुगमन क्या है?

[1+4+1+3+1=10]

7. a) Describe the process of DNA replication, DNA transcription and DNA Translation.
   b) Explain with examples how traits are inherited in animal kingdom.
   c) Why natural selection is called a survival advantage?
   d) Explain the following with suitable examples.
      i. Inheritance of body color
      ii. Adaption

क) डीएनए प्रतिकृति, डीएनए प्रतिलेखन और डीएनए अनुवाद की प्रक्रिया का वर्णन करें।

ख) उदाहरण सहित स्पष्ट करें कि पशु जगत में लक्षण कैसे विरासत में मिलते हैं।

ग) प्राकृतिक चयन को उत्तरजीविता लाभ क्यों कहा जाता है?

घ) निम्नलिखित को उपयुक्त उदाहरणों सहित स्पष्ट कीजिए।

i. वंशनुक्रमित शरीर का रंग

ii. अनुकूलन

[5+3 +1+1=10]

8. a) What is systolic pressure and which is diastolic pressure? Which one is greater and why?
   b) What is DNA finger prints? Explain how it is utilized in animal investigation
   c) Who argued that life was formed through chemical evaluation? Explain the arguments in favor of chemical evolution
   d) Explain with diagram the detail process of carbon dating.
   e) Mention the methods through which fossils are formed.

क) सिस्टोलिक दबाव क्या है और डायस्टोलिक दबाव कौन सा है? इनमें से कौन बड़ा है और क्यों?

ख) डीएनए फिंगर प्रिंट क्या है? बताएं कि इसका उपयोग पशु जांच में कैसे किया जाता है

ग) किसने तर्क दिया कि जीवन का निर्माण रासायनिक मूल्यांकन के माध्यम से हुआ था? रासायनिक विकास के पक्ष में तर्क स्पष्ट कीजिए

घ) कार्बन डेटिंग की प्रक्रिया को विस्तार से चित्र सहित समझाइए।

ङ) उन विधियों का उल्लेख करें जिनके माध्यम से जीवाश्मों का निर्माण होता है।

[2+2+4+1+1=10]

Group C

9. a) Explain the key components of assessment and evaluation in the context of learning science, highlighting the Perspective of Science.

b) Differentiate between assessment and evaluation, providing specific examples within the realm of learning science.

क) विज्ञान के परिप्रेक्ष्य पर प्रकाश डालते हुए, विज्ञान सीखने के संदर्भ में आंकलन और मूल्यांकन के प्रमुख घटकों की व्याख्या करें।

ख) विज्ञान सीखने के दायरे में विशिष्ट उदाहरण प्रदान करते हुए आंकलन और मूल्यांकन के बीच अंतर करें।

[5+5= 10]

10. a) Explain how incorporating specific dimensions of learning can be advantageous in teaching science.

b) Provide examples of how educators can utilize these dimensions to create engaging and effective learning experiences.

c) Compare Bloom's Taxonomy and Bloom's Revised Taxonomy, highlighting one major difference between the two models.

d) Discuss how these taxonomies are applied in science education to promote diverse levels of learning.

क) बताएं कि विज्ञान शिक्षण में सीखने के विशिष्ट आयामों को शामिल करना कैसे फायदेमंद हो सकता है।

ख) आकर्षक और प्रभावी अधिगम अनुभव के लिए शिक्षक इन आयामों का उपयोग कैसे कर सकते हैं, इसके उदाहरण प्रदान करें।

ग) ब्लूम के वर्गीकरण और ब्लूम के संशोधित वर्गीकरण की तुलना करें, दोनों मॉडलों के बीच एक प्रमुख अंतर पर प्रकाश डालें।

घ) चर्चा करें कि सीखने के विभिन्न स्तरों को बढ़ावा देने के लिए विज्ञान शिक्षा में इन वर्गीकरणों को कैसे लागू किया जाता है।

[3+2+3+2=10]

11. a) Define an achievement test and provide a brief explanation of its primary purpose in assessing students' knowledge in a specific subject.

b) Explain the key considerations involved in planning an effective assessment. Highlight at least two factors that educators should take into account when designing an assessment strategy.

