



Recommendations on the Proposed Assessment & Examination Reforms by Central Board of Secondary Education (CBSE)



केन्द्रीय माध्यमिक शिक्षा बोर्ड
CENTRAL BOARD OF SECONDARY EDUCATION

डॉ. जोसफ इमानुवल
निदेशक (शैक्षणिक)

DR. JOSEPH EMMANUEL
Director (Academics)

CBSE/ DIR(ACAD)/2019

10th May, 2019

Subject: Report on Assessment and Examination Reforms- Reg

Dear Ms. Ghosh,

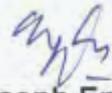
CBSE appreciates the efforts of FICCI Arise Team in compiling the report titled '*Recommendations on the Proposed Assessment & Examination Reforms by Central Board of Secondary Education*'. It is also commendable that these recommendations have been submitted after deliberations and discussions with various stakeholders on issues that are central to holistic education.

The Board had initiated a similar exercise in the later half of 2018 and has come out with a policy document titled *Strengthening Assessment and Evaluation Practices of the Board*. During this process long deliberations were undertaken with many stakeholders and experts. Subsequently, the current assessment at classes IX to XII have been strengthened and notified vide Circular F. 1001/CBSE/Dir.(Acad)/2019 dated 6th March 2019.

As the work of strengthening assessment and evaluation is a process, the Board will keep the recommendations given by FICCI Arise in cognizance when further work in this direction is undertaken.

I thank you and your team for this endeavor as well as sharing your views on Assessment and Examination Reforms.

Regards,


(Dr. Joseph Emmanuel)

Ms. Shobha Mishra Ghosh
Assistant Secretary General
Federation of Indian Chambers of Commerce and Industry
Federation House
Tansen Marg, New Delhi -110001

“शिक्षा सदन”, 17, राउज एवेन्यु, इंस्टीट्यूशनल एरिया, नई दिल्ली – 110002

“Shiksha Sadan”, 17, Rouse Avenue, Institutional Area, New Delhi-110002

फोन / Telephone: 011-23212603, 011-23234324, वेबसाइट / Website: www.cbseacademic.in

ई-मेल / E-mail: directoracad.cbse@nic.in, directoracad.cbse@gmail.com

PREFACE

Managing an education system that is meaningful, credible and practicable within a very complex, continuously changing context at massive scale and under constant scrutiny is no mean feat. The Central Board of Secondary Education (CBSE), one of the most respected flagship education boards of India has managed to do just that by constantly evolving and serving students year on year for the past ninety years.

The world has changed dramatically over the last decade and measuring the factors that determine competitiveness continues to be a highly complex process. The early 21st century has seen education reforms in many countries that were driven by new economic imperatives that called for a realignment of assessment concepts to match the prevailing educational goals. Global adaptation of Outcome-Based education framework and enhanced focus on higher-order learning and professional skills necessitates a paradigm shift in conventional practices of curriculum design, education delivery and assessment. Rapidly changing technologies in various fields have changed the way we need to measure key aspects for creating engaged thinkers, active learners, knowledge constructors and global citizens.

The skills sets tested in the current Indian examinations are far removed from the skills required for success in real life or in work careers and since the schools see their primary benchmark in producing good results in these examinations, the country is experiencing a huge skills gap. As students prepare for skills that are not relevant, the levels of non-employability continue to increase. In such a situation unless reforms in Assessment & Examinations are urgently addressed, the future of the students will be in jeopardy.

In the light of the above, the FICCI ARISE team deeply appreciates CBSE's commitment to remaining a relevant and high-quality Examination Board. This current initiative is heralded by CBSE to undertake along with FICCI ARISE a study to recommend Proposed Assessment & Examination reforms. To achieve the best possible outcome, a resource pool of experts was constituted from policy makers to practical practitioners, with deep knowledge of local context to the broad understanding of different global boards. This group of experts through a set of shared and allocated goals had several iterations of discussions in India and London, both through online as well as in focused workshops to brainstorm and chart out a roadmap for the country. This expert participation was amongst senior officials from CBSE, leading experts from various bodies like International Baccalaureate Organisation, Cambridge Assessment International Education College Board, British Council and governors, educationists, school leaders and practitioners.

We gratefully acknowledge the support of the current CBSE leadership (Ms Anita Karwal Chairperson; Mr Anurag Tripathi Secretary; Dr Antriksh Johri Director IT & Project; Dr Biswajit Saha Director Skill Education & Training). They have been open, pragmatic and encouraging in their inputs and dialogue with the FICCI ARISE team. The fact that the CBSE has supported this endeavour is a testimony to its desire for constant self-improvement, the hallmark of a great learning institution.

The common goal of this paper is to find the most appropriate solution possible in our unique context of operation and delivery that will best meet the needs of all learners. The contributing team hopes that many of these recommendations that range from easy wins to complex radical changes will see the light of day and transform the way teaching and learning happens in this country, to create balanced, empathetic, knowledgeable, healthy, future ready citizens.



Mr Naga Prasad Tummala
Chairman, FICCI ARISE;
Chairman, People Combine
Initiatives



Mr Manit Jain
Co-Chair, FICCI ARISE;
Director, The Heritage Group
of Schools



Dr Manjula Pooja Shroff
Co-Chair, FICCI ARISE;
Chairperson, Kalorex Group
of Schools



Ms Shobha Mishra Ghosh
Assistant Secretary General,
FICCI

TABLE OF CONTENTS

TOPICS	Page No.
Preface	3
Executive Summary	6
Context & Introduction	8
Methodology & Approach	9
Key Discussions & Takeaways	10
Review and Recommendations of reforms in pipeline by CBSE	12
Engagement Cycle and Way Forward	15
Other Recommendations	16
Conclusion	18
References	19
List of Abbreviations	20
Acknowledgements	21



TABLE OF **CONTENTS** (Appendices)

TOPICS

Page No.

Appendix 1 (CBSE Past Question Paper Analysis and Model Papers)	22
1A (Mathematics)	22
1B (Physics)	28
1C (Chemistry)	39
1D (Biology)	50
1E (English)	64
1F (Economics)	78
1G (History)	83
1H (Geography)	91
1I (Political Science)	94
Appendix 2 (Internal Assessments)	101
Appendix 3 (Specific Tabulated Recommendations on Reforms by CBSE in Pipeline)	102
Appendix 4 (Brief Overview on Experiential Learning)	103
Appendix 5 (Sample Curriculum for Sports Sciences Being Offered in Australian Schools)	104
Appendix 6 (Recent initiatives by CBSE for Examination Reforms)	136



EXECUTIVE SUMMARY

The aim of this challenging initiative undertaken by CBSE and FICCI ARISE has been to study the various facets of student Assessment and Examination in order to arrive at the most suitable improvement and reform plan within the distinctive milieu and diversity of the CBSE Assessment & Examination procedures that will best suit the aspiration of the learners for their role in the global village. The interest of every student was the primary contemplation and at the center of the discussions and deliberations that went into creating this set of recommendations for the Board Examinations for the Higher Secondary level.

Key Recommendations

Short-Term

1. **Change in question paper:** The presupposition is that if right priorities are set in the question paper, in accordance to Bloom's Taxonomy along with the desired learning outcomes, it will necessitate early review of approach to the teaching learning process and therefore impact all areas holistically, including the curriculum.
2. **Combining internal assessment marks with theory marks:** It was felt necessary to use the scope for internally assessed components to promote exploratory, choice driven, research oriented and creative learning through formative and stress free assessments of a wide variety of methods.
3. **Change in the marking scheme:** By modifying the marking scheme, both within a question paper and the weightage between marks allocated to internally assessed components vis-à-vis external examinations the desired goals can be achieved. This will have a cascading effect on all other areas of learning.
4. **Annual review of question papers:** Annual review and statistical analysis of past years examination papers will establish contemporaries to reduce redundancy and check the various trends of students' performance. This along with the result analysis will also be an essential tool to share with the schools for their identification of areas that need attention for improvement.

Mid -Term

1. **Doing away with subject hierarchy:** Though CBSE places all subjects at par, a perceived hierarchy of subjects grouped as 'streams' exists at the school level, hence it is important to lay special emphasis on certain subjects such as fine arts, visual arts, theatre, technical drawing, music, filmmaking and community service so as to bring parity with the 'mainstream subjects' with a similar level of academic rigour, designed appropriate to the subject.
2. **Introducing different subject levels:** All subjects can have different levels of syllabus like Higher Level [HL], Standard Level [SL] and Basic Level [BL]. The difference between these levels is the degree of difficulty and depth of topics being covered and assessed. Assessment for these levels should check a larger scope of knowledge, understanding and skills that are appropriate for the given level HL, SL or BL. The students will therefore have a wider choice according to their desire, interest and aptitude.

3. **Institutionalizing ethics:** Instilling institutional ethics in all stakeholders in Assessments and Examinations in terms of understanding its purpose, students' psychology and academic integrity will go a long way towards creating the right eco-system.
4. **Aligning curriculum:** The NCERT textbooks should be reviewed and updated once in every two years. This review should be in total alignment and compliance with the CBSE principles of Assessment & Examinations.
5. **Bilingual question papers:** Question papers can be designed to have one side, say left hand pages printed in Hindi while other side printed in English, similar to the IIT JEE papers.
6. **Capacity building for teachers:** Mandatory on the job short term training or How-to online instructions for the teachers would be of key importance for the success of all the above.

Long-Term

1. **End to End approach:** The task of preparing a comprehensive guideline covering the entire life cycle for administering CBSE assessments and

examinations can be undertaken. Aligning the full circuit of designing curriculum, principles of assessment, setting question papers, conducting and evaluating, analysis of question papers and stakeholder concurrence will result in a robust and sustainable model.

2. **Constructing academic discipline:** In the overall scheme CBSE can introduce an academic discipline, where the students will learn to evaluate the knowledge acquired and also to ask how they learn, what they learn.
3. **Harnessing artificial intelligence:** CBSE can also leverage Artificial Intelligence for performing diagnostic tests to capture student performance and to plan for review and timely interventions without increasing teacher work load as is the practice in nations like China.

Since the reforms suggested will bring about far reaching changes both in range and depth, it is advised that each reform be implemented with conviction rather than in fervour. For every change it is important to carry all stakeholders together, to have necessary checks and balances in place through an effective feedback mechanism so as to provide for mid-course corrections and to ensure that the reforms lead to the desired impact.



CONTEXT & INTRODUCTION

Before setting out on the task of framing these recommendations the expert team reflected and agreed on the basic purpose of education, the overarching need, the nature of learner and the need to shift the paradigm of assessment system that currently assessed largely content knowledge and was rapidly losing relevance.

It is generally agreed that the core purpose of education is to pass on cultural wisdom, knowledge and learning, as well as to prepare for life and living. However simple this may sound, globally it is proving to be a very tough task for education systems situated as they are, in a constantly changing, technology driven 'data economy'¹. As quoted in Future of Jobs Report 2018 by World Economic Forum, "Workforce transformations are no longer an aspect of the distant future". As per FICCI Future of Jobs report, "by 2022, 9% of people would be deployed in jobs that do not exist today and 37% of them would land up in jobs that will have radically changed skill set". The question being asked worldwide is, how do we educate our young children to take their place in the economies of the future when we are unable to anticipate what those economies will look like.

It is now widely accepted that deep learning of core skills such as critical thinking, problem solving, collaboration, citizenship, creativity may be the answer to creating future ready citizens able to learn, unlearn and relearn confidently to adapt to an ever-changing environment². Unfortunately, "The skills that are easiest to teach and test are also the skills that are easiest to digitize, automate and outsource"³ and therefore the easiest to become redundant as artificial intelligence and new age technology rapidly becomes a reality.

There is also consensus that each learner who sits at the heart of the system is unique and multi-faceted. The traditional notion of Intelligence Quotient (IQ) has been replaced with the widely accepted theory of Multiple Intelligences proposed by Dr Gardner. It doesn't matter "How intelligent you are?"⁴ but is a question of "How you are intelligent?". However, this creates a further layered challenge to any assessment and examination system that has traditionally only been focused on academic achievements ignoring most others such as emotional or

creative intelligence entirely or doing so in a very shallow and arbitrary manner. Giving learners an opportunity to demonstrate all their skills, aptitude and intelligences should be the aim and objective of an evaluation system but this is not easy to do in the current largely paper and pen format. Efforts made by allowing internal assessments are laudable but require much more scalable systems of checks and measures, rubrics and guidelines to create a fit for purpose education system.

The experts group also took into consideration the uniqueness of the context of operation of CBSE which is obliged to serve large numbers of very diverse group of schools that are geographically spread out across the Indian sub-continent and even overseas. The infrastructure of CBSE affiliated schools range from the state-of-the-art urban schools to very basic rural government schools. They also took into account, that any changes suggested for implementation would need extensive orientation and explanation to find acceptability amongst teachers, parents and the wider community in this age of very intense media and public scrutiny. Lastly the group also recognised the fact that its scope in suggesting examination and assessment reforms was limited by the curriculum offered and would need extensive teacher capacity building to implement effectively.

It was in this context that the experts reviewed the current CBSE, IBO and Cambridge International systems of assessment to create a set of recommendations that would be implementable and meet the needs of the learners most closely.



¹ Data Economy Report 2018; Digital Reality

² Fullan, M., & Langworthy, M. (2014). A rich seam: How new pedagogies find deep learning. London: Pearson, p.7. Retrieved from: http://www.michaelfullan.ca/wpcontent/uploads/2014/01/3897.Rich_Seam_web.pdf

³ <http://www.thefivethings.org/andreas-schleicher/>

⁴ Gardner, Howard (1999), Intelligence Reframed: Multiple Intelligences for the 21st Century, Basic Books, ISBN 978-0-465-02611-

METHODOLOGY & APPROACH



The Methodology followed

The experts group began by revisiting the relevance and purpose of Assessment and Examination for different stakeholders of the education system. Then they explored the statement “What will make the CBSE Assessment and Examination system Future Ready and Fully Fit for Purpose?” through a situation analysis exercise. They mapped the processes of Assessment and Examination life cycle and examined in further details the paper setting aspect of the full process. They compared how assessment is carried out in International Baccalaureate Organisation (IBO) and International General Certificate of Secondary Education (IGCSE) systems on parameters such as the principle and structure of the examination system.

The last part of the exercise involved collating the recommendations and observations and classifying them to align with CBSE's current reforms process guideline documents and pre-noticees.



KEY DISCUSSIONS & TAKEAWAYS

Stakeholders' Views on Purpose of Assessments

Students

- Understand one's own strength and weakness
- Understand how to contribute to society
- Evaluate level of skill, knowledge & understanding and assess scope of improvement
- Benchmark achievement against set criteria of self and others
- Help craft and chart their learning journey

Teachers

- Improve teaching learning skills
- Self-assessment and peer- feedback for growth
- Understand the learning level of students for lesson planning
- Proof of what has been learned and improve learning

Schools

- Help the academic leadership align
- Enhance learning and teaching processes
- Encourage schools to integrate annual pedagogical plans
- Build a cohesive environment of nurturing every learner

Parents

- Inform parents of their ward's strength, areas of improvement and need for additional support
- Help understand if the ward has achieved the expected outcomes and milestones of learning
- Reassurance of the chances of college admissions and job prospects

HEI's & Employers

- Assessments to guide them to make informed and correct recruitment decisions
- To foster confidence in the Industry Academia relationship

Nation

- Create social equity
- Equip for life and livelihood
- Evaluate the quality of education to develop 'citizens of tomorrow'
- Informed decision for policy making

Reflections on Current Scenario

The focus, design and difficulty of examinations vary greatly and do not take into account background factors that may impact learning.

Common board examinations are conducted only in Class 10 and Class 12, which is the end of a child's schooling career.

The results are 'high-stakes' for the students because they determine the future course of study or employment.

Examinations are designed to allow the maximum number of students to qualify, and not specifically to distinguish between them indicating the absence of diagnostic feedback.

Skills tested in examinations are way different from skills needed for success in workplaces.

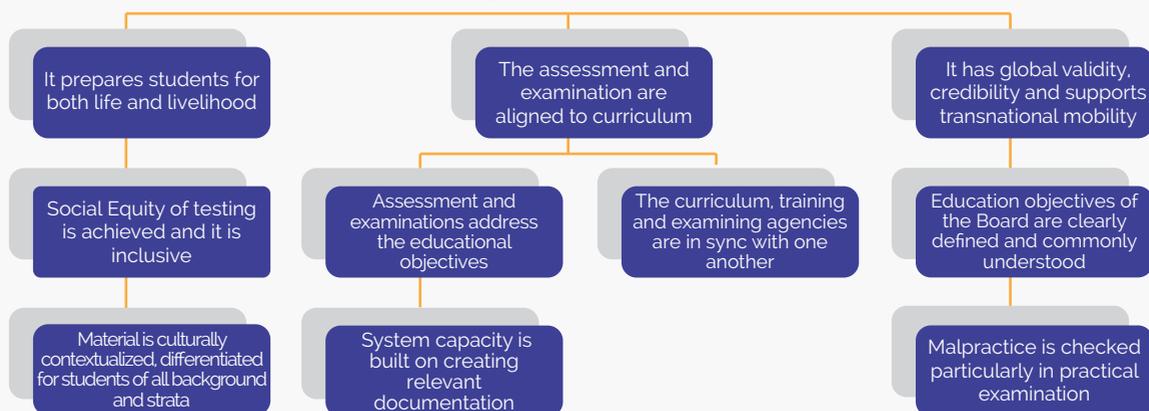
The examinations do not allow students to demonstrate the full range of skills, talents and focus more on rote learning.

No satisfactory tools and processes are in place to mainstream and measure sports, music, arts at 10th level.

Examinations do not test coreskills such as creativity, critical thinking, empathy and emotional intelligence etc.

Rubrics, descriptors, marking schemes, test-items need development or improvement in line with curriculum and learning outcome.

CBSE Assessment and Examination will be fully fit for purpose if:



REVIEW AND RECOMMENDATIONS OF REFORMS IN PIPELINE BY CBSE

The recent initiatives undertaken by CBSE for examination reforms covering thirteen important points and handed over to FICCI as per Chairperson's address (Annexure 6). These thirteen points were discussed and debated in depth by this expert group.



The following initiatives were found laudable, progressive and appreciated:

- A. **Counting of marks in vocational subjects in best of 5 for class X:** If any student fails in any one of the three compulsory subjects (i.e. Science, Mathematics and Social Science) in class X, then it gets replaced by the Vocational subject (offered as a 6th additional subject) and result of Class X Board Examination is computed accordingly.
- B. **Conduct of final exams in Skill Subjects in the month of February:** The Secondary School Certificate Examination (Class X) and Senior School Certificate Examination (Class XII) for all Skill oriented subjects will be conducted in the month of February from the Academic session 2018-2019 onwards. This has been done to ensure earlier results and better chances at admissions in good universities.
- C. **Exam Centre Locator:** The Board has developed an Exam Centre Locator (ECL) App. This mobile app has been developed to facilitate CBSE examinees to locate their centres on Google map entering their roll number. This also helps to know the shortest route to reach the centre and time required to reach the centre.
- D. **Digilocker:** CBSE has registered with Digilocker which is a platform for issuance and verification of documents & certificates digitally, thus eliminating the use of physical documents. The Board opens digital lockers of class X & XII students wherein their digitally signed marks sheets, migration certificates and pass certificates with PKI based QR Codes are pushed, immediately on declaration of results. In 2018, all 28 lakhs students were provided the digital academic documents on the same day and at the same time of declaration of results. This will be continued in all Board exams.