क) उपलब्धि परीक्षण को परिभाषित करें और किसी विशिष्ट विषय में छात्रों के ज्ञान का आकलन करने में इसके प्राथमिक उद्देश्य का संक्षिप्त विवरण दीजिए।

ख) प्रभावी मूल्यांकन की योजना बनाने में शामिल प्रमुख निर्देशों की व्याख्या करें। कम से कम दो कारकों पर प्रकाश डालें जिन्हें शिक्षकों को मूल्यांकन रणनीति तैयार करते समय ध्यान में रखना चाहिए।

[5+5=10]

12. a) Evaluate the significance of incorporating practical components into the Continuous and Comprehensive Evaluation framework in science learning.

b) Provide examples of practical assessments and explain how they enhance the overall evaluation process.

क) विज्ञान सीखने में सतत और व्यापक मूल्यांकन ढांचे में व्यावहारिक घटकों को शामिल करने के महत्व का मूल्यांकन करें।

ख) व्यावहारिक मूल्यांकन के उदाहरण प्रदान करें और बताएं कि वे समग्र मूल्यांकन प्रक्रिया को कैसे बढ़ाते हैं। [5+5=10]

Group D

13. a) Describe the steps you would take to select and define a research topic in science education.

b) Discuss the factors that influence your choice and the importance of a well-defined topic in the research process.

c) Outline the key components of a research proposal in science education, focusing on title, objectives, and intended outcomes. Explain why these elements are crucial for a successful research proposal.

क) विज्ञान शिक्षा में शोध विषय को चुनने और परिभाषित करने के लिए आपके द्वारा उठाए जाने वाले चरणों का वर्णन करें।

ख) उन कारकों पर चर्चा करें जो आपकी पसंद को प्रभावित करते हैं और शोध प्रक्रिया में एक अच्छी तरह से परिभाषित विषय के महत्व पर चर्चा करें।

ग) शीर्षक, उद्देश्यों और इच्छित परिणामों पर ध्यान केंद्रित करते हुए विज्ञान शिक्षा में एक शोध प्रस्ताव के प्रमुख घटकों की रूपरेखा तैयार करें। बताएं कि ये तत्व एक सफल शोध प्रस्ताव के लिए महत्वपूर्ण क्यों हैं। [3+2+5=10]

14. a) Discuss the process of developing hypotheses in science education research.

b) Provide an example of how a well-constructed hypothesis can guide the research process and contribute to meaningful findings.

b) Explain the role of administrative tools in the process of conducting research in science education.

c) Discuss at least two administrative tools that can be employed and their significance in ensuring the smooth execution of the proposed research plan.

क) विज्ञान शिक्षा अनुसंधान में परिकल्पना विकसित करने की प्रक्रिया पर चर्चा करें।

बी) एक उदाहरण दीजिए कि कैसे एक अच्छी तरह से निर्मित परिकल्पना अनुसंधान प्रक्रिया का मार्गदर्शन कर सकती है और सार्थक निष्कर्षों में योगदान कर सकती है।

ख) विज्ञान शिक्षा में अनुसंधान करने की प्रक्रिया में प्रशासनिक उपकरणों की भूमिका की व्याख्या करें।

ग) कम से कम दो प्रशासनिक उपकरणों पर चर्चा करें जिन्हें नियोजित किया जा सकता है और प्रस्तावित अनुसंधान योजना के सुचारू निष्पादन को सुनिश्चित करने में उनके महत्व पर चर्चा करें।

[2+3+3+2=10]

15. a) Name some renowned science research journals.

b) Mention the name of some renowned level scholarships for education research.

c) Describe the important steps to be taken care of while organizing the Seminar on Science Education Research.