- E. **Special Exams for International Sportspersons:** In order to promote talent in sports, the Board has done a departure from set practice of following the fixed exam schedule. Students who have to represent India at various international sports events during the CBSE board exams are given special permission for appearing in Board Exams on later dates. This policy was introduced in 2018 and so far 9 students who took benefit of this, got medals for India.



A few recommendations are being made on the remaining points:

1. **Change in design of question paper:** The experts group has worked in great detail on the design of question papers in order to make assessments more reliable, valid, stress free, effective, fair and equitable. An evaluation of question papers across various international boards was done with a view to collate findings on how Bloom's Taxonomy is being applied. Along with this comparative study, a detailed analysis of past year question papers of CBSE for a multiple of subjects was undertaken to check ascendancy for application of Bloom's taxonomy to assess cognitive learning level and to check if there is complete alignment to the CBSE aspiration as laid out in the curriculum. Based on the findings and identified variances, model Question papers have been prepared to act as exemplars and to illustrate a well balanced, representation of the typology that has been recommended by CBSE. In the making of the Model Question Papers the aim was two-fold
 1. Study international curriculum and question paper styles
 2. Implement the CBSE aspiration for the assessment goals already laid out in the curriculum based on NCF 2005

Subject wise past year question paper analysis and model question papers that were prepared by the expert group are provided for ready reference in [Appendix 1]:

Mathematics: Inherently, Mathematics can be stated as a logical discipline. This inherent nature of the subject prepares the students for a VUCA (volatile, uncertain, complex, and ambiguous) world. In the last year's CBSE question paper, one could see a dip in the portion allocated to analysis, synthesis and evaluation. The model question paper now designed intends to provide scope for students to solve problems creatively and logically and apply mathematical knowledge to solve unfamiliar problems. Past year question paper analysis and model question paper is given in [Appendix 1A]

Physics: This subject attempts to make the learner aware of the way the laws of nature work and also the technological advances that determine the social priorities. A learner while studying Physics must be able to apply and integrate knowledge and skills to understand real problems and put together parts to effectively draw conclusion and make judgements. While analysing the CBSE previous year question paper it was observed that by and large the typology of CBSE matches the Bloom's taxonomy, however, certain sections are not in sync with the taxonomy and needs upgradation. The Model Test Paper prepared ensures that the learners are able to apply the process of scientific investigation and also use their understanding to analyse and reason. [Appendix 1B]

Chemistry: It is often called the central science as chemical principles underpin both the physical environment in which we live and all biological systems. Apart from being a subject worthy of study in its own right, chemistry is often a prerequisite for many other courses in higher education, such as medicine, biological science and environmental science. The internal and external assessment must involve a hands-on approach, use of data-bases, modelling, simulation or a hybrid. While analysing the previous year CBSE question paper, a significant dip from 44% to 33% was observed in the areas allocated to analysis, synthesis and evaluation. The Model Question Paper prepared intends to incorporate the interdisciplinary nature of chemistry with reference to Mathematics, Physics and Biology. Past year question paper analysis and model question paper is given in [Appendix 1C]

Biology: It is the study of how life evolves, survives and changes. It gives knowledge about the interaction of cells with the organs and organisms, environment and ecosystem. It is imperative to assess higher level cognitive skills, creating opportunities for formative assessment of content, developing critical thinking skills and developing the capacity of students to self-regulate their learning. As per the analysis of the previous year question paper, a major focus towards remembering and understanding and a dip in analytical and application-based questions was observed. Past year question paper analysis and model question paper is given in [Appendix 1D]

English: The language of international communication, English is a systematic use of symbols and sounds. The study of language is not only transactional but also aesthetic in nature. As per the analysis, it has been observed that HOTS/evaluation has been reduced to 5%

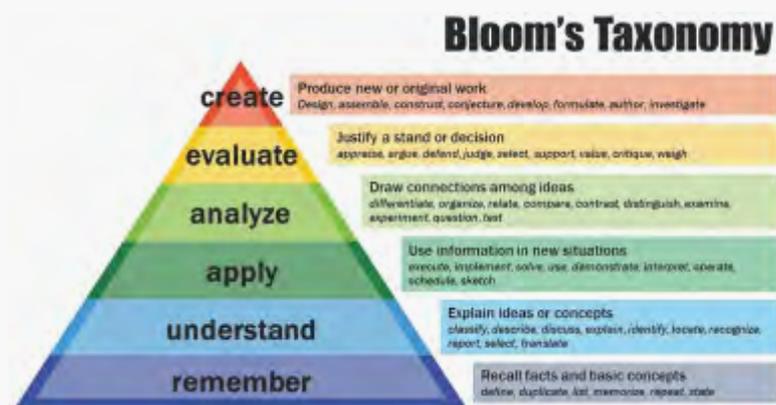
from the allotted 20% as per the published curriculum of CBSE, again indicating a shift towards remembering and understanding. Past year question paper analysis and model question paper is given in [Appendix 1E].

Economics: Economics prepares students how to make sound choices, it is vital to the future health of any nation. By studying how markets work our young people also learn how to manage their own resources such as time and money. As per the analysis, it is perceived that the necessary weightage prescribed to HOTS and multidisciplinary approach in the CBSE curriculum is not reflected in the past year question paper. Past year question paper analysis and model question paper is given in [Appendix 1F]

History: History helps in the understanding of change and how the society came to be as is. As a subject it is inescapable as a serious study since the past causes the present as well as impacts the future. It provides an opportunity to develop the tendency to question and debate. As per the analysis of CBSE past paper there is a shift from application and evaluation to remembering and understanding. Past year question paper analysis and model question paper is given in [Appendix 1G]

Geography: Prepares students for understanding and resolution of issues related to environment and sustainable development and the processes of change on the planet we live in. CBSE has prescribed 43% weightage to the typology level of remembering and understanding whereas the same has been increased to 60% in the past year paper. Keeping in view the findings, the model test paper has incorporated more of application and Higher Order thinking skills-based questions. Past year question paper analysis and model question paper is given in [Appendix 1H]

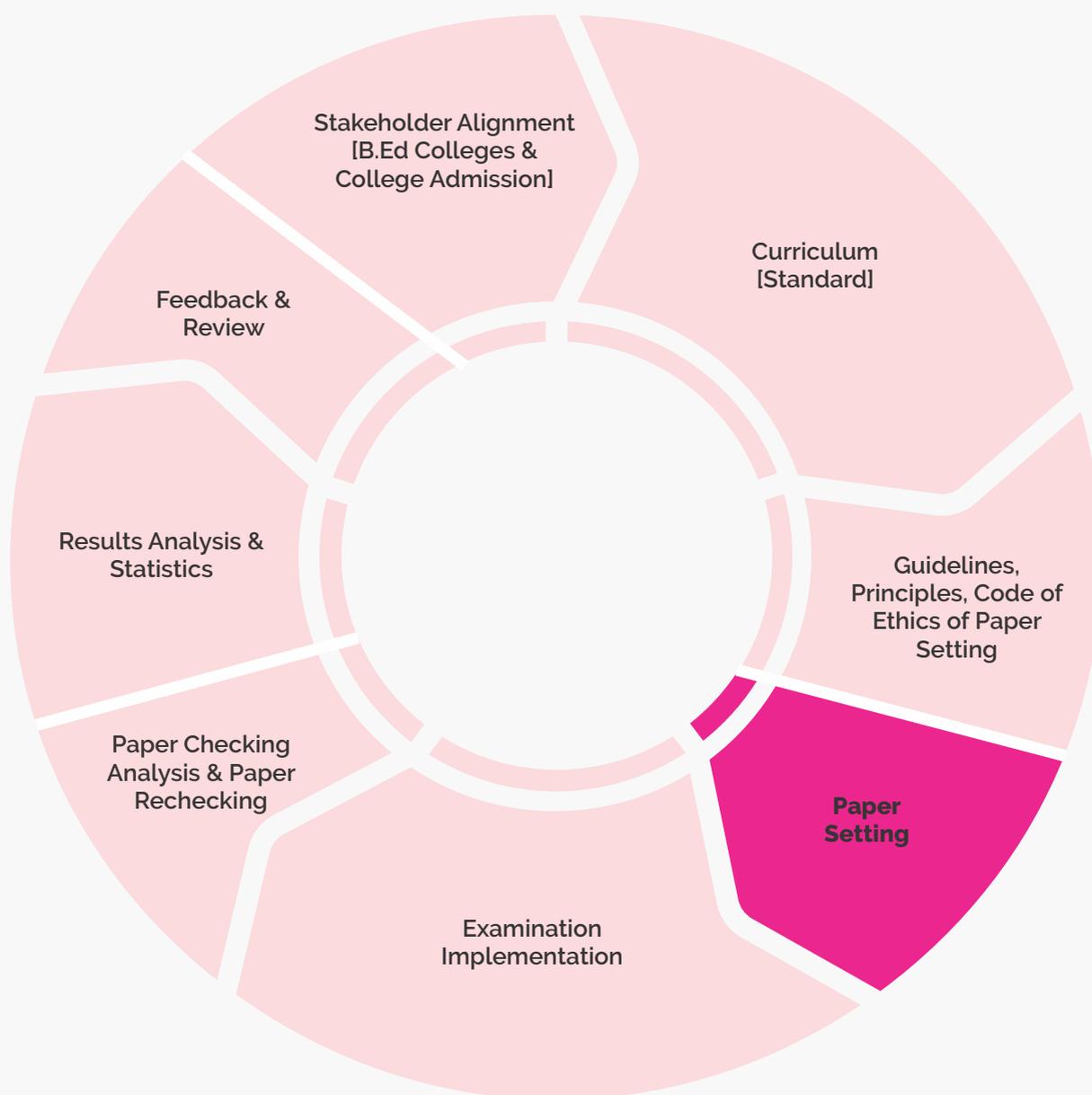
Political Science: The knowledge of Political Science is indispensable because it helps in the understanding of mechanism and constitution of government whether domestic or foreign. Along the same lines as Geography, the previous year's paper analysed depicts greater emphasis on remembering and a decrease in the number of questions pertaining to analytical and application skills. Past year question paper analysis and model question paper is given in [Appendix 1I]



2. **Combining internal assessment marks with theory marks:** Given the fact that many schools resort to inflation of internal assessment marks, it is imperative to adopt measures to check reliability of these assessments through technology and make them more diagnostic in nature. It is also important to make a shift towards assessments that are more analytical, exploratory and experiential for students. Specific recommendations concerning timelines to upload the results of internal assessments, standard guidelines, trainings and measures to prevent unethical practices are listed in Appendix 3. Implementing this plan without the checks and measures negatively impacts the credibility and validity of CBSE assessments. Additionally, the experts group reviewed the proposed changes in Internal Assessment and Year End/ Board Examinations in the CBSE circular dated 6th March, 2019 and suggested changes as listed in Appendix 2.
3. **Making learning outcomes compulsory:** If CBSE's educational objectives, learning outcomes and assessment design are in complete sync, well articulated and explained to all stakeholders for desired purpose, it would enhance organisation's credibility as an assessment body which is preparing students for life with relevant competencies and skills. Assessments can be made accurate by ensuring that evaluations are elements of a process and not an isolated event, the same can be achieved through a well-defined 'rubric' as an evaluation tool. In addition to this it is very important to take appropriate measures for capacity building of teachers in order to leverage this tool for a diagnostic feedback and identifying areas of improvement [Appendix 3]
4. **Introduction of experiential learning from 2019-20:** Curriculum and pedagogy should promote experiential learning to build a foundation of interdisciplinary and constructivist learning. Classroom-based experiential learning can take a multitude of forms, including role-playing, games, case studies, simulations, presentations, and various types of group work. Internal Assessments need to be designed in such a way that supports experiential learning. Appendix 4 provides a brief overview on Experiential Learning. FICCI ARISE would be sharing a detailed document shortly.
5. **Two levels of Mathematics:** While the expert groups welcome this step of CBSE, it highlights the need for segregation in the syllabus for the two levels. For secondary standards of Class 9 & 10, an example of this could be drawn from the Cambridge International board IGCSE Mathematics, which offers three different curriculums. Two out of these three are further divided into core and extended. Students opting for core do fewer topics as compared to students opting for extended. Students are expected to study the syllabus for 2 years and appear for an examination. While there is a difference in the manner in which grades are awarded, it will clear that students opting for core do not get grades A*, A & B. The grade for Core subjects starts at C, even if the student gets full marks. In a nutshell, for core the grades range from C to G and for extended the grades range from A* to D.
For senior secondary Class 11 & 12, an example can be drawn from International Baccalaureate IBDP where Mathematics is offered at three levels Higher Level (HL), Standard Level (SL) and Studies Standard Level (SSL). The difference between HL and SL is essentially in the degree of difficulty and depth for every topic that is taught. The SSL course is entirely different in content and more emphasis for statistics to make it functional mathematics. In order to enhance the functional nature of SSL course the students learn the use of the calculator designed for statistical operations.
Other factors that need consideration in the current way that CBSE has designed a single syllabus, two different sets of Question papers for Standard Level and Basic Level are concerns like, will a Basic Level Mathematics student be able to pursue Honours Level Mathematics courses in University? Aligning with Universities and having admission criteria worked out is critical.
6. **Making sports mandatory:** Curriculum concepts are best when mapped and aligned with Physical Education (PE) classes. The PE concept and lessons plans can be developed in accordance with subject teachers, this will help learners to expand their skills and understanding in sport science through a theoretical and applied understanding of the factors which influence sporting performance. Sports Science assumes a serious portion of curriculum in countries like Australia since students develop life skills like empathy, team spirit, leadership and decision making among other soft skills. A sample curriculum for sports sciences being offered in Australian schools is attached in Appendix 5.
7. **Change in marking scheme:** There is a need to appreciate that learners are different and therefore it is extremely important to understand that 'multiple intelligences' lead to multiple learning styles and the same shall be assessed in exams. In this context marking scheme has to be in sync with the design of question papers. The rubrics for evaluations need to be clearly defined with special focus on knowledge and skills to be assessed. A detailed recommendation sheet along with probable challenges and solutions thereof is given in Appendix 3
8. **Teacher readiness for active learning and objective evaluation:** For any assessment and examination reforms to be successfully implemented, teachers need to strengthen culture of evaluation. Periodic capacity building and trainings are necessary to be able to keep pace with ongoing reforms. There is a need to develop a pool of Trainers and Master Trainers to cater to growing needs of 'teacher preparedness'.

ENGAGEMENT CYCLE AND WAY FORWARD

The below lifecycle denotes an end to end comprehensive Mid-term/Long-Term goals that FICCIARISE wishes to achieve for CBSE. This would entail a much deeper analytic study with the assistance of International Assessment professionals. For the purpose of this workshop the Expert Group focused only on the paper setting component of the life cycle.



OTHER RECOMMENDATIONS

During the discussions the expert group also made a few additional recommendations which are listed below:



Shifting focus of CBSE towards:

- Aligning curriculum, assessments and examinations, trainings and learning outcomes
- Decentralizing management work and supervising the quality of transactions and teacher preparedness
- Developing a learner profile index for continuous monitoring and introducing timely interventions
- Preparing a comprehensive guideline covering the entire life cycle for administering CBSE assessments and examinations
- Instilling institutional ethics in all stakeholders in assessments
- Expanding exposure to industry for identifying the future needs and preparing students accordingly through vocational studies



Principles of Assessments:

- Focus on ensuring social equity and being valid, reliable, fair and practical
- The focus should shift from measuring 'quantitative' to 'qualitative learning'
- A detailed diagnostic feedback mechanism to be put in place and delve deeper into assessing a student's performance
- Conscious effort to remove the unwarranted Subject Hierarchy
- Support transnational mobility and find higher rates of acceptance in the global workplace

- Maximum scope for demonstrating and exhibiting social and emotional skills and creativity
- Maintaining authenticity of internal assessment through dynamic sampling and applying moderation if there is a huge disparity between teacher grades and the external examiner
- There could be corrective measures such as training assessors, reviewing guidance, investigating malpractice and putting in place well understood and implementable punitive measures
- Group rankings to be introduced for group projects/work
- Every important CBSE circular to be addressed to School Management Committees
- Should also promote social and emotional learning



Structure:

- If the schools are mandated to offer subject choices from various/varied groups (of subjects) on the lines of IBO then students would be better prepared for life
- Mainstream subjects including fine arts, visual arts, theatre, technical drawing, music, filmmaking and community service etc. with same level of academic rigour
- Check points like assessments/examinations to be introduced at Class V and VIII –
 - To assess proficiency in the subjects for standardization
 - To assess minimum expected level of learning
 - Be mostly objective type and with the goal of assessing aptitude and not memory or preparedness for a specific exam

- Practical based questions to be added to the theory paper
- Reduce the length of papers, so as to allow space for assessing thinking, understanding and creativity rather than just the ability to handle stress in deadlines
- Relevant and appropriate formula to be provided so that students do not have to memorize and focus on application of principles
- Sections in relevant subjects to be created where test items can be designed that need modern tools such as calculators. Perhaps even in arts have use of digital arts tools in curriculum and assessment where possible as optional sections in case some schools do not have technology
- Annual review and statistical analysis of past years' examinations will establish contemporariness, reduce redundancy and check the trend of teaching for the test
- Practical exams should be conducted to test interpretation of results, unlike the current practice of it being a demonstration of theory
- Assessment should move from norm to criteria referencing



Capacity Building:

- If curriculum, teacher training and assessment bodies are aligned, then a coherent education system can be realized
- Providing mandatory orientation and exhaustive trainings for the new evaluation framework is necessary
- Introduce educators and learners to the key components of assessment and help them develop a common understanding
- Take appropriate measures to also include parents, students and wider community for creating awareness about the evaluation framework



Technology Integration:

- CBSE should also leverage Artificial Intelligence for diagnostic tests for taking timely interventions for reviewing student understanding without increasing teacher work load, as is being practiced in China
- Gamified assessments can be used alongside to ensure more engaging and realistic experience for students and relatively easy correction method for teachers



CONCLUSION

The various review deliberations and the workshops brought to the fore a lot of good practices already in place. It also shines a spot light on areas that need significant change. The expert group concluded that the recommendations provided could be categorised into some easy wins and other more complex projects. The idea of the exercise was not to throw the baby out with the bathwater but to create a set of recommendations that could be categorised as short term and implementable at short notice. The experts however, also noted that for real and impactful reform it was necessary to move slowly and steadily. The recommendations given have therefore been classified into short, medium term and long term goals. The FICCI ARISE group recognises that some of these would need further support and research and would be happy to take these on in the next stage of the process. Further, in the more immediate term it hopes to see the implementation of at least some of the recommendations to enable young learners to leverage a new and reformed assessment and examination system as soon as possible.



REFERENCES

The Future of Jobs Report 2018 by World Economic Forum

FICCI-NASSCOM-EY Report on Future of Jobs in India – A 2022 perspective

Gardner, Howard (1999), Intelligence Reframed: Multiple Intelligences for the 21st Century, Basic Books

Digital Realty Data Economy Report 2018

IGCSE subjects and related syllabus and exam resources:
<https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-secondary-2/cambridge-igcse/subjects/>

Cambridge International AS & A Level subjects and related syllabus and exam resources
<https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/subjects/>

Fullan, M., & Langworthy, M. (2014). A rich seam: How new pedagogies find deep learning. London: Pearson

<https://www.tasc.tas.gov.au/wp-content/uploads/pdf/courses/spt315118.pdf>,

<https://www.ibo.org>,

<https://www.cbseacademic.nic.in>

Bloom, B.S Engelhart, M.D, Furst, E.J. Hill, W H and Krathwohl, D.R 1956 Taxonomy of education objectives Handbook 1: cognitive domain. London, Longman Group Ltd.



LIST OF ABBREVIATIONS

FICCI ARISE	Federation of Indian Chambers of Commerce & Industry-Alliance for Re-imagining School Education
NCERT	National Council of Educational Research & Training
CBSE	Central Board of Secondary Education
Cambridge International	Cambridge Assessment International Education
ECL	Exam Centre Locator
NCF	National Curriculum Framework
HEI	Higher Education Institutes
IBO	International Baccalaureate Organization
IGCSE	International General Certificate of Secondary Education
SSL	Studies Standard Level
IQ	Intelligence Quotient
PKI	Public Key Infrastructure
PE	Physical Education

ACKNOWLEDGEMENTS

We are grateful to the following members of the FICCI ARISE Working Group for CBSE Assessment and Examination Reforms for providing strategic direction for this study and for their guidance and inputs in preparing this report:

CBSE Officials

1. [Dr. Joseph Emmanuel](#)
Director (Academics), CBSE
2. [Mr Manoj Kumar Srivastava](#)
Director (Professional Exams), CBSE
3. [Dr. \(Mrs.\) Sweta Singh](#)
Joint Secretary (Academics), CBSE

FICCI ARISE Task Force on 'CBSE Affairs'

4. [Dr Manjula Pooja Shroff](#)
Co-Chair, FICCI ARISE; Chairperson, Kalorex Group of Schools
5. [Mr Arunabh Singh](#)
Chair- Uttar Pradesh West, FICCI ARISE; Director, Nehru World School
6. [Mr Manit Jain](#)
Co-Chair, FICCI ARISE; Director, The Heritage Group of Schools
7. [Mr Anirudh Khaitan](#)
Treasurer, FICCI ARISE; Vice Chairman, Khaitan Public School
8. [Mr Naga Prasad Tummala](#)
Chairman, FICCI ARISE; Chairman, People Combine Initiatives
9. [Ms Shobha Mishra Ghosh](#)
Asst. Secretary General, FICCI

Participants at the Workshop

10. [Ms Rittika C Parruck](#)
Assistant Director, Programmes, North India, British Council
11. [Mr Samik Ghosh](#)
Director, Calorx Olive International
12. [Mrs Geeta Varshneya](#)
Education Director, Khaitan Public School, Sahibabad
13. [Mr Surender Sachdeva](#)
Principal, Delhi Public School Bopal, Ahmedabad
14. [Ms Aparajita Das Roy](#)
Head-Middle School, Khaitan Public School

15. [Mr BS Yadav](#)
Principal, DPS Jodhpur
16. [Ms Priyamvada Taneja](#)
Regional Manager-India, Middle East & Africa, Fieldwork Education
17. [Ms Ruchira Ghosh](#)
Regional Director (South Asia), Cambridge Assessment International Education
18. [Lt Gen Surendra Kulkarni](#)
Director, Mayo College
19. [Mr Navin Dixit](#)
Director-Academics, Mayo College
20. [Mr Sanjay Khati](#)
HoD- English, Mayo College
21. [Ms Mallika Marwah](#)
Asst. Director- Education, FICCI
22. [Ms Samreen Ghauri](#)
Project Manager, Education, FICCI

Online Support

23. [Mr Vinayak Sudhakar](#)
Development and Recognition Manager, South India, IB
24. [Dr. Shalini Advani](#)
Director, Pathways World School, Noida
25. [Mr Shantanu Das](#)
Principal, Sarala Birla Academy
26. [Mr Kunwar Sumer Singh](#)
Member, Governing Body, Mayo College
27. [Mr Sathish Jayarajan](#)
Principal, Mallya Aditi International School
28. [Mr Dhananjay Joshi](#)
Education Consultant; Former IBDP Co-ordinator, Dhirubhai Ambani International School
29. [Ms Susan Holmes](#)
Head Teacher, Nehru World School, Ghaziabad
30. [Ms Lisa Jain](#)
India Manager, College Board



Appendix 1

Appendix 1 (CBSE Past Question Paper Analysis and Model Papers)

Appendix 1(A) - CBSE Question Paper analysis of Mathematics and Model Paper

CBSE Mathematics AISCE Syllabus & Question Paper Analysis as per Bloom's Taxonomy

Syllabus 2018		Question Paper 2018 Set 1 Code: 65/1		Model Question Paper		Proposed Percentage Allocation of Marks for each Cognitive Skill
Typology (Cognitive Skill)	Percentage of Syllabus (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	
Remembering Draw, Recognize, Count, Group, Reproduce, Memorize, State, Tabulate, Identify, Point, Follow Directions	20	Sec A : Q. 2, 3 Sec B : Q. 5, 7, 11 Sec C : Q. 16, 21 Sec D : Q. 28	22	Sec A - Q1, 3 Sec B - Q5, 9, 10 Sec C - Q 20, 21 Sec D - 0	16	R+U = 40
Understanding (U) Change, Classify, Convert, Estimate, Interpret, Measure, Put in Order, Show, Suggest, Express in other terms	35	Sec A : Q.1 Sec B : Q. 6, 9, 10 Sec C : Q. 13, 15, 19, 23 Sec D : Q. 24, 29	35	SecA - Q.4 Sec B - Q8, 11, Sec C - Q15, 16, 23 Sec D - Q24,	23	
Application/Applying (A) Calculate, Compute, Construct, Demonstrate, Derive, Graph, Manipulate, Operate, Practice, Prove, Solve	25	Sec A : Q.4 Sec B : Q. 12 Sec C : Q. 14, 20, 22 Sec D : 25, 26	27	SecA - Q.2 Sec B - 0 Sec C - Q17, 22 Sec D - Q25, 26, 29	27	
Analyzing (A) (High Order Thinking Skills (H)) Break down, Deduce, Diagram, Distinguish, Formulate, Group, Order.	10	Sec A : 0 Sec B : 0 Sec C : Q. 17 Sec D : Q. 0	4	SecA - 0 Sec B - Q7, Sec C - Q13, 14, Sec D - Q28,	16	A+(A+S=H)+E=60
Synthesis/Create (S)(High Order Thinking Skills (H)) Construct, Create, Derive, Develop, Document, Generate, Integrate, Plan						
Evaluation (E) Appraise, Choose, Compare, Conclude, Decide, Describe, Evaluate, Justify, Measure, Validate	10	Sec A : 0 Sec B : Q. 8 Sec C : Q. 18 Sec D : Q. 27	12	SecA - 0 Sec B - Q6, 12, Sec C - Q18, 19, Sec D - Q27,	18	

Series _____

Set - 1

Code No. _____

Candidate Name													
Center Number						Candidate Roll Number							

MATHEMATICS 041 [Model Paper Version 2]

Time duration:

Maximum Marks: 100

READ THESE INSTRUCTIONS FIRST

Please check that this question paper contains _____ printed pages.
Code Number given on the right hand side of the question paper should be written on the title page of the answer-booklet by the candidate. Write the details on the question paper too.
If you have been given an answer booklet, follow the instructions on the front cover of the booklet.
Write your Centre number, candidate number and name in all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions. The question number(s) must be **clearly** shown. Write the Serial Number of the question **before** attempting it.

You are reminded of the need for clear presentation in your answers.
At the end of the examination, fasten all your work securely together.
The total number of marks for this paper is 100.

15 minutes has been allotted to read this question paper. The question paper will be distributed at 10:15 a.m. from 10:15 a.m. to 10:30 a.m, the students will read the question paper only and **will not write** any answer on the answer booklet during this period.

The question paper consists of **29** questions divided into four sections A, B, C and D.
Section A comprises of **4** questions of **one mark** each,
Section B comprises of **8** questions of **two marks** each,
Section C comprises of **11** questions of **four marks** each and
Section D comprises of **6** questions of **six marks** each.



SECTION A

1. Using the properties of inverse trigonometric functions find the value of

$$\tan^{-1}\left(\tan \frac{5\pi}{6}\right) + \cos^{-1}\left(\cos \frac{13\pi}{6}\right)$$

2. If $A = [a_{ij}]$ is a matrix of order 2×2 such that $|A| = -15$ and C_{ij} represents the co-factor of a_{ij} , then find

$$a_{21} c_{21} + a_{22} c_{22}$$

3. Find the unit vector in the direction of sum of vectors

$$\vec{a} = 2\hat{i} - \hat{j} + \hat{k} \quad \text{and} \quad \vec{b} = 2\hat{j} + \hat{k}$$

4. If functions $f: A \rightarrow B$ and $g: B \rightarrow A$ satisfy $g \circ f = I_A$ then show that f is 1-1 and g is onto.

SECTION B

5. Prove that $\frac{1}{2} \leq x \leq 1$ then $\cos^{-1} x + \cos^{-1} \left[\frac{x}{2} + \frac{\sqrt{3-3x^2}}{\sqrt{2}} \right] = \frac{\pi}{3}$

6. Let A be the matrix $\begin{bmatrix} 17 & 12 \\ 12 & 10 \end{bmatrix}$

Determine the integer n for which $27A - A^2 = nI$, where I is the 2×2 identity matrix.

7. Find all points of discontinuity of the function $f(t) = \frac{1}{t^2 + t - 2}$, where $t = \frac{1}{x-1}$.

8. Find the approximate change in the value of $\frac{1}{x^2}$, when x changes from $x = 2$ to $x = 2.002$.

9. Evaluate $\int \frac{\sin(x-a)}{\sin(x+a)} dx$

10. Find the number of solutions of $\frac{dy}{dx} = \frac{y+1}{x-1}$ when $y(1) = 2$.

11. Show that the four points $A(4, 5, 1)$, $B(0, -1, -1)$, $C(3, 9, 4)$ and $D(-4, 4, 4)$ are coplanar.

12. The probability distribution of a random variable X is given as under

$$P(X = x) = \begin{cases} kx^2, & x = 1, 2, 3 \\ 2kx, & x = 4, 5, 6 \\ 0, & \text{otherwise} \end{cases}$$

where k is a constant. Calculate

- (i) $E(X)$
- (ii) $E(3X^2)$
- (iii) $P(X \geq 4)$

SECTION C

13. If a, b, c are distinct real numbers and the system of equations
- $$ax + a^2y + (a^3 + 1)z = 0$$
- $$bx + b^2y + (b^3 + 1)z = 0$$
- $$cx + c^2y + (c^3 + 1)z = 0$$
- have a non-trivial, show that $abc = -1$.
14. Use the function $f(x) = x^{\frac{1}{x}}$, $x > 0$ to determine the bigger of the two numbers e^π or π^e .
15. If $x^m \cdot y^n = (x + y)^{m+n}$ prove that $\frac{dy}{dx} = \frac{y}{x}$
16. Find the difference between the greatest and least values of the functions $f(x) = \sin 2x - x$ on $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
17. The sum of surface area of a rectangle parallelepiped with sides $x, 2x$ and $\frac{x}{3}$ and a sphere is given to be constant. If x is equal to three times the radius of the sphere, prove that the sum of their volumes is minimum. Also, calculate the minimum value.
18. In a game a man wins a rupee for a six and loses a rupee for any other number when a fair die is thrown. The man decided to throw a die but to quit as and when he gets a six. Find the expected value of the amount he wins / loses.
19. Find the solution of differential equation $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$



20. Dot product of vector $\hat{i} + \hat{j} - 3\hat{k}$, $\hat{i} + 3\hat{j} - 2\hat{k}$ and $2\hat{i} + \hat{j} + 4\hat{k}$ are 0, 5, 8 respectively. Find the vector.
21. Find the coordinates of the foot of the perpendicular and perpendicular distance from the point P(4, 3, 2) to the plane $x + 2y + 3z = 2$. Also find the image of P in the plane.
22. Three persons A, B and C attempt a mathematics problem independently. The odds in favour of A and C solving the problem are 3:2 and 4 : 1 respectively. And odds against B solving the problem are 2:1. Find the probability that
- all the three will solve problem
 - problem will be solved
23. A student takes his examination in four subjects $\alpha, \beta, \gamma, \delta$. He estimates his chance of passing α as $\frac{4}{5}$, in β as $\frac{3}{4}$ in γ as $\frac{4}{5}$ in δ as $\frac{2}{3}$. To qualify he must pass in α and at least two other subjects. What is the probability that he qualifies?

SECTION D

24. Let A be binary operation on Q defined by $a * b = \frac{3ab}{5}$ show that * is
- Commutative
 - Associative
 - Also find the identity element, if it exists.
25. Solve the system of equations using determinants:
- $$x - y + 3z = 6$$
- $$x + 3y - 3z = -4$$
- $$5x + 3y + 3z = 10$$
26. The area bounded by the parabola $y^2 = 16ax$ and the line $y = 4mx$ is $\frac{a^2}{12}$ sq. units. Using integration find the value of m.
27. Evaluate: $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^3 x \sqrt{2 \sin 2x}}$

28. Find the vector and Cartesian equations of the plane passing through the intersection of the planes $\vec{r} = (\hat{i} + \hat{j} + \hat{k}) = 6$ and $\vec{r} = (2\hat{i} + 3\hat{j} + 4\hat{k}) = -5$ and the point $(1, 1, 1)$.
29. A dealer deals in two items only, item A and item B. He has Rs. 50, 000 to invest and a space to store at most 60 items. An item A costs Rs. 2500 and an item B cost Rs. 500. A net profit to him on item A is Rs. 500 and on item B is Rs. 150. If he can sell all the items that he purchases, how should he invest his amount to have maximum profit? Formulate L. P. P. and solve it graphically.



Appendix 1(B) - CBSE Question Paper analysis of Physics and Model Paper

AISSEE Physics (Theory) 2018 set 1 Code: 55/1

Detailed Analysis of Question Paper*

Q. No	Level of Difficulty	Skill Tested	Marks	Remarks
1	Average	Application	1	
2	Easy	Remembering	1	
3	Average	HOTS	1	Synthesis and Compare
4	Average	Understanding	1	
5	Easy	Remembering	1	
6	Average	Application	2	
7	Average	Application	2	
7 'OR'	Average	Application	2	
8	Average	Understanding	2	
9	Average	Evaluation	2	
10	Easy	Application	2	
11	Difficult	Evaluation	3	
11 'OR'	Difficult	Evaluation	3	
12 (a)	Easy	Remembering	1	
12 (b)	Easy	Evaluation	2	
13	Difficult	Application	3	
14 (a)	Average	Understanding	1.5	Ambiguity [ring - 'n' turns per metre]
14 (b)	Average	Remembering	1.5	
15 (a)	Average	Understanding	1.5	Ambiguity [Fig. improper - position of ray]
15 (b)	Average	Evaluation	1.5	
16	Average	Application	3	
17	Difficult	HOTS	3	Analysis
18	Average	Understanding	3	
19 (a)	Average	Understanding	2	
19 (b)	Average	Application	1	
20 (a)	Average	Application	2	
20 (b)	Average	Remembering	1	
21	Average	Understanding	3	
22	Average	Understanding	3	
23 (a)	Average	Remembering	1	Value Based
23 (b)	Average	Understanding	1	Value Based
23 (c)	Easy	Evaluation	2	Value Based
24 (a)	Average	Application	3	1 mark Remembering + 2 marks Application
24 (b)	Average	Understanding	2	
24 (a) OR'	Average	Application	3	

AISCE Physics (Theory) 2018 set 1 Code: 55/1
Detailed Analysis of Question Paper*

Q. No	Level of Difficulty	Skill Tested	Marks	Remarks
24 (b) 'OR'	Average	Understanding	1	
24 (c) 'OR'	Average	Evaluation	1	
25 (a)	Average	Understanding	3	1 mark Remembering + 2 marks Understanding
25 (b)	Average	Application	2	
25 'OR'	Average	HOTS	5	Analysis of equations and Application
26 (a)	Average	Understanding	1	
26 (b)	Average	Application	3	
26 (c)	Average	Understanding	1	
26 (a) 'OR'	Average	Application	3	1 mark Remembering + 2 marks Application
26 (b) 'OR'	Difficult	HOTS	1	
26 (c) 'OR'	Difficult	HOTS	1	

AISCE Physics (Theory) 2018
Paper Analysis (cont.)

Level of Difficulty	CBSE %age	OBSERVED %age	Marks
Easy	15	13	9
Average	70	70	49
Difficult	15	17	12

Skills Tested	CBSE %age	OBSERVED %age	Marks
Remembering	10	9	6.5
Understanding	30	30	21
Application	30	33	23
HOTS	14	13	9
Evaluation	16	15	10.5

Numericals	About 15 marks	17 marks	
------------	----------------	----------	--



CBSE Physics (Theory) Paper AISSCE – 2018; Set 1, Code: 55/1

After analyzing the class XII Physics paper for 2018, following points have been summarized below:

1. The Class XII Physics paper of 2018 was more or less in accordance with the Typology given by CBSE in its curriculum for the session 2017-18.
2. Comparative Study :

		Type	VSA	SA-I	SA-II	VBQ	LA
Remembering	CBSE Curriculum		2	1	1		
	Paper 2018 Set - 1		2		1		
Understanding	CBSE Curriculum			2	4		1
	Paper 2018 Set - 1		1	1	5		1
Application	CBSE Curriculum			2	4		1
	Paper 2018 Set - 1		1	3	3		1
HOTS	CBSE Curriculum		2		1		1
	Paper 2018 Set - 1		1		1		1
Evaluation	CBSE Curriculum		1		2	1	
	Paper 2018 Set - 1			1	2	1	
		Total	5	5	12	1	3

3. The difficulty level, of questions to be set, in the question paper is not mentioned in the Curriculum of 2017-18, whereas it used to be there in curriculum earlier e.g, for the year 2011 and 2012. In addition, the weightage of numericals is also not mentioned in the curriculum.

*Please refer to the sample (part of the curriculum 2011 extracted for reference) shown below:

C. Scheme of Options

1. There will be no overall choice.
2. Internal choices (either/or type) on a very selective basis has been given in five questions. This internal choice is given in any one question of 2 marks, any one question of 3 marks and all three questions of 5 marks weightage.

D. A weightage of around 15 marks, has been assigned to numericals

E. Weightage to difficulty level of questions

S.No.	Estimated difficulty level	Marks Allotted
1.	Easy	15 %
2.	Average	70 %
3.	Difficult	15 %

4. Some points included in typology (CBSE) under given headings do not match with the Bloom's taxonomy causing **confusion**. For example refer to the table below showing comparison between the two :

Objective/Skill	CBSE	Bloom's Taxonomy (BT)	Differences
Remembering	Knowledge based Simple recall questions, to know specific facts, terms, concepts, principles, theories, identify , define, recite information	Recall facts and basic concepts, define, duplicate, list, memorize, repeat, state	' Identify ' given in Remembering in CBSE but in BT it is given in Understanding.
Understanding	Comprehension -to be familiar with meaning and to understand conceptually, interpret, compare, contrast , explain, paraphrase information	classify , describe, discuss, explain, identify , locate, recognize, report, select, translate	' Compare, Contrast ' are given in two skills 'Understanding' and 'HOTS'
Application	Use abstract - information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem	execute, implement, solve, use, demonstrate, interpret , operate, schedule, sketch	' Interpret ' given in Understanding in CBSE but in BT it is given in Application.
HOTS (Analysis & Synthesis)	classify, compare, contrast , or differentiate between different pieces of information, Organize and/or integrate unique pieces of information from a variety of sources	Analyze - differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test	' Classify ' given in HOTS in CBSE but in Bloom's it is given in understanding.
Evaluation	Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values	justify, appraise, argue, defend, judge, select, support, value, critique, weigh	- -

Suggestions:

1. The sample paper released by CBSE must follow the criteria of Design of Paper i.e, Typology given in curriculum and one or two blue prints must also be given along with the sample paper, and followed while designing the BOARD paper.
2. The typology given by CBSE must be updated and modified in accordance with Bloom's taxonomy.
3. The paper should have one side (say Left hand pages) printed in Hindi while other side printed in English, similar to the IIT JEE papers. This will help remove confusion regarding comprehension of questions. Till now the questions in both languages are printed together at same place in continuity and students sometimes to skip a few questions.
4. The Typology should be redesigned chapter wise, as it used to be earlier and not Unit-wise which at times include 3 – 4 chapters in one unit. Marking Scheme should be Chapter wise and not Unit-wise
5. Numerical weightage criteria should be strictly fixed and known at the beginning of the session, in curriculum.
6. NCERT books should be updated every two years and must be strictly in accordance with CBSE curriculum.