क) कुछ प्रसिद्ध विज्ञान शोध पत्रिकाओं के नाम बताइए।

ख) शिक्षा अनुसंधान के लिए कुछ प्रसिद्ध स्तर की छात्रवृत्तियों के नाम का उल्लेख करें।

ग) विज्ञान शिक्षा अनुसंधान पर सेमिनार आयोजित करते समय ध्यान रखने योग्य महत्वपूर्ण कदमों का वर्णन करें।

[4+3+3=10]

16. a) Discuss the role of research in addressing gender issues in science education.

b) Provide two examples of research topics that specifically target gender-related challenges or disparities in the learning and engagement of students in science.

c) Explore the importance of researching science education in different settings, including rural, urban, and remote areas.

e) Discuss how contextual factors in each habitat influence science education and propose one potential research question for each setting.

क) विज्ञान शिक्षा में लैंगिक मुद्दों के समाधान में अनुसंधान की भूमिका पर चर्चा करें।

ख) अनुसंधान विषयों के दो उदाहरण प्रदान करें जो विशेष रूप से विज्ञान में छात्रों की सीखने और भागीदारी में लिंग संबंधी चुनौतियों या असमानताओं को लक्षित करते हैं।

ग) ग्रामीण, शहरी और दूरदराज के क्षेत्रों सहित विज्ञान शिक्षा पर शोध के महत्व को लिखिए ।

घ) चर्चा करें कि प्रत्येक आवास में प्रासंगिक कारक विज्ञान शिक्षा को कैसे प्रभावित करते हैं और प्रत्येक सेटिंग के लिए एक संभावित शोध प्रश्न प्रस्तावित करते हैं।

[3+2+2+3=10]

Annexure 13

Diploma Programme in Science education at secondary level
Marksheet (Final)

REGIONAL INSTITUTE OF EDUCATION, BHOPAL
(National Council of Educational Research and Training)

DIPLOMA IN SCIENCE EDUCATION AT SECONDARY LEVEL

GRADE REPORT

ACADEMIC SESSION - 2023-24

Name : Richa Motiwala | Roll No. : 2023066017 | Enrollment No. : DPSE2023RM017

No.	Credit	STATEMENT OF MARKS/ GRADES					Overall Marks & GD	Remarks
		Max	Secured		Total	Grade		
1.	THEORY (18)	Th P-1 (80)	70	17.5	42	A	86.75 (A)	Successfully Completed
		Th P-2 (80)	63	15.75				
		AS-1 (10)	9	4.5				
2.	PRACTICAL (8)	AS-2 (10)	8.5	4.25	21.75	A		
		PR-1 (30)	27	13.5				
		VV-1 (20)	17	8.5				
		PR-2 (30)	25	12.5				
		VV-2 (20)	18	9				
3.	PROJECT (4)	PJR (30)	28	14	11.5	A		
		PVV (20)	18	9				
4.	CONTACT PROGRAMME (4)	Grand Viva-Voce (25)	23	11.5	11.5	A		

1 & 2 refer to the two phases of Theory and Practical

Th- Theory, PR1&2 - Practical Report-1&2, PJR - Project Report, AS - Assignment, VV-1& VV-2 - Practical Viva-voce, GT - Grand Total, GD - Grade

Programme Coordinator

Principal

Annexure 14

Diploma Programme in Science education at secondary level
Certificate of Merit

Roll No. 2023066017

REGIONAL INSTITUTE OF EDUCATION, BHOPAL
(National Council of Educational Research and Training)

CERTIFICATE OF MERIT

Diploma in Science Education at Secondary Level is hereby conferred upon ***Richa Motiwala*** *in fulfillment of requirements as prescribed for award of the programme.*

Grade : A

Programme Coordinator
Prof. (Capt.) Rashmi Singhai
DPSE

Principal
Prof. Jaydip Mandal
RIE, Bhopal

Director
Prof. Dinesh Prasad Saklani
NCERT, New Delhi

Date of issue : 8 August, 2024

REGIONAL INSTITUTE OF EDUCATION, BHOPAL

(National Council of Educational Research and Training)