PHYSICS (Theory)

(Model Paper)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions :

- (i) All questions are compulsory. There are 26 questions in all.
- (ii) This question paper has five sections : Section A, Section B, Section C, Section D and Section E.
- (iii) Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each.
- (iv) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
- (v) You may use the following values of physical constants wherever necessary :

$$c = 3 \times 10^8 \text{ m/s}$$

$$\text{Mass of electron } (m_e) = 9.1 \times 10^{-31} \text{ kg}$$

$$h = 6.63 \times 10^{-34} \text{ Js}$$

$$\text{Mass of neutron} = 1.675 \times 10^{-27} \text{ kg}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$\text{Mass of proton} = 1.673 \times 10^{-27} \text{ kg}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$$

$$\text{Avogadro's number} = 6.023 \times 10^{23} \text{ per gram mole}$$

$$\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$$

$$\text{Boltzmann constant} = 1.38 \times 10^{-23} \text{ JK}^{-1}$$

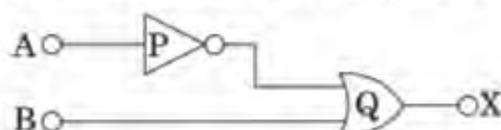
$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$$

Section - A

- 1 Write one difference between displacement current and conduction current in an a.c. circuit with a capacitor. 1
- 2 Define self inductance of a coil. 1
- 3 State Ampere's circuital law. 1
- 4 Two wires one of copper and other of manganin have same resistance and equal length. Which wire is thicker and why? 1
- 5 Name the physical quantity whose unit is JCN^{-1} . 1

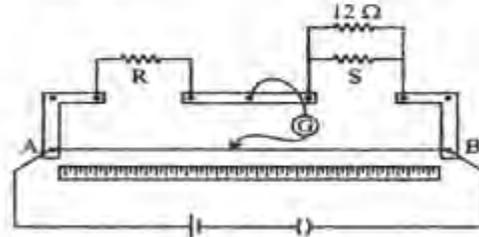
Section - B

- 6 (a) Identify the logic gates marked P and Q in the given logic circuit. 2



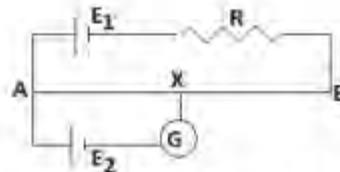
- (b) Draw the truth table for the logic operation by the circuit.

- 7 Write two uses of studying the curve showing variation of binding energy per nucleon with mass number of different nuclei. 2
- 8 Name the electromagnetic waves whose wavelength lies in the range: (a) 2
 $10^{-12} \text{ m} < \lambda < 10^{-8} \text{ m}$
 (b) $10^{-3} \text{ m} < \lambda < 10^{-1} \text{ m}$
 Also write one use for each type of waves.
- 9 In a meter bridge experiment, the null point is found at a distance of 40 cm from A. If a resistance of 12Ω is connected in parallel with S, the null point occurs at 50.0 cm from A. Determine the values of R and S. 2



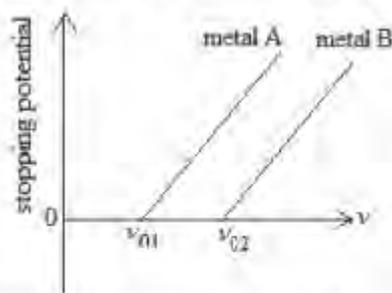
OR

AB is a uniform wire of resistance 15Ω and length 1m. It is connected to a cell E_1 of emf 2V and negligible internal resistance and a resistor 'R' as shown in the circuit diagram shown below.



The balance point with another cell E_2 of emf 75mV is found at 30 cm from the end A. Calculate the value of the resistance 'R'.

- 10 The graph given below shows the variation of stopping potential with frequency of incident radiation for two photosensitive metals A and B. 2



Which one of the two has higher value of work function? Hence explain that the photoelectrons emitted from which metal will have higher kinetic energy.

Section - C

- 11 A convex lens of focal length 20 cm is placed coaxially with a convex mirror of radius of curvature 20 cm. The two are kept at 15 cm away from each other. A point object lies at 60 cm in front of the convex lens. 3
- (a) Draw the ray diagram to show the formation of image by the combination.
 (b) Determine the nature and position of the image so formed.

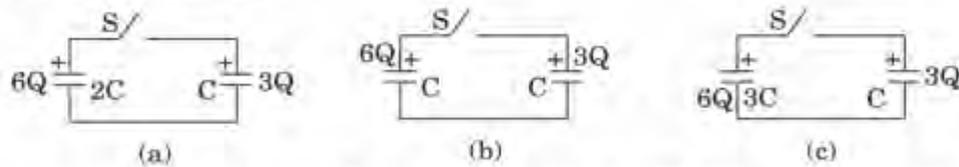


- 12 You are given three lenses L_1 , L_2 and L_3 with their specifications tabulated below. 3

Lenses	Power (D)	Aperture (cm)
L_1	3	8
L_2	6	1
L_3	10	1

Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? Give reason for your choice.

- 13 Three circuits, each consisting of a switch 'S' and two capacitors, are initially charged, as shown in the figure below. 3

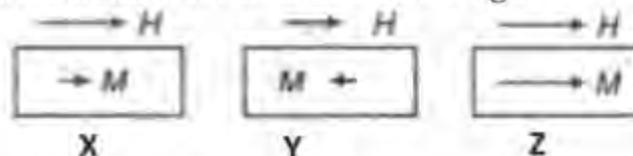


After the switch has been closed, in which circuit will the charge on the left-hand capacitor (i) increase, (ii) decrease and (iii) remain same? Give reasons.

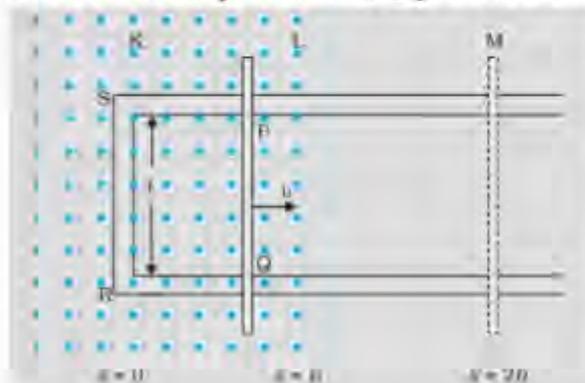
OR

A capacitor of unknown capacitance 'C' is connected across a battery of 'V' volts. The charge stored in it is $300\mu\text{C}$. When the potential across the capacitor is reduced by 100 volts, the charge stored in it becomes $100\mu\text{C}$. Calculate the potential 'V' and the unknown capacitance 'C' of the capacitor. What will be the charge stored in the capacitor if the voltage applied had increased by 100 volts

- 14 Three materials X, Y and Z are kept in a uniform external magnetizing field 'H' and the dipole moments induced in them are as shown in the figure below. 3

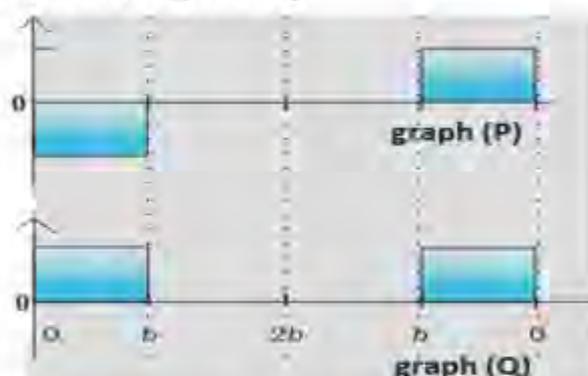


- (a) Identify these magnetic materials X, Y and Z.
 (b) What changes, if any, occur in their induced dipole moments when their temperature is increased?
- 15 The arm PQ of the rectangular conductor, shown in the figure below, is moved from $x = 0$, outwards. The uniform magnetic field is perpendicular to the plane and extends from $x = 0$ to $x = b$ and is zero for $x > b$. Only the arm PQ possesses substantial resistance r . 3

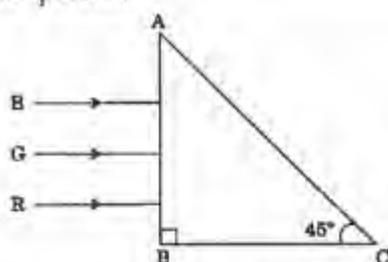


Consider the situation when the arm PQ is pulled outwards from $x = 0$ to $x = 2b$, and is then moved back to $x = 0$ with constant speed v .

Justify that the graphs P and Q shown below, depict the induced emf and power dissipated across the conductor, respectively.



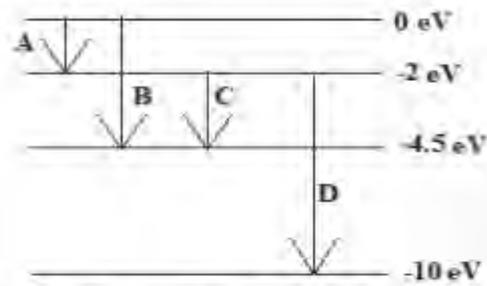
- 16 (a) Draw the circuit diagram showing use of NPN transistor as CE amplifier. 3
 (b) Why is the output voltage out of phase by ' π ' radians with respect to the input voltage?
- 17 Three rays of light, red (R), green (G) and blue (B) are incident on the face AB of a right-angled prism ABC as shown below. The refractive indices of the material of the prism for red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Find out which of the rays will pass through / suffer total internal reflection on the face AC. Also trace the path of the rays through the prism. 3



- 18 (a) How is an intrinsic semiconductor different from a p-type semiconductor? 3
 (b) Give reason why a p-type semiconductor is electrically neutral, although $n_h \gg n_e$.
- 19 Three particles A, B and C each carrying a charge ' q ' and moving with speed ' v ' enter a given uniform magnetic field under following situations. 3
 (i) A enters the field at 90°
 (ii) B enters the field at angle 0°
 (iii) C enters the field making an angle between 0° and 90° .
 Illustrate their motion by drawing the trajectories of these particles in the region of uniform magnetic field.
- 20 (a) Define the term 'mobility' of charge carriers in a conductor. Write its SI unit. 3
 (b) State Kirchhoff's rule, to solve electrical networks, which is based on conservation of energy.
- 21 A proton, an alpha particle and a deuteron all three have same kinetic energy. Find their de-Broglie wavelengths as λ_1 , λ_2 and λ_3 respectively and arrange them in the increasing order. 3



- 22 The energy levels of a hypothetical hydrogen-like atom along with a few transitions are shown in the figure below. 3



Find out the transition which will result in the emission of a photon of wavelength 275 nm.

Section - D

- 23 In a famous conversation, Rakesh Sharma, the first Indian Astronaut in space, was asked by the then Prime Minister Indira Gandhi as to how India looked from space. To which he replied '*Sare Jahan Se Achha*' (better than the whole world). 4

Answer the following questions based on above passage:

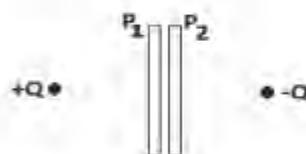
- (i) Which scientific mode of communication enabled The Prime Minister to speak to the Astronaut?
- (ii) Write two values being reflected by the astronaut in his reply.
- (iii) Give one more example of this scientific mode of communication in everyday life situations.

Section - E

- 24 (a) Show with the help of a suitable example along with the figure, that the outward flux due to a point charge 'q' in vacuum within a closed surface is independent of its size or shape and is given by q/ϵ_0 . 5
- (b) Two parallel uniformly charged infinite plane sheets, P_1 and P_2 , have charge densities $+\sigma$ and -2σ respectively. Give the magnitude and direction of the net electric field at a point (i) in between the two sheets and (ii) outside, near the sheet P_1 .

OR

- (a) Figure given below shows two large metal plates P_1 and P_2 held close to each other and placed between two equal and unlike point charges perpendicular to the line joining them.



- (i) What will happen to the plates when they are released?
 - (ii) Draw the pattern of the electric field lines for the system.
- (b) An electric dipole is held in a uniform electric field aligned along the field. How do the (i) potential energy (ii) torque and (iii) stability of the dipole, change when it is oriented perpendicular to the field?

- 25 (a) Briefly discuss the importance of coherent sources in the phenomenon of interference. Why can't two independent monochromatic sources of light ever be coherent? 5
- (b) Light waves each of amplitude "a" and frequency " ω ", emanating from two coherent light sources superpose at a point. If the displacements due to these waves is given by $y_1 = a \cos \omega t$ and $y_2 = a \cos(\omega t + \phi)$ where ϕ is the phase difference between the two, obtain the expression for the resultant intensity at the point.

OR

- (a) Using Huygens' principle explain how a diffraction pattern is obtained on a screen due to a narrow slit on which a narrow beam coming from a monochromatic source of light is incident normally.
- (b) Show that the angular width of the first diffraction fringe is half of that of the central fringe.
- (c) If a monochromatic source of light is replaced by white light, what change would you observe in the diffraction pattern?
- 26 (a) An a.c. source of voltage $V = V_0 \sin \omega t$ is connected to a series combination of L, C and R. Using the phasor diagram or otherwise, obtain the expression for impedance of the circuit and the phase angle between voltage and current. [Assume that $V_L > V_C$]. 5
- (b) Find the condition for which the current in the circuit remains in phase with the applied voltage.
- (c) In a series LR circuit $X_L = R$ and power factor of the circuit is P_1 . When a capacitor with capacitance C such that $X_L = X_C$, is put in series, the power factor becomes P_2 . Calculate the ratio P_1 / P_2 .

OR

- (a) Draw a labelled diagram of a step-up transformer. State the principle of its working.
- (b) Express the turn ratio in terms of (i) voltages and (ii) currents in the two coils of the transformer.
- (c) How much current is drawn by the primary coil of a transformer connected to 220 V supply when it delivers power to a 110 V - 550 W refrigerator?

-----x-----



Typology for Physics (Theory)
(Sample Paper)

	Typology	Difficulty level
1	HOTS Distinguish	Average
2	EVALUATE Define	Easy
3	REMEMBER State	Easy
4	HOTS Compare/contrast	Average
5	REMEMBER Recall	Easy
6	UNDERSTANDING Identify	Average
7	APPLICATION Application of Previous knowledge	Average
8	REMEMBER Recall, Knowledge	Average
9	APPLICATION Numerical	Average
10	UNDERSTANDING Interpret from graph Explain	Average
11	APPLICATION Numerical	Difficult
12	EVALUATE Select	Average
13	APPLICATION Solve	Average
14	UNDERSTANDING Classify/categorize	Average
15	EVALUATE Justify/judge	Average
16	UNDERSTANDING Explain	Average
17	HOTS Investigate	Difficult
18	UNDERSTANDING Explain	Average
19	APPLICATION Application of formula	Average
20	REMEMBER Define, State	Easy
21	UNDERSTANDING Explain	Average
22	APPLICATION Calculate	Average
23	EVALUATE Values	Easy
24	UNDERSTANDING Discuss	Average
25	HOTS Discuss, Develop concept Obtain formula etc	Difficult
26	APPLICATION Application of knowledge	Average

Difficulty Level: Easy - 15%, Average - 70%, Difficult - 15%

Appendix 1C) - CBSE Question Paper analysis of Chemistry and Model Paper

Syllabus 2018		CBSE Sample Question Paper 2018-2019; Code 043		Model Question Paper		Proposed Percentage Allocation of Marks for each Cognitive Skill
Typology (Cognitive Skill)	Percentage of Syllabus (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	
Remembering Draw, Recognize, Count, Group, Reproduce, Memorize, State, Tabulate, Identify, Point, Follow Directions, to know specific facts, terms, concepts, principles, or theories, Identify, define, or recite, information	10	Sec A : Q. 2,4,5 Sec B : Q. 7,11 Sec C : Q.17, 19, 24 Sec D : Q. 0	23	Sec A : Q. 2 Sec B : Q. 7, 11 Sec C : Q. 17 Sec D : Q.	11	R+U = 41
		Sec A : Q. 1,3 Sec B : Q. 9 Sec C : Q. 14, 18 Sec D : Q. 26	21	Sec A : Q. 3,5 Sec B : Q. 8,9 Sec C : Q.19, 22,23 Sec D : Q.27	30	
Understanding (U) Change, Classify, Convert, Estimate, Interpret, Measure, Put in Order, Show, Suggest, Express in other terms	30	Sec A : Q. Sec B : Q. 6, 12 Sec C : Q. 13, 20 Sec D : Q. 27	21	Sec A : Q. Sec B : Q. 6,12 Sec C : Q.13, 18,20 Sec D : Q. 26	25	A+(A+S=H)+E=59
		Sec A : Q. Sec B : Q. Sec C : Q.15 Sec D : Q.25	11	Sec A : Q. 4 Sec B : Q. Sec C : Q.15 Sec D : Q.25	13	
Application/Applying (A) Calculate, Compute, Construct, Demonstrate, Derive, Graph, Manipulate, Operate, Practice, Prove, Solve	30	Sec A : Q. Sec B : Q. 8, 10 Sec C : Q. 16,21,22,23 Sec D : Q.	23	Sec A : Q. 1 Sec B : Q. 10 Sec C : Q.14,16,21,24 Sec D : Q.	21	
		Sec A : Q. Sec B : Q. 8, 10 Sec C : Q. 16,21,22,23 Sec D : Q.	23	Sec A : Q. Sec B : Q. 8, 10 Sec C : Q. 16,21,22,23 Sec D : Q.	23	
Analyzing (A) (High Order Thinking Skills (H)) Break down, Deduce, Diagram, Distinguish, Formulate, Group, Order.	14	Construct, Create, Derive, Develop, Document, Generate, Integrate, Plan				
		Synthesis/Create (S)(High Order Thinking Skills (H)) Construct, Create, Derive, Develop, Document, Generate, Integrate, Plan				
Evaluation (E) Appraise, Choose, Compare, Conclude, Decide, Describe, Evaluate, Justify, Measure, Validate	16					



Series _____

Set - 1

Code No. _____

Candidate Name													
Center Number						Candidate Roll Number							

CHEMISTRY 043 [Model Paper]

Time duration: 3 Hours

Maximum Marks: 70

READ THESE INSTRUCTIONS FIRST

Please check that this question paper contains _____ printed pages.

Code Number given on the right hand side of the question paper should be written on the title page of the answer-booklet by the candidate. Write the details on the question paper too.

If you have been given an answer booklet, follow the instructions on the front cover of the booklet.

Write your Centre number, candidate number and name in all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions. The question number(s) must be **clearly** shown. Write the Serial Number of the question **before** attempting it.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The total number of marks for this paper is 70.

15 minutes has been allotted to read this question paper. The question paper will be distributed at 10:15 a.m. from 10:15 a.m. to 10:30 a.m, the students will read the question paper only and **will not write** any answer on the answer booklet during this period.

All questions are compulsory.

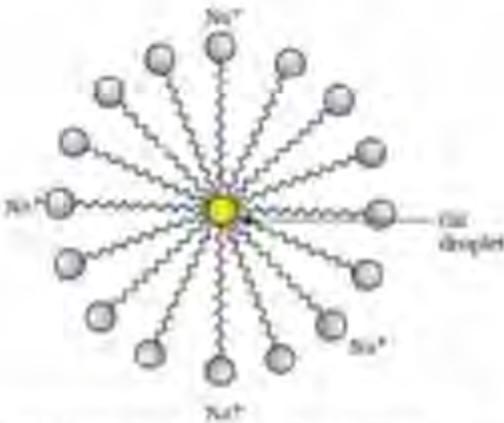
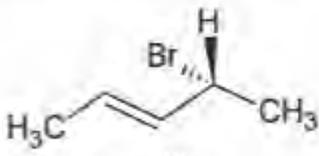
Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each. (c) Section B:

Q.no. 6 to 12 are short answer questions and carry 2 marks each.

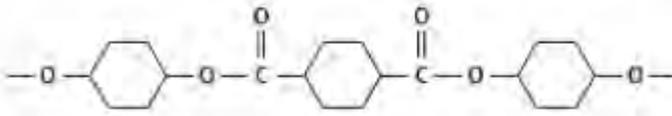
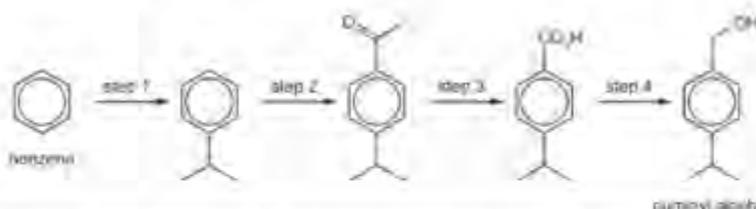
Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each. (e) Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.

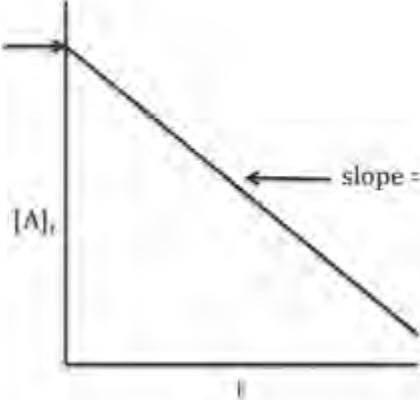
There is no overall choice. However an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.

Use of log tables if necessary, use of calculators is not allowed.

SECTION A		
1.	ZnO crystal appears white crystalline powder. On heating it shows yellowish color and release some gas. a) What type of defect is generated in ZnO. b) What could be the possible chemical formula of ZnO so obtained after its formation?	
2.	On the basis of dispersed phase colloids are classified as <i>Multimolecular Colloids</i> , <i>Macromolecular Colloids</i> and <i>Associated Colloids</i> . The following diagram is of micelle (soap solution).  a) Identify the type of colloid when micelles is formed. b) Name the end that as attached with the oil	1
3.	One the basis of crystal field theory draw the energy diagram of d^6 configuration for Splitting of d-orbital energies by an octahedral field of ligands when $\Delta_o < P$.	1
4.	Optically active compounds have chiral carbon atom. Following organic compound undergoes hydrogenation. Draw the structure of the product formed and encircle the carbon because of which the product becomes optically active. 	1



5.	<p>Sections of some polymer is shown below. For the polymer write the monomer unit.</p> <div style="text-align: center;">  </div>	1
SECTION B		
6.	<p>Pure water has freezing point at 273K. When a non-volatile solute is dissolved in water the depression in the freezing point of pure water is observed.</p> <p>A student dissolved 8.1 g of HBr in 100g of water with the knowledge of degree of dissociation as 0.9.</p> <p>HBr ionizes in the water as follows:</p> $\text{HBr} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Br}^-$ <p>a) What does depression in the freezing point of solution mean? b) Calculate the new freezing point of the above mentioned solution. [Given: Molar mass Br = 80 g/mol, K_f water = 1.86 K kg / mol]</p>	2
7.	<p>Cumyl alcohol can be synthesised from benzene by the following route.</p> <p>Suggest reagents and conditions for steps 1–4.</p> <div style="text-align: center;">  </div>	2
8.	<p>Tert-butyl peroxide acts as free radical generating initiator in the preparation of polyalkenes.</p> <p>a) Draw the structure of Tert-butyl peroxide. b) How the radical from Tert-butyl peroxide is formed Or Write the various steps involved in the polymerization of ethene with chemical reactions.</p>	2
9.	<p>Lithium reacts with alcohols in a similar way to sodium. A small piece of lithium metal is dropped onto watch-glass containing propan-1-ol.</p> <p>a) What would you observe? Name the products of the reaction.</p>	2

	b) What difference would you expect to see if you used sodium instead of lithium in this reaction?	
10.	<p>For a certain chemical reaction variation in concentration $[A]$ vs. time (s) plot is given below:</p>  <p>a) Predict the order of the given reaction? b) What does the slope of the line and intercept indicate? c) What is the unit of rate constant k?</p>	3
11.	<p>BrO_3^{1-} is called bromate ion. It form distorted tetrahedral or trigonal pyramid structure as per VSEPR theory.</p> <p>a) Draw the Lewis dot structure of bromate ion. b) Name and draw the structure of one noble gas species which is isostructural with bromate ion.</p>	3
12.	<p>Lithium is often used as the negative pole in 'button' cells used to power watches.</p> <p>a) Explain why lithium is often used to make electrochemical cells. b) The half-equations for a lithium/iodine button cell are:</p> $\text{Li}^+ + \text{e}^- \rightleftharpoons \text{Li} \quad E^\ominus = -3.04\text{V}$ $\frac{1}{2}\text{I}_2(\text{s}) + \text{e}^- \rightleftharpoons \text{I}^-(\text{aq}) \quad E^\ominus = +0.54\text{V}$ <p>c) Predict the cell voltage of this cell using the reduction potential values for the two half-equations above.</p> <p>Or</p>	3



The actual voltage of a lithium/iodine button cell is 2.8 V. Suggest why this is different from the value you calculated in part i.

SECTION - C

13. **Niobium**, formerly known as columbium, is a chemical element with symbol Nb (formerly Cb) and atomic number 41 and atomic mass 93u. It is a soft, grey, crystalline, ductile transition metal, often found in the minerals pyrochlore and columbite. Niobium crystallizes as follows:

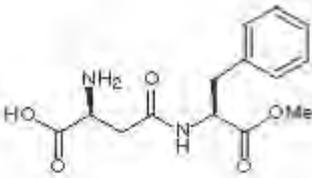


The atomic radius of the atom is obtained by X-ray diffraction method and found to be 143.1 pm. Calculate the density of the Niobium

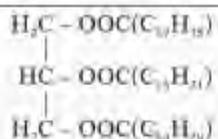
14. Arvind a student of grade 12th while doing the practical in the chemistry lab adds 2g of benzoic acid to 25g of benzene.
Where as Ram an another student of the same class added 2ml of alcohol to 25ml of acetone.
They noted their observation as follow:

Student	Change in the Volume of the mixture	Change in ΔH_{mix}	Type of deviation from the Rault's Law
Arvind			
Ram			

15. An alcohol A ($C_4H_{10}O$) on oxidation with acidified potassium dichromate gives acid B ($C_4H_8O_2$). Compound A when dehydrated with conc. H_2SO_4 at 443 K gives compound C. Treatment of C with aqueous H_2SO_4 gives compound D ($C_4H_{10}O$) which is an isomer of A. Compound D is resistant to oxidation but compound A can be easily oxidised. Identify A, B, C and D. Name the type of isomerism exhibited by A and D

16.	<p>1-bromobutane will undergo reactions when heated, as shown by reactions A and B.</p> <div style="text-align: center;"> $\begin{array}{ccc} & \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} & \\ & \swarrow \text{A} \quad \searrow \text{B} & \\ \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} & & \text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \end{array}$ </div> <p>a) For reactions A and B give the reagents used in each case. b) What type of reaction mechanisms will take place in both the cases? Explain any one.</p>	3
17.	<p>Phenylamine reacts with nitrous acid (nitric (III) acid) to form a diazonium salt. The diazonium salt formed reacts with phenol to form a useful substance, X.</p> <p>a) What one essential conditions for the reaction? b) Give the displayed formula of X and write a balanced symbol equation for this change. c) Give a possible use for X.</p>	3
18.	<p>i) Aspartame is composed of two amino acids, phenylalanine and aspartic acid and methanol, Its chemical structure is as follows:</p> <div style="text-align: center;">  <p>The structure shows a central amide linkage between two amino acid residues. On the left is an aspartic acid residue (with a free amino group and a carboxylic acid group). On the right is a phenylalanine residue (with a benzene ring and a methyl ester group).</p> </div> <p style="text-align: center;">Aspartame</p> <p>Why do think its use is limited to only cold foods and not used for hot food.</p> <p>ii) Acidity is a set of symptoms caused by excess production of acid by the gastric glands of the stomach. To cure acidity several basic compounds are used to neutralize excess acidic content of the stomach.</p> <p>Give two basic substances that are available at the home that can be used to treat acidity.</p> <p>iii) Soaps are salts of fatty acids. In what way fatty acids are different from acetic acid.</p>	3
19.	<p>i) Below is one example of a compound found in vegetable oil, and used to make soap.</p>	3



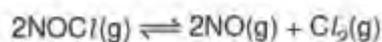


- a) This compound is an ester. Explain that term.
- b) To make soap, the oil is usually reacted with a sodium compound. Which one? (CONTINUE PTO)
- ii)
- a) The reaction in a) will give four different products. Write down their formulae.
- b) One product is an alcohol. Name it. In which way is it different from ethanol?

20. When hydrocarbons such as petrol or paraffin wax are burned in an excess of air in a laboratory, carbon dioxide and water are the only products.

When petrol is burned in a car engine, nitrogen monoxide, NO, is also formed.

NO is also formed when nitrosyl chloride, NOCl, dissociates according to the following equation.



Different amounts of the three gases were placed in a closed container and allowed to come to equilibrium at 230 °C. The experiment was repeated at 465 °C.

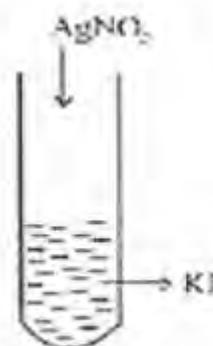
The equilibrium concentrations of the three gases at each temperature are given in the table below.

temperature / °C	concentration / mol dm ⁻³		
	NOCl	NO	Cl ₂
230	2.33 × 10 ⁻³	1.46 × 10 ⁻³	1.15 × 10 ⁻²
465	3.68 × 10 ⁻⁴	7.63 × 10 ⁻³	2.14 × 10 ⁻⁴

- a) Write the expression for the equilibrium constant, K_c , for this reaction. Give the units.
- b) Calculate the value of K_c at 230 °C.
- c) Is the forward reaction endothermic or exothermic? Explain your answer.

21.

- a) A colloidal sol is prepared by the given method in figure. What is the charge of AgI colloidal particles in the test tube? How is the sol formed, represented?
- b) Explain how the phenomenon of adsorption finds application in Heterogeneous catalysis.
- c) Which of the following electrolytes is the most effective for the coagulation of $\text{Fe}(\text{OH})_3$ sol which is a positively charged sol? NaCl , Na_2SO_4 , Na_3PO_4



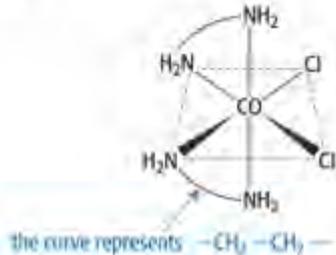
22. Aluminium is the most abundant metal in the Earth's crust. Iron is next.

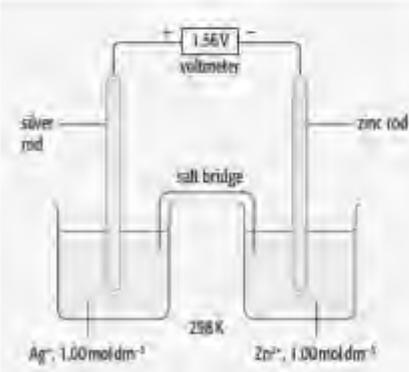
3

Iron and aluminium are extracted from their ores in large quantities. The table below summarises the two extraction processes.

Extraction	Iron	Aluminium
Chief ore	hematite	bauxite
Formula of main compound in ore	Fe_2O_3	Al_2O_3
Energy source used	burning of coke in air (exothermic reaction)	electricity
Other substances used in extraction	limestone	carbon (graphite) cryolite
Temperature at hottest part of reactor/ $^{\circ}\text{C}$	1900	1000
How the metal separates from the reaction mixture	melts and collects at the bottom	melts and collects at the bottom
Other products	carbon dioxide sulfur dioxide slag	carbon dioxide



	<p>a) In each extraction, is the metal oxide oxidised or reduced, when it is converted to the metal?</p> <p>b) Explain why each of these substances is used:</p> <ol style="list-style-type: none"> limestone in the extraction of iron carbon in the extraction of aluminium cryolite in the extraction of aluminium. <p>c) Give a use for the slag that is produced as a by-product in the extraction of iron.</p>	
23.	<p>Explain the following:</p> <ol style="list-style-type: none"> Out of Sc^{3+}, Co^{2+} and Cr^{3+} ions, only Sc^{3+} is colourless in aqueous solutions. (Atomic no.: Co = 27; Sc = 21 and Cr = 24) The $E^\ominus_{\text{Cu}^{2+}/\text{Cu}}$ for copper metal is positive (+0.34), unlike the remaining members of the first transition series $\text{La}(\text{OH})_3$ is more basic than $\text{Lu}(\text{OH})_3$. <p>Or</p> <p>a) Cobalt forms a complex with the simplified structure:</p> <div style="text-align: center;">  <p>the curve represents $-\text{CH}_2-\text{CH}_2-$</p> </div> <ol style="list-style-type: none"> Give the co-ordination number in this complex. Draw the stereoisomer of this complex. Explain why this is a stereoisomer. <p>b) Draw the two geometrical isomers of $\text{Ni}(\text{CN})_2(\text{Cl})_2$. Label the cis-isomer and the trans-isomer.</p>	3
24.	<p>A metal complex having composition $\text{Cr}(\text{NH}_3)_4\text{Cl}_2\text{Br}$ has been isolated in two forms A and B. The form A reacts with AgNO_3 to give a white precipitate readily soluble in dilute aqueous ammonia whereas B gives a pale yellow precipitate soluble in concentrated ammonia.</p> <ol style="list-style-type: none"> Write the formulae of isomers A and B. State the hybridisation of chromium in each of them. Calculate the magnetic moment (spin only value) of the isomer <div style="text-align: center;">  </div>	3

25.	<p>Benzene can be nitrated to give nitrobenzene.</p> <ol style="list-style-type: none"> Name the mechanism for this reaction. The species attacking benzene in the reaction is NO^+ How is this generated in the reaction mixture? (Name the substances used and give a chemical reaction leading to the formation of NO^+.) Suggest a suitable temperature for this reaction. Use curly arrows to show the mechanism of how benzene reacts with NO^+ to produce nitrobenzene. 	5	
26.	<p>a) A cell is prepared as shown in the diagram below:</p> <p>The standard electrode potential given: $E_{\text{Zn}^{2+}/\text{Zn}}^{\ominus} = -0.76 \text{ V}$, $E_{\text{Ag}^+/\text{Ag}}^{\ominus} = +0.80 \text{ V}$</p> <ol style="list-style-type: none"> What is the effect of increase in concentration of Zn^{2+} on the E_{cell}? Calculate the EMF of the cell. Express the give conditions using Nernst Equation. 		5
27.	<ol style="list-style-type: none"> Which of these mixtures will result in a chemical reaction? <ol style="list-style-type: none"> bromine solution and sodium chloride solution iodine solution and sodium bromide solution <p>Write a balanced chemical equation for each reaction that occurs in part a.</p> What type of reaction occurs in part a? What trend do the reactions in part a show us? For one of the reactions that occurs in part a, identify the substance oxidised and the substance reduced. Chlorine is a stronger oxidising agent than bromine. Explain why. 	5	



Appendix 1(D) - CBSE Question Paper analysis of Biology and Model Paper

CBSE Biology AISSCE Syllabus & Question Paper Analysis as per Bloom's Taxonomy

Syllabus 2018		CBSE Question Paper 2018		Model Question Paper	
Typology (Cognitive Skill)	Percentage of Syllabus (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	Typology (Cognitive Skill)	Percentage of Paper (%)
Remembering	20	Q1+Q2+Q3+Q4+Q5+Q10+Q11+Q12+Q16+Q24(a)+Q25(a)+ Q26 (a)	1+1+1+1+1+2+3+3+2+2+4 = 24 (34%)	Q5+Q6+Q11+Q19	1+2+3+3 = 9 (12%)
Understanding	35	Q6+Q7+Q8+Q9+Q13+Q14+Q15+ Q17+ Q18+Q20(a)+Q21+ Q22+ Q23 (a,b)+Q24(b)+ Q25(b)	2+2+2+2+3+3+3+3+1+3+3+2+3+3 = 38 (54%)	Q3+Q7+Q9+Q12+Q13+Q16+Q18+Q21	1+2+2+3+3+3+3 = 20 (28.5%)
Application	25	Q20(B) +Q23 (c) + Q26(b)	2+2+1 = 5 (7%)	Q1+Q2+Q4+Q10+Q20+Q23 (a,b)+ Q24 (a,b)+ Q25	1+1+1+2+3+3+4+5 = 20 (28.5%)
High Order Thinking Skills(Synthesis & Analysis)	10	Q19	3 (4%)	Q8+Q15+Q17+Q26	2+3+3+5=13 (18.5%)
Evaluation	10			Q14+Q22+Q24 (c)+Q23 ©	3+3+1+1 = 8 (11%)

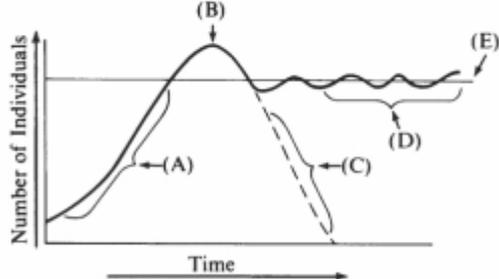
Model Question Paper Biology
Grade 12

Instructions

- Please check that this question paper contains 8 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 26 questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

Section A		
1	<p>The diagram shows part of a DNA molecule.</p> <div style="text-align: center;"> </div> <p>What type of bond is labelled X?</p> <ol style="list-style-type: none"> Covalent bond Hydrogen bond Peptide bond Semi-conservative bond 	1
2	<p>Given below are pairs of pathogens and the diseases caused by them. Which out of these is not a matching pair and why?</p> <ol style="list-style-type: none"> Viruscommon cold. <i>Salmonella</i>.....Typhoid <i>Microsporium</i>.....Filariasis <i>Plasmodium</i>.....Malaria 	1
3	<p>Huntington's disease is a neurological disorder caused by the repetition of the amino acid glutamine in the protein Huntingtin. The higher the number of repetitions of glutamine, the earlier the onset of the disease. What type of disease is it?</p> <ol style="list-style-type: none"> It is an inherited disease. It is a nutritional disease. It is a sexually transmitted disease. It is a sex-linked disease. 	1
4	<p>In the experiments performed by Meselson and Stahl, <i>E. coli</i> were grown for many generations in ^{15}N then for one generation in ^{14}N. What results for the DNA of the last generation showed that</p>	1



	<p>replication was semi-conservative?</p> <ol style="list-style-type: none"> Both strands containing only ^{15}N Both strands containing only ^{14}N One strand containing only ^{15}N and one strand containing only ^{14}N Both strands containing a mixture of ^{15}N and ^{14}N in equal amounts 	
5	<p>Which enzyme rejoins sections of DNA in genetic engineering?</p> <ol style="list-style-type: none"> DNA ligase DNA polymerase restriction enzyme reverse transcriptase 	1
Section B		
6	<p>Your advice is sought to improve the nitrogen content of the soil to be used for cultivation of non-leguminous crop.</p> <ol style="list-style-type: none"> Recommend two microbes that can enrich the soil with nitrogen. Why do leguminous crops not require such enrichment of the soil? 	2
7	<p>a. Which of the following is not a fact or inference of Darwin's theory of evolution by natural selection?</p> <ol style="list-style-type: none"> there is heritable variation among individuals. there is struggle for limited resources. individuals whose inherited characteristics best fit them to the environment will on average leave more offspring. offspring inherit characteristics acquired by their parents during the parents lifetime. all of the above are correct statements. <p>b. The bones in the front leg of a lizard and in the wing of a bat, which are evolutionarily derived from their common ancestor, are said to be</p> <ol style="list-style-type: none"> analogous functionally similar sympatric homologous convergent 	2
8	<p>Each group of questions below consists of five lettered headings followed by a list of numbered phrases or sentences. For each numbered phrase or sentence select the one heading that is most closely related to it. Each heading may be used once, more than once, or not at all in each group.</p> <p>a. Questions 31-34 refer to the graph below that shows the changes in population size over time.</p> 	2

- (31) A mature, well-established population in favourable conditions
- (32) The carrying capacity of the environment
- (33) A population in unfavourable conditions
- (34) The exponential growth phase of a new population

b. Questions 35-38

(A) tropical rain forest (B) taiga (C) arctic tundra (D) temperate grassland (E) desert

(35) Permafrost; temperatures range from approximately -50°C to $+25^{\circ}\text{C}$; a growing season of 60 days or less

(36) Over 10 inches of precipitation per year; long, cold winters and short summers; dominant vegetation is evergreen trees

(37) Lack of water common in summer; seasonal temperature variations; maintained by periodic fires

(38) Less than 10 inches of precipitation per year; extremes of hot and cold throughout the year; large daily temperature variations

9 You have obtained a high yielding variety of tomato. Name and explain the procedure that ensures retention of the desired characteristics in large populations of future generations of tomato crop. 2

10 Drug addiction is characterized by compulsive and at times uncontrollable drug craving, seeking and use. 2

A study was undertaken to compare ten drugs, using a scale from 0 to 3 for intensity of response, psychological addiction and physical addiction, to create an overall mean score for addiction.

Drug	Intensity of effect	Psychological addiction	Physical addiction	Overall mean
Heroin	3.0	3.0	3.0	3.00
Cocaine	3.0	2.8	1.3	2.37
Alcohol	2.3	1.9	1.6	1.93
Tobacco	2.3	2.6	1.8	2.23
Barbiturates	2.0	2.2	1.8	2.01
Benzodiazepines	1.7	2.1	1.8	1.83
Amphetamine	2.0	1.9	1.1	1.67
LSD	2.2	1.1	0.3	1.23
Cannabis	1.9	1.7	0.8	1.51
Ecstasy	1.5	1.2	0.7	1.13

Source: adapted from D Nutt, *et al.*, (2007), *The Lancet*, 369, pages 1047–1053]

(a) Using the table, identify which drug causes the lowest physical addiction. (1)



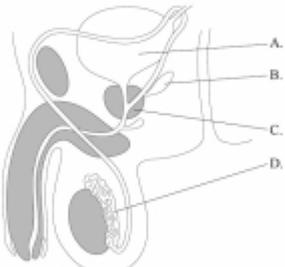
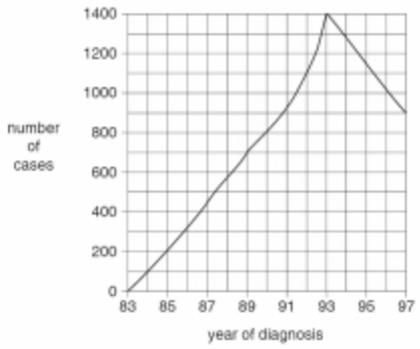
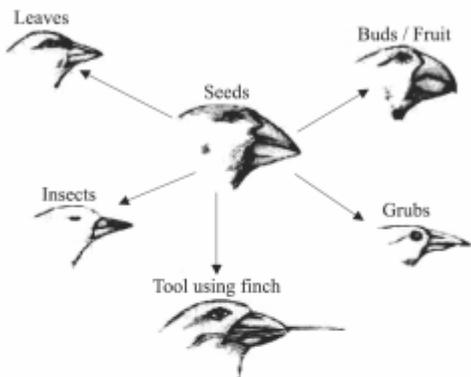
	(b) State one example of a drug that is a stimulant and one example that is a sedative. (1)		
	Section C		
11	<p>The diagram shows a section through the male reproductive system.</p> <p>a. Where are sperm stored?</p> <p>b. Explain the process of spermatogenesis with the help of a flowchart.</p>		3
12	<p>a. Explain VNTR and explain its role in DNA finger printing.</p> <p>b. List any two applications of DNA finger printing technique.</p>		3
13	Differentiate between parthenogenesis and parthenocary. Give one example of each.		3
14	<p>Fig.1.2 shows the number of HIV/AIDS cases diagnosed in a European country from 1983 to 1997.</p>  <p style="text-align: center;">Fig.1.2</p> <p>a. Calculate for the period of 1989 to 1993, the mean rate of increase in HIV/AIDS cases. Show your working. (1)</p> <p>b. Suggest two explanations for the trend in the incidence of HIV/AIDS from 1993 to 1997. (2)</p>		3
15	<p>a. Explain the genetic basis of Down's syndrome in humans. (2)</p> <p>b. In a study into diagnosis of Down's syndrome, the way in which 323 people with Down's syndrome were initially diagnosed was recorded. All had been screened before 24 weeks of pregnancy by one of four different tests, A, B, C or D, in approximately equal numbers.</p> <p>The number of cases detected by each test, as well as the total number of cases missed by the tests, and so detected only at or after birth, is shown in Table 4.1.</p>		3

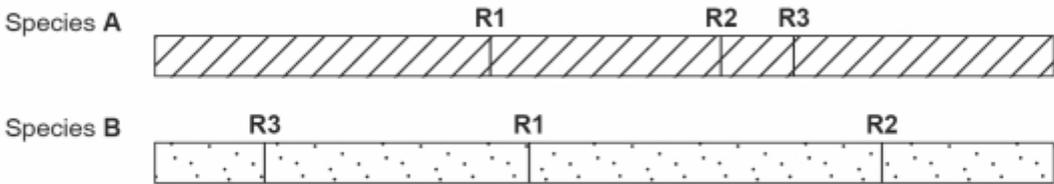
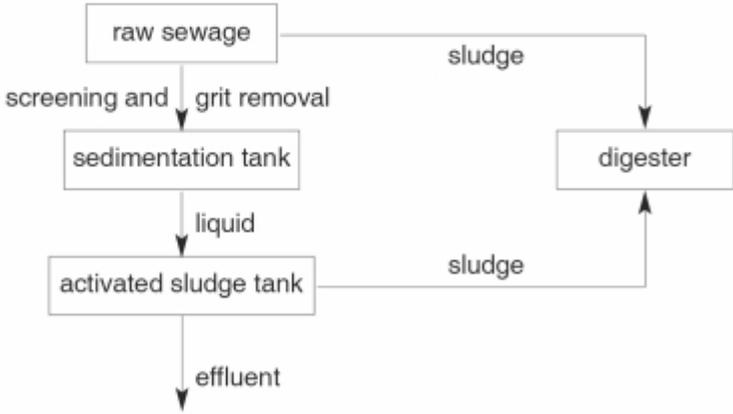
Table 4.1

Screening test	A	B	C	D
number of cases of Down's syndrome detected before 24 weeks of pregnancy	32	36	42	61
number of cases of Down's syndrome detected at or after birth	152			
total number of cases of Down's syndrome	323			

With reference to Table 4.1, calculate the percentage of cases of Down's syndrome that were detected before 24 weeks of pregnancy. Show your working. (1)

16	You have identified a useful gene in bacteria. Make a flow chart of the steps that you would follow to transfer this gene to a plant.	3
17	Diabetes can be controlled by daily injections of insulin. The insulin used to be produced from pigs. Genetically engineered (transgenic) microorganisms can now be used to produce human insulin. a. Explain what is meant by a <i>genetically engineered microorganism</i> . (1) b. State two problems that are avoided by using insulin produced by genetically engineered microorganisms rather than insulin from pigs. (2)	3
18	Explain out-breeding, out-crossing and cross breeding in animal husbandry.	3
19	a. Give an example of a bacterium, a fungus and an insect used as biocontrol agents. b. How has the bacteria <i>Bacillus thuringiensis</i> helped us in controlling caterpillars of insect plants?	3
20	<p>a. The diagram shows the beaks of finches on the Galapagos Islands. (1)</p>  <p>[Source: adapted from www.bras.org]</p> <p>Which process of evolution has occurred in the finches?</p> <ol style="list-style-type: none"> Convergent evolution of the beaks Natural selection for the strongest beaks Selection pressure caused by the exploitation of different food sources 	3



	<p>iv. Mutation of the beaks to adapt in different environments</p> <p>b. Differentiate between analogous and homologous structures. (2)</p>	
21	<p>a. India has greater ecosystem diversity than Norway. Do you agree with the statement? Support your answer with reasons.</p> <p>b. Write the difference between genetic biodiversity and species biodiversity that exists at all levels of biological organization.</p>	3
22	<p>Restriction enzymes can be used to cut DNA at specific sites. Genes such as the gene for insulin, can be cut from the chromosome of one species and as a result of ligation joined to the chromosome of another species forming recombinant (hybrid) DNA.</p> <p>Fig. 4.1 shows two chromosomes from different species. The specific restriction enzyme sites (R1, R2, and R3) are shown.</p> <div style="text-align: center;">  <p>The diagram shows two horizontal chromosomes. The top chromosome, labeled 'Species A', has diagonal hatching and three vertical lines representing restriction sites labeled R1, R2, and R3 from left to right. The bottom chromosome, labeled 'Species B', has a dotted pattern and three vertical lines representing restriction sites labeled R3, R1, and R2 from left to right.</p> </div> <p style="text-align: center;">Fig. 4.1</p> <p>Both chromosomes were cut at restriction site R1. The fragments were mixed and allowed to join to form recombinant (hybrid) DNA.</p> <p>Sketch all the possible ways in which the fragments could join.</p>	3
23	<p>The flowchart, Fig. 1.1, summarises a modern sewage treatment process.</p> <div style="text-align: center;">  <p>The flowchart shows the following process: 'raw sewage' enters from the top left. An arrow labeled 'screening and grit removal' points down to a box labeled 'sedimentation tank'. From 'sedimentation tank', an arrow labeled 'liquid' points down to a box labeled 'activated sludge tank'. From 'activated sludge tank', an arrow labeled 'effluent' points down to the bottom. From 'activated sludge tank', an arrow labeled 'sludge' points right to a box labeled 'digester'. From 'sedimentation tank', an arrow labeled 'sludge' points right to the 'digester' box. From 'digester', an arrow labeled 'sludge' points up to the 'activated sludge tank' box.</p> </div> <p style="text-align: center;">Fig. 1.1</p> <p>a. Give one key difference between the processes going on in the activated sludge tank and in the</p>	4

- digester. (1)
- b. Explain the role of microorganisms in the activated sludge tank in preparing the sewage for disposal. (2)
- c. Outline the role of **named** microorganisms in the production of biogas in a digester. (1)

24 Fig. 3.1 is a diagram of a transverse section of the anther of a stamen.

5

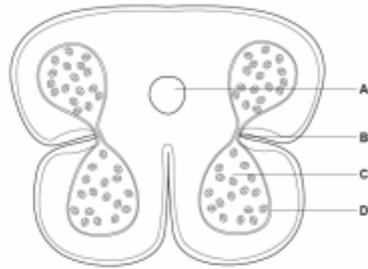


Fig. 3.1

- a. Name parts A to D. (2)
- b. Describe the steps of pollen formation. (2)
- c. Complete the outline drawing of a section of an anther shown in Fig. 3.2 to show what happens to an anther to allow pollen dispersal. (1)

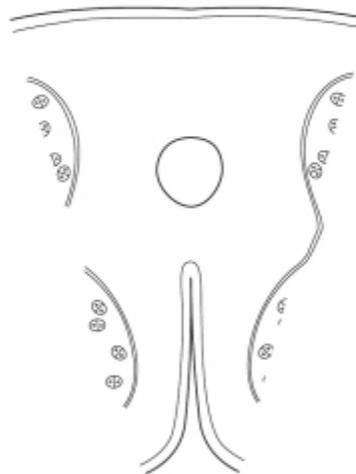


Fig. 3.2



OR

(a) Name the precise sites of production in the human male of the following hormones: (1 ½)

- (i) follicle stimulating hormone (FSH);
- (ii) luteinising hormone (LH) or interstitial cell stimulating hormone (ICSH);
- (iii) testosterone.

Fig. 2.1 shows the concentration of the hormones FSH, LH (ICSH) and testosterone in the blood of a human male at different ages.

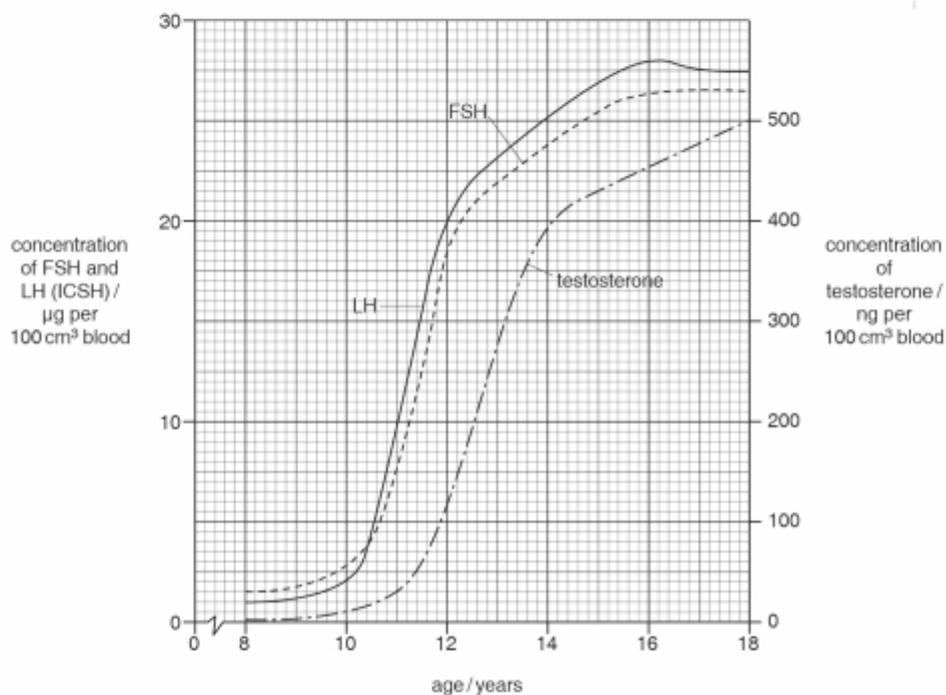


Fig. 2.1

With reference to Fig. 2.1, describe and explain the changes in concentration of:

- (i) FSH and LH (ICSH); (2)
- (ii) testosterone. (1 ½)

25 Fig. 4.1 shows four generations of a family in which some members of the family suffer from sickle cell anaemia. 5

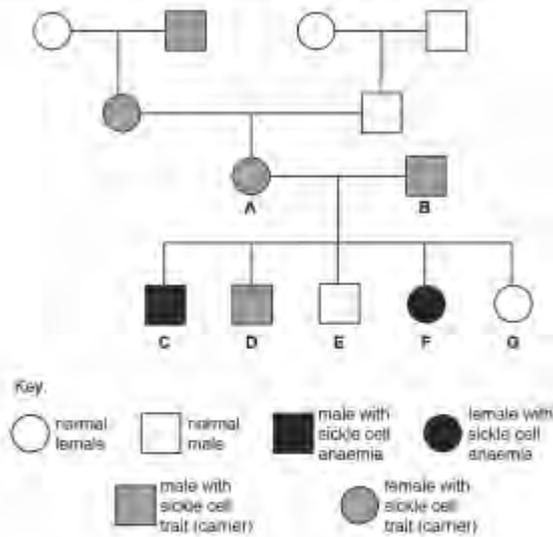
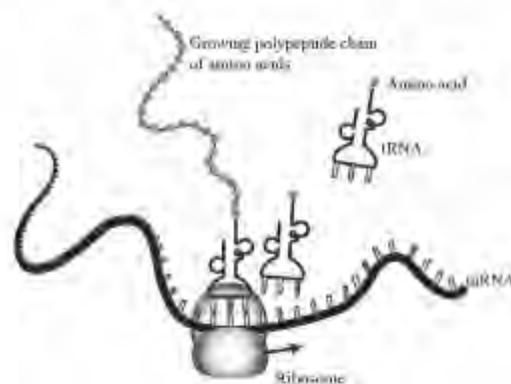


Fig. 4.1

- Using the symbols H^N for the allele for normal haemoglobin and H^S for the allele for sickle cell haemoglobin, state the genotypes of the following individuals A and B. (2)
- Draw a genetic diagram to show the probability of the parents A and B producing another child with sickle cell anaemia. (3)

OR

a. The diagram shows the translation of an mRNA molecule.



(Courtesy: National Human Genome Research Institute)

A tRNA molecule with anticodon CAG carries the amino acid valine. Which codon of mRNA will the tRNA join? (1)

- CTG
- CAG
- GTC
- GUC

b. Describe the steps of translation. (4)

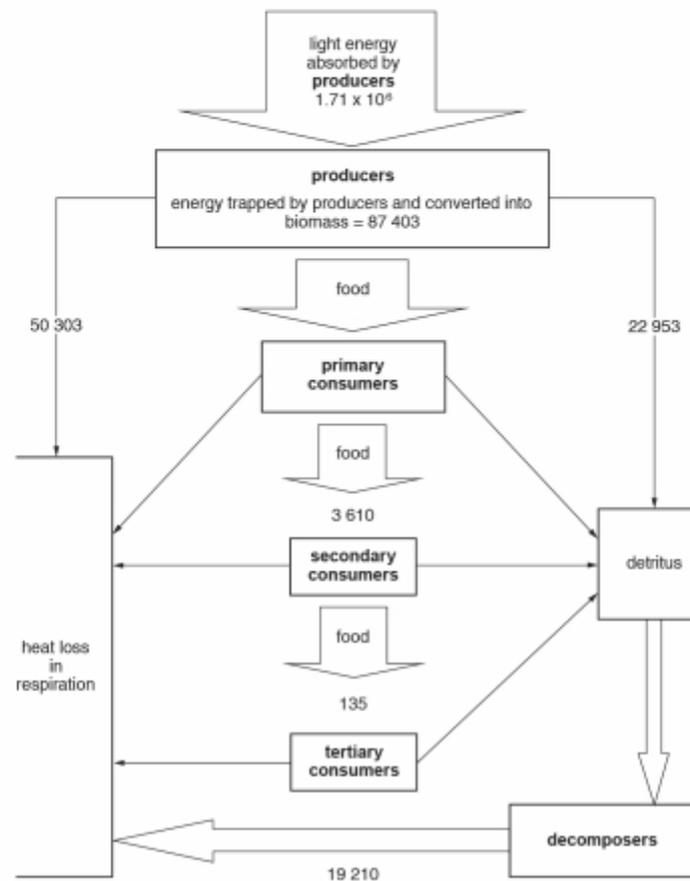


Fig. 2.1

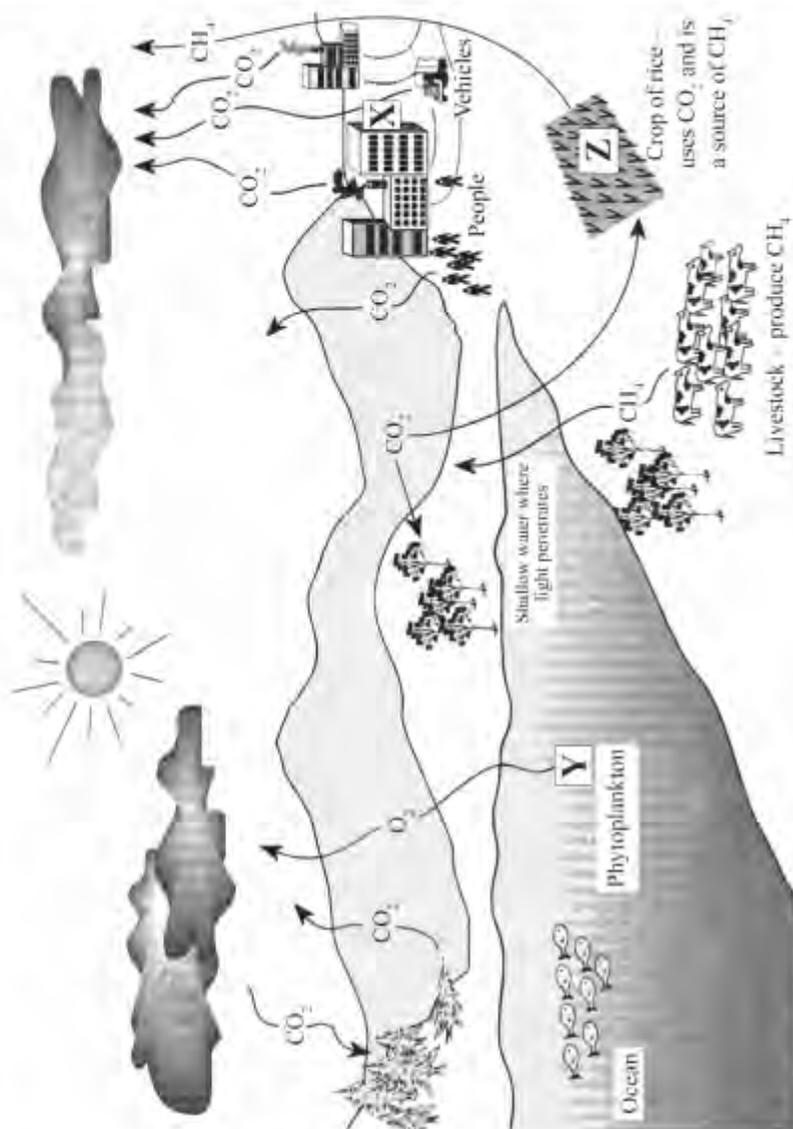
- Calculate how much energy is available to the primary consumers in this ecosystem. (1)
- The efficiency of energy transfer between trophic levels is calculated by comparing the energy available to a trophic level with the energy available to the next trophic level. Between secondary and tertiary consumers, this is calculated as follows. ‘

$$\frac{\text{energy available to tertiary consumers}}{\text{energy available to secondary consumers}} \square 100 \%$$

- Use the formula above to calculate the efficiency of energy transfer between the secondary consumers and the tertiary consumers in this ecosystem. (1)
- In some food webs, individual consumer species feed at different trophic levels. With reference to Fig. 2.1, explain an advantage of this for these consumer species. (1)
- Explain the role of decomposers in the cycling of carbon and nitrogen in ecosystems. (2)

OR

The diagram shows the carbon cycle.



[Source: adapted from www-das.uwyo.edu/~garr/cws/ames/vlaq01/carbon_cycle.jpeg]

- State the processes occurring at X and Y. (1)
- Predict the conditions that would increase the release of methane shown at Z. (2)
- Outline the impact of the gases shown in the diagram on the greenhouse effect. (2)

Source: These questions are from Cambridge AS Biology past papers and IB DP Biology past papers.



Comparative Analysis of Biology CBSE Paper and Proposed Model Paper

Ques. No.	CBSE Paper	Model Paper
1	'Write' is knowledge level	MCQ which assesses the same concept but is application of the knowledge.
2	'Name' is knowledge level (asking to remember 2 names)	The question with options given, students have to find which pair does not match. Same learning objective but application based
3	'How' is knowledge level	MCQ – options assess understanding of different diseases.
4	'Write' the names – knowledge level – very text based, it requires memorization.	MCQ assesses understanding of concept along with application; this requires conceptual understanding, not memorization.
5	'Mention' knowledge level	Same knowledge level but asked through MCQ which deemphasizes memorization. If a student understands genetic engineering, then he/she will be able to discern the correct option from the choices given.
6	'Recommend' – knowledge level 'Why' – understanding level	Same
7	'Explain' – understanding	'Which is not a fact or inference' in encouraging understating and evaluation.
8	'How' and 'Explain' – Knowledge and Understanding – directly from the text	Students have to choose one heading from the list given. Also synthesize and apply
9	'Name' and 'explain' – knowledge and understanding	Same
10	'Name' and 'Write' – knowledge level	The question encourages analysis of the data, and then addresses application of understanding
11	'Draw' and 'label' – knowledge level and depends on memorization	Same knowledge level maintained with use of 'explain' for understanding
12	'Expand' and 'List' – knowledge level	Same
13	'Differentiate' - understanding	Same
14	'Do you agree' – closed ended question as the answer is predictable and closed. 'Give reasons' – understanding level but very text based, depends on memorization	'Calculate' – understanding and analysis – needs understanding and not memorization. 'Suggest two explanations for the trend' – evaluation level which depends on interpretation of given data and background knowledge, not memorization.
15	'Explain' – understanding but very text based.	Changed the question to data interpretation and elaboration of – so now is a 'synthesis' level
16	'How' and 'Name' – knowledge level	Change the question to data interpretation and elaboration which is synthesis level
17	'Explain' – understanding level but	The question still addresses 'understanding'

Comparative Analysis of Biology CBSE Paper and Proposed Model Paper

	dependent on text directly	but instructs to differentiate between two approaches which need application of understanding.
18	'Explain' – understanding level but dependent on text	same
19	'Justify' but very closed ended question. 'Give an example' – knowledge level but very dependent on memorization.	Same maintained for knowledge level. 'How' – understanding of the pest control process through genetic engineering
20	'Differentiate' and 'Select and write' – understanding - text based	Same
21	Same	Same
22	'How' - knowledge level text based	'Sketch all possible ways'- needs understanding leading to synthesis
23	'Write' and 'mention' – knowledge level – can give too generalized answers	A flowchart is already given, and then differences are asked – which focuses on understanding – does not depend on memorization. 'Explain' and 'outline' focuses on understanding through elaboration.
24	'Describe', 'explain', 'how' – understanding level	When diagram is given, then the understanding can be assessed without depending on memorizing the diagram. The cognitive level has not changed, but when the question is asked to 'complete' the diagram, then the answer reflects understanding of the process but it has an indirect approach.
25	'Write', 'how', 'state' – knowledge level – very text based – depends on memorization rather than understanding.	Finding probability is application and cannot be memorized. MCQ is also application of understanding – does not need memorization.
26	'describe', 'what', 'how' - knowledge and understanding level but text based.	The question is changed to data interpretation; 'calculate' focuses in application, 'predict' focuses on synthesis level. In these questions, the diagram is already given which de-emphasizes memorization, it depends on understanding of concept and its application.



Appendix 1(E) - CBSE Question Paper analysis of English and Model Paper

CBSE English AISCE Syllabus & Question Paper Analysis as per Bloom's Taxonomy

Syllabus 2018		Question Paper 2018; Set 1; Code 1/1		Model Question Paper	
Typology (Cognitive Skill)	Percentage of Syllabus (%)	Typology (Cognitive Skill)	Percentage of Paper (%)	Typology (Cognitive Skill)	Percentage of Paper (%)
Remembering	20	Q1(k)+ Q2(i)+ Q8(a)+ Q9 (a)(b)(d)(f)	2+2+1+9= 14%	Q1.4+ Q2.3	1+ 2= 3%
Understanding	35	Q1(a-j)+ Q2(a-h)+ Q8(b)(c)+ Q9 (c)(e)+ Q10+ Q11+ Q12+ Q13	10+8+2+3+6+6+6=47%	Q1.1+ Q1.2+ Q2.1+ Q8	3+4+4+4= 15%
Application	25	Q3b+ Q4+ Q5+ Q6+ Q7+ Q8(d)	3+4+6+10+10+1=34%	Q3.2+ Q4+ Q5+ Q12+ Q10	3+ 4+6 +6+ 10= 29%
High Order Thinking Skills(Synthesis & Analysis)	10	Q3a	5%	Q1.3+ Q2.2+ Q3.1 + Q7 + Q9	4+4+ 5+10+12= 35%
Evaluation	10	-	0	Q10 + Q11+ Q13	6+6+6= 18%

Roll No.

Name:

Date:

**MODEL PAPER
CLASS- 12
SUBJECT- English
SESSION-2018**

Time allowed: 3 Hours

Maximum marks: 100

General Instructions:

1. This paper is divided into three sections: A, B, and C.
2. All the sections are compulsory.
3. Read the instructions very carefully and follow them carefully.
4. Do not exceed the prescribed word limit while answering the questions.

S.No	Questions	Marks
	SECTION -A (READING)	30
Q1.	Read the passage and on the basis of your understanding of the passage answer the questions given below:	12
	<p>1. A new born baby appears to be sleeping almost all the time. But as it grows up, its pattern of sleep changes. It sleeps less and less, and stays awake longer, playing or crying or babbling. By adulthood, the pattern is well established, people sleep eight or nine hours a day. Well, not quite that long, for our sleep habits have changed over the last century or so and we do not get as much sleep as we ought to.</p> <p>2. In the eighteenth and nineteenth centuries, people went to bed early, soon after it was dark. They had nothing to do in the evenings, and their sleep habits were fixed by the alternation of day and night, light and darkness. They woke up by daybreak, and thus they could get nine hours of sleep on an average.</p> <p>3. Today, the situation has changed. People, especially in industrialized countries, get less than eight hours of sleep per day; many of them believe that six or six-and-a-half hours of sleep is enough for them. According to biologists and specialists in sleep disorders, a large number of people are not sleeping enough and thus sleep deficit affects their health and their performance.</p> <p>4. How did this change in our sleep habits come about? One cause was the introduction of the light bulb. When the electric bulb came into common use, people could work till late in the evening or even till midnight. As the life of a civilized community became more complex, people began to deprive themselves of sleep in order to squeeze their busy schedule into the late evening hours. Many factories introduced the shift system, by which people work in 8-hour cycles by rotation. A</p>	

worker who has been working 8 am to 4 pm during one month is asked to work from midnight till 8 am during the next month. The human brain cannot adapt easily to such a different sleep time, and as a result, the worker loses his sleep till the new pattern is established.

5. Millions of people today travel by air across time zones, and suffer jet lag in the process. The world has become one big market, and businessmen have to be constantly travelling; this robs them of their sleep. Even at other times, businessmen have to stay awake keeping track of market developments in the business capitals of the world, like New York, London and Tokyo. If they fail to monitor the movements of price in the foreign markets, they will be the losers. Radio and television must bear their share of responsibility for depriving people of sleep. Even after local TV transmissions have closed by midnight, satellite transmission brings programmes from other transmitting stations across the world through the night. Many people get addicted to television and consider themselves compensated for the loss of sleep by being able to watch interesting programmes of entertainment, or live telecasts of sports or political events from foreign countries.

6. Experiments, where people have stayed awake for days at a time show that they soon become tired, confused, irritable and eventually ill, with headaches and increased risk of infections and accidents. Many people who suffer from sleeplessness (insomnia) are worried or anxious or depressed. They may get stuck in a vicious spiral where they cannot sleep, so they worry about that as well, and so sleep even less. Treating the insomnia may help; doctors can prescribe various types of sleeping pills to aid sleep. However, it is usually better to get to the root of the problem to find out what is causing the worry or depression, and to deal with that.

7. Research has shown that the performance of people suffers if they are deprived of sleep. They cannot concentrate, they cannot absorb what they are reading, they cannot make calculations, they make mistakes. Some traffic accidents can be traced to drivers falling asleep while at the wheel. Sleep-deprived people cannot be alert, and this can lead to accidents in factories when such people lose their concentration while monitoring machines.

8. What, then, is to be done to set things right? Obviously, people should learn to sleep more. One way is to take a siesta in the afternoon, as people often do in tropical countries. Extra sleep during weekends can help, but where there has been severe deprivation, it may take a long time to make up for lost sleep. The most sensible thing to do would be to go back to our old-time habit and sleep an hour longer every night. Sleep therapists advise us to take extra sleep at bedtime in the evening rather than in the morning.

1.1 On the basis of your understanding of the above passage answer each of the questions given below with the help of options that follow:

(i) Modern man has been compromising his sleep to 1x3=3

- a. squeeze in more hours of work
- b. enjoy himself at night
- c. work in factories
- d. increase profits

(ii) Air travel has added to the woes of those who are sleep deprived because

- a. people travel across different time zones in a day
- b. people who travel by air can't sleep peacefully
- c. people have to adjust to different weather conditions
- d. none of the above

(iii) According to the writer our sleep patterns have changed in the last century because

- a. we no longer sleep for nine hours
- b. people have nothing to do in the evenings
- c. people have to wake up early
- d. none of the above

1.2 Answer the following questions briefly in your own words: 1x4=4

- (i) What is the 'vicious spiral'?
- (ii) What are the results of not having enough sleep?
- (iii) How can we improve our sleep patterns?
- (iv) Give an appropriate title to the passage.

1.3 Answer the following: 2x2=4

- (i) The author talks about 2 major technological developments that have caused sleep deprivation. Which ones are they and how have they impacted sleep patterns?
- (ii) The passage mentions anxiety and depression as root causes of insomnia. Why do you think these disorders have grown in the 21st century?

1.4 Find words from the passage which mean the same as each of the following (Any 2):

0.5x2=1

- i. shortfall/shortage (para 3)
- ii. broadcasts (para 5)
- iii. deficiency (para 8)

Q2 Read the following passage carefully and answer the questions that follow:

10

1. Hysteria comes from the Greek root *hystera*, meaning 'uterus.' Originally, it was believed that hysteria and hysterical symptoms were caused by a defect in the womb, and thus, only women could become hysterical.

2. Hysteria has been an official diagnosis in psychology. Sigmund Freud (who did much of his work in the late 1800's in Europe, a time and place where sexual repression was an important part of the culture) used the term frequently in his notes and professionally published papers. Freud, however, was not afraid to address the traumatic roots of hysterical symptoms, which often had to do with sexual abuse and/or diagnose men with hysteria. In the context of a rigid patriarchy where sex was considered unclean, both of these points of discussion were completely unapproachable for many people. Freud aside, let's look at the sexism behind the very word 'hysteria' and also the sexism behind the fear of talking about men with hysteria.

3. First of all, the idea that women could have womb defects which caused physical and psychological symptoms of distress is bizarre. This idea is reflective of a cultural belief that women are simply less capable of being reasonable. When we're upset, we get asked whether we are on our period. When we're not upset, and instead feeling emotionally level, we're considered cold. This horrendous catch-22 leaves us with only one socially acceptable option: smiling and acting warmly toward those around us is the only attitude considered appropriate for us. For women, reasonableness is simply not a social expectation. Smiles are.

4. I believe this problem has roots in an old, outdated culture. One which believed sick or mentally unwell women would get better if their uteruses were better aligned. The sexism of which has been discredited on almost all fronts. The sexism of which we need to completely gut from our culture today.

5. I also think this is a fantastic example of the way that sexism is detrimental to *both* genders. Men could not be diagnosed with hysteria because they did not have wombs. Besides, they were supposed to be too strong for these 'womanly' diseases. In turn, they could not be treated for their psychological distress.

6. Both genders could benefit from a dissociation between the ideas of 'weakness' and 'woman'. The American Psychiatric Association did not officially kill 'hysteria' as a clinical term until 1980, but today even the most severe form of what was formerly known as hysteria has another name ie conversion disorder.

7. Academia recognized that the roots of the word 'hysteria' were offensive to women and stalled the progress of psychology as a science. They reach down to the Victorian era of sexual suppression and absurd ideas about the functions of a uterus. The word itself had to be removed, and it has.

Source: "On the sexist etymology of "hysteria," and what academia did about it" by Shalome Sine (Edited)

- 2.1** On the basis of your reading of the passage answer the following questions as briefly as possible: 1x4=4
- i. Why were men not diagnosed with hysteria in the past?
 - ii. Why does the writer feel that hysteria has sexist connotations?
 - iii. What made Freud's viewpoints so revolutionary?
 - iv. Why do women prefer smiling even when they are in pain?
- 2.2** Answer the following questions: 2x2=4
- i. How would both the genders benefit from the dissociation between women and weakness?
 - ii. Do you think hysteria still has sexist connotations in the 21st century? Why or why not?
- 2.2** Find words in the passage that mean the same as the following: 0.5x4=2
- i. distressing and hurtful (para 2)
 - ii. odd/peculiar (para 3)
 - iii. disadvantageous/injurious (para 5)
 - iv. delayed (para 7)
- Q3. Read the passage and answer the questions given below:** **8**
1. The word 'depressed' in common usage means sad, frustrated, fed up, bored and pessimistic. Depression is a state of mind. It is specifically a mental disorder characterized by a lowering of the individual's vitality. His mood, desires, hopes, aspirations and of his self- esteem. Depression arising out of environmental factors is called Reactive Depression whereas depression arising out of some biochemical changes in the brain is called Endogenous Depression. If depression is mild or moderate and if the individual is in touch with his surroundings, it is known as Neurotic Depression. If the individual is severely disturbed and is not able to comprehend what is happening around him, such a state is called Psychotic Depression

2. Old age is one of the stages of human development, where a person attains wisdom, maturity, social and economic stability with social recognition and emotional fulfillment. Generally, societies show a great respect and consideration for the aged. In ancient times, old people were considered as the guiding stars in Indian families, since they were symbols of tradition, respect, wisdom and experience. The old people were considered repositories of wisdom and traditions and were not considered as problems.
3. At present, social structures and values are undergoing transformation from traditional to modern. There is a rapid stride in urbanization and industrialization leading to the breaking up of joint families and property. From time to time, changes in the institution of marriage and family have diminished the control of parents over their children. It has increased the freedom of children and they view the aged as a useless and non-productive entity.
4. Modernization has eventually led to the degradation of their status and authority. Consequently, the integrity of the family and the existence of the elderly as an integral part of the family are being uprooted. The importance of their functional position thus declines and consequently their authority and much of their respect and prestige that they enjoyed earlier fades away. These changes generally bring about depression in older people.
5. The loneliness also arises because of premature loss of a spouse. This would deprive the person of a long standing emotional bond that had provided plenty of emotional succour and security. The loss, if it occurs in the later years, leaves the individual terribly lonely and at the mercy of the sons and daughters-in-law. Added to this, the increasing gap and interactional stress and strain in the family may leave the elderly without peace of mind. The elderly as a result of these developments feel marginalized, alienated and left out of the main stream. Usually, the mild depression which is caused due to environmental factors is temporary. The person reconciles within a short time and tries to forget the loss. Kind words and timely support of friends, relatives and family members help one recover from depression.

- | | | |
|------------|--|----------|
| 3.1 | On the basis of your reading of the above passage, make notes on it using headings and sub-headings. Also use recognizable abbreviations wherever necessary (minimum 4) | 5 |
| 3.2 | Write a summary of the above passage in about 80 words. | 3 |

SECTION: B (ADVANCED WRITING SKILLS)

30

- Q4** You are Rohit/Renu of Green Horizon Public School, Dwarka. Your school is organizing a workshop on the Topic, "Crackers cause Pollution". Prepare a poster for the same. (50 words)

OR

You are Kanishk/Kirti (Head Boy/Head Girl) of Blue Star Public School, Gurugram. Your school is hosting its Annual Day Function this month. Draft an invitation for the same in fifty words.. Supply necessary details wherever required.

- Q5** A vacancy for the post of P.G.T. English has just arisen in the Kaizen Public School, Sector 21, Gurugram. You saw the advertisement in an English Daily recently. Draft a Cover Letter and a Biodata pursuant to applying for the same.

OR

You recently read a report stating that Cape Town might be the first city to run out of water. Some scientists even go to the extent of saying that the Third World War may be fought on the issue of water. Write an letter to the editor addressing the scarcity of water and its causes.(100-125 words)

- Q6.** Censorship of movies has become a political weapon intended to enrage the public around election season. As Aarushi/Akhilesh, write an debate, in 150-200 words, on movies as a piece of art that is consumed by the masses, and whether they should be censored or have freedom of expression.

OR

You are Aarushi/Akhilesh. You are deeply concerned about the changing attitude of politicians who are using religion for political gains. Write an article, in 150-200 words, for publication in a national daily suggesting that people separate religion from politics and work for the betterment of society.

- Q7.** You are a Counsellor of XYZ Public School. You have been asked to write an article for a parenting magazine on the increasing Mental Health issues in today's children and the importance of talking about such issues on a regular basis. Write the magazine article in 150-200 words.

OR

Varshini/Varun reads about the recent terror attacks in the middle east. She/he is troubled by the lives lost and the vicious cycle of destruction that ensues. She/he decides to create awareness by addressing his peers in the assembly on the disaster caused by terrorism and the need to preserve peace. Write a speech in about 150-200 words.



SECTION: C - LITERATURE (TEXT BOOKS AND LONG READING TEXT)

40

Q8. Read the following extract and answer the following questions briefly.

“On sour cream walls, donations. Shakespeare’s head,
Cloudless at dawn, civilized dome riding all cities.
Belled, flowery, Tyrolese valley. Open handed map
Awarding the world its world. And yet...”

Explain why the author has made use of contrasting imagery, with emphasis on the given extract. 4

OR

“What I want should not be
Confused
With total inactivity.
Life is what it is about;
I want not truck with death.”

Demonstrate how the form of the poem emphasises its message, focusing on the extract given. 4

Q9. Answer any four of the following questions in 30 – 40 words. 4x3=12

(i) Give an alternative title to “Evans tries an O-Level”. Justify your choice.

(ii) Does the parent child relationship of Joanne and Jack mirror that of Roger Skunk and Mommy Skunk? How ?

(iii) Why do you think the author has chosen the form of satire for the story “The Tiger King”?

(iv) “When a people are enslaved, as long as they hold fast to their language it is as if they had the key to their prison.” Analyse the feelings of the character, in context of this quote.

(v) Kamala Das wrote on a large number of themes, prominent among them female sexuality. How does “My mother at sixty-six” promote her opinions regarding the same?

(v) Do you think Dr. Sadao’s final decision was the best possible one in the circumstances? Why/Why not? Explain with reference to the story, ‘The Enemy’.

Q10. Answer any one of the following questions in 120 – 125 words.

6

(i) “Beauty lies in the eyes of the beholder.” How far does Keats’ version of beauty relate to the quote? Is beauty subjective or universal?

(ii) Injustice does not escape the eyes of children. Analyse the actions of Zitkala-Sa in light of this statement.

(iii) In the poem Aunt Jennifer’s Tigers, there is a sharp contrast between the reality of Aunt’s life and her imagination. Find any other character from the syllabus that is in the same dilemma and elaborate on the similarities.

Q11. Answer any one of the following questions in 120 – 125 words

6

(i) Mahatma Gandhi offers a model of leadership that is centered around dialogue and argumentation. Discuss this model with relevance to the violence of the 21st century. Is it a workable solution? Why or why not?

(ii) The children of Firozabad make beautiful bangles and make everyone happy but they live and die in squalor. Critique the practice of Child Labour with reference to “Lost Spring”.

(iii) “All we have to fear is fear itself.” Compare Douglas’ experience to your own and analyse how the conquest of fear may not be the same journey for everyone.

Q12. Answer any one of the following questions in 120 – 125 words

6

(i) Everyone who comes in contact with Griffin always suffers. Write a diary entry, as Griffin, either agreeing or disagreeing with the given statement.

(ii) Compare and contrast the character of Dr. Kemp with that of Griffin.

Q13. Answer any one of the following questions in 120 – 125 words

6

(i) How does the novel ‘The Invisible Man’ highlight the theme of corruption of morals in the absence of social restriction?

(ii) Invisibility is more a handicap than an advantage for Griffin. Evaluate his situation and analyse the author’s perspective on the situation.



Comparative Analysis of English CBSE Paper and Proposed Model Paper

CBSE Paper	Model Paper
<p>Q1- Comprehension</p> <ul style="list-style-type: none"> • Factual, straightforward passage • MCQs are direct. No interpretation required. Understanding based. • Short Answer Questions are also stated directly in the passage. • Keywords are for <u>Understanding</u>: Why, How, When and What • Vocabulary (<u>Knowledge</u> based) is for 1 mark each 	<p>Q1- Comprehension</p> <ul style="list-style-type: none"> • Factual, straightforward passage • MCQs are direct. No interpretation required. Understanding based. • Short Answer Questions are also twisted and require deeper understanding. Allow for subjectivity of interpretation. • Keywords are for <u>Understanding</u>: Why, How • Eg: Give an appropriate title. • Vocabulary (<u>Knowledge</u> based) is for 0.5 mark each • <u>Introduced 2 markers that are based on critical thinking, creativity and analysis.</u> • Eg: The passage mentions anxiety and depression as root causes of insomnia. Why do you think these disorders have grown in the 21st century?
<p>Q2- Comprehension</p> <ul style="list-style-type: none"> • Factual, straightforward passage • MCQs are direct. No interpretation required. Understanding based. • Short Answer Questions are also stated directly in the passage. • Keywords are for <u>Understanding</u>: Why, How and What • Vocabulary (<u>Knowledge</u> based) is for 1 mark each 	<p>Q2- Comprehension</p> <ul style="list-style-type: none"> • Analytical passage. Requires thorough study. • No MCQs. • Short Answer Questions are also stated directly in the passage, however the questions themselves are twisted. • Keywords are for <u>Understanding</u>: Why, How • Vocabulary (<u>Knowledge</u> based) is for 0.5 mark each • <u>Introduced 2 markers that are based on critical thinking, creativity and analysis.</u> • Eg: Do you think hysteria still has sexist connotations in the 21st century? Why or why not?
<p>Q3- Note Making</p> <p>(a) <u>Synthesis</u></p> <p>(b) <u>Application</u></p>	<p>Q3- Note Making</p> <p>(a) Synthesis</p> <p>(b) Application</p>
<p>Q4- Short Writing Task</p> <ul style="list-style-type: none"> • Application of format and prior knowledge. • Students do not need in-depth information of the topics given. • <u>Factual statements and content is required.</u> 	<p>Q4- Short Writing Task</p> <ul style="list-style-type: none"> • Application of format and prior knowledge. • Students do not need in-depth information of the topics given. • Factual statements and content is required.

Comparative Analysis of English CBSE Paper and Proposed Model Paper

<p>Q5- Letter Writing Task</p> <ul style="list-style-type: none"> • Application of format. • Students do not need in-depth information of the topics given. • <u>Factual statements and content is required.</u> • Some prior general awareness is required about world issues and occupations. 	<p>Q5- Letter Writing Task</p> <ul style="list-style-type: none"> • Application of format. • Students do not need in-depth information of the topics given. • Factual statements and content is required. • Prior general awareness is required about world issues and occupations. • Aspect of critical thinking is required.
<p>Q6- Long Writing Task</p> <ul style="list-style-type: none"> • Should be a Synthesis based question, but is <u>Application</u>. • Topic is too generic. • Students do not require in depth knowledge of the topic. • Fact and Information based topic. • <u>No scope for critical thinking and creativity.</u> • Tests language and domain vocabulary. • Eg: Write an article on the common man's woes during the monsoons. • Eg: Write a speech on Indiscipline in Schools. 	<p>Q6- Long Writing Task</p> <ul style="list-style-type: none"> • <u>Synthesis</u> • Topic is subjective and debatable. • Students require in depth knowledge of the topic. • Analysis based topic. • <u>Critical thinking and creativity required.</u> • Tests language and domain vocabulary. • Eg: Write an debate on movies as a piece of art that is consumed by the masses, and whether they should be censored or have freedom of expression. • Eg: Write an article for publication in a national daily suggesting that people separate religion from politics and work for the betterment of society.
<p>Q7- Long Writing Task</p> <ul style="list-style-type: none"> • Should be a Synthesis based question, but is <u>Application</u>. • Topic is too generic. • Students do not require in depth knowledge of the topic. • Fact and Information based topic. • <u>No scope for critical thinking and creativity.</u> • Tests language and domain vocabulary. • Eg: "Academic Excellence is the only requirement for a successful career." Write a debate either for or against the topic. • Eg: Write a report on "Effect of pollution on quality of life". 	<p>Q6- Long Writing Task</p> <ul style="list-style-type: none"> • <u>Synthesis</u> • Topic is subjective and debatable. • Students require in depth knowledge of the topic. • Analysis based topic. • <u>Critical thinking and creativity required.</u> • Tests language and domain vocabulary. • Eg: Write an article for a parenting magazine on the increasing Mental Health issues in today's children and the importance of talking about such issues on a regular basis. • Eg: Create awareness by addressing your peers in the assembly on the disaster caused by terrorism and the need to preserve peace.
<p>Q8- Reference to Context</p> <ul style="list-style-type: none"> • Tests knowledge, understanding and application. 	<p>Q8- Reference to Context</p> <ul style="list-style-type: none"> • Understanding Based: Explain. • Introduced a 4 marker answer rather



Comparative Analysis of English CBSE Paper and Proposed Model Paper

<ul style="list-style-type: none"> • Knowledge: Identify the poet. • Understanding: What, How- However this is more <u>knowledge</u> based as the student needs to memorise these from the texts. • Application: Figure of speech 	<p>than 4 one markers that only test knowledge.</p> <ul style="list-style-type: none"> • Tests analytical skills and understanding of literary forms and styles. • Requires thorough understanding of the text. • Eg: Explain why the author has made use of contrasting imagery, with emphasis on the given extract.
<p>Q9- Short Answer Questions</p> <ul style="list-style-type: none"> • <u>Knowledge based</u>: What, which • <u>Understanding based</u>: How, Why • All questions require memorisation of plot and fact based details from the literary pieces. • Questions do not test analysis of literary styles or forms. • Questions do not allow for subjective interpretation. • Eg: Why does Derry's mother not want him to go back to visit Mr Lamb? • Eg: What considerations influenced the Tiger King to get married? 	<p>Q9- Short Answer Questions</p> <ul style="list-style-type: none"> • <u>Analysis based</u>: Analyse, Why do you think • <u>Understanding based</u>: How, Why • All questions require thorough understanding of the texts but less memorisation. • Questions test analysis of literary styles or forms. • Questions allow for subjective interpretation, with textual evidence. • Eg: Why do you think the author has chosen the form of satire for the story "The Tiger King"? • Eg: Do you think Dr. Sadao's final decision was the best possible one in the circumstances? Why/Why not?
<p>Q10- Long Answer Question</p> <ul style="list-style-type: none"> • <u>Understanding Based</u>: How • Should be value based, but is knowledge based. • Requires memorisation of content from the text. • Requires factual and plot based details. • Poetry not included, only stories. • Does not allow for critical thinking • Eg: How is Jansie's attitude different from that of Sophie? 	<p>Q10- Long Answer Question</p> <ul style="list-style-type: none"> • <u>Analysis Based</u>: How, Analyse • Can have a subjective interpretation. • Requires a thorough understanding of the text. • Includes analysis of poetry. • Asks for critical thinking • Requires understanding of literary form and style. • Eg: Beauty lies in the eyes of the beholder." How far does Keats' version of beauty relate to the quote? Is beauty subjective or universal?
<p>Q11- Long Answer Question</p> <ul style="list-style-type: none"> • <u>Understanding Based</u>: How • Should be value based, but is knowledge based. • Requires memorisation of content from the text. • Requires factual and plot based details. • Does not allow for subjective 	<p>Q11- Long Answer Question</p> <ul style="list-style-type: none"> • <u>Analysis Based</u>: Critique, Compare, Discuss • Can have a subjective interpretation. • Requires a thorough understanding of the text. • Asks for critical thinking • Requires understanding of literary form

Comparative Analysis of English CBSE Paper and Proposed Model Paper

<p>interpretation.</p> <ul style="list-style-type: none"> • Eg: At the end of the story, why does Jack consider himself 'caught in an ugly middle position'? 	<p>and style.</p> <ul style="list-style-type: none"> • Eg: Critique the practice of Child Labour with reference to "Lost Spring".
<p>Q12- Long Answer Question from the Novel</p> <ul style="list-style-type: none"> • <u>Knowledge</u> Based: How • Should be value based, but is knowledge based. • Requires memorisation of content from the text. • Requires factual and plot based details. • Could be subjective but is very restrictive. • Eg: How do you perceive Dr Kemp based on his interaction with Griffin? 	<p>Q12- Long Answer Question from the Novel</p> <ul style="list-style-type: none"> • <u>Analysis</u> Based: How, Analyse • Can have a subjective interpretation. • Requires a thorough understanding of the text. • Asks for critical thinking • Requires understanding of literary form and style. • Theme based, rather than character or plot based. • Eg: Write a diary entry, as Griffin, either agreeing or disagreeing with the given statement.
<p>Q13- Long Answer Question from the Novel</p> <ul style="list-style-type: none"> • <u>Knowledge</u> Based: How, Describe • Should be a question on thematic analysis. • Requires memorisation of content from the text. • Requires factual and plot based details, character description. • Eg: How is Godfrey Cass different from his younger brother, Dunstan? 	<p>Q13- Long Answer Question from the Novel</p> <ul style="list-style-type: none"> • <u>Analysis</u> Based: Evaluate, Analyse • Can have a subjective interpretation. • Requires a thorough understanding of the text. • Asks for critical thinking • Requires understanding of literary form and style. • Theme based, rather than character or plot based. • Eg: Invisibility is more a handicap than an advantage for Griffin. Evaluate his situation and analyse the author's perspective on the situation.



Appendix 1(F) - CBSE Question Paper analysis of Economics and Model Paper

Question Paper Analysis					
Subject: <u>Economics, Class XII</u>			SET 2		
Year:- <u>2018</u>			Code No. :- <u>58/2</u>		
S. No.	Unit	Blooms Taxonomy Level	LA/SA/VSA	Marks	
1		Apply	VSA	1	
2		Remember	VSA	1	
3		Remember	VSA	1	
4		Understand	VSA	1	
5		Understand	SA	3	
6		Understand	SA	3	
7		Remember + Analyse	SA	1 + 3	
8		Apply	SA	4	
9		Remember	SA	4	
10		Apply + Analyse	SA	3 + 1	
11		Understand	LA	6	
12		Remember + Understand	LA	3 + 3	
13		Understand	LA	4	
14		Remember	VSA	1	
15		Remember	VSA	1	
16		Remember	VSA	1	
17		Understand	VSA	1	
18		Remember + Understand + Apply	SA	1 + 1 + 1	
19		Understand	SA	3	
20		Apply	SA	4	
21		Understand	SA	4	
22		Remember + Understand	SA	1 + 3	
23		Apply	LA	6	
24		Understand	LA	6	
25		Understand	LA	6	
		TOTAL			
Remember	Understand	Apply	Analyse	Evaluate	Create
15	46	19	4	0	0

Total is > 80 as 8th question has an optional question with different BT Level of 4 marks

MODEL QUESTION PAPER

ECONOMICS

Code No. SET-2

58/2

--	--	--	--	--	--	--	--

Roll No.

Candidates must write the Code on the title page of the answer-book.

Please check that this question paper contains 4 printed pages.

- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **24** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

ECONOMICS

Time allowed: 3 hours

Maximum Marks: 80

General Instructions:

- All questions in both the sections are compulsory.*
- Marks for questions are indicated against each question.*
- Question Nos. 1 – 4 and 13 – 16 are very short-answer questions carrying 1 mark each. They are required to be answered in **one sentence** each.*
- Question Nos. 5 – 6 and 17 – 18 are short-answer questions carrying 3 marks each. Answers to them should normally not exceed **60** words each.*
- Question Nos. 7 – 9 and 19 – 21 are also short-answer questions carrying 4 marks each. Answers to them should normally not exceed **70** words each.*
- Question Nos. 10 – 12 and 22 – 24 are long-answer questions carrying 6 marks each. Answers to them should normally not exceed **100** words each.*
- Answers should be brief and to the point and the above word limits should be adhered to as far as possible.*



SECTION A

1. When the total fixed cost of producing 100 units is = 30 and the average variable cost = 3, total cost is: (Choose the correct alternative)

- (a) 3
- (b) 30
- (c) 270
- (d) 330

2. State one example of positive economics.

3. What happens to fixed cost in the long run?

4. When the Average Product (AP) is maximum, the Marginal Product

(MP) is: (Choose the correct alternative)

- (a) Equal to AP
- (b) Less than AP
- (c) More than AP
- (d) Can be any one of the above

5. What is meant by inelastic demand? Compare it with perfectly inelastic demand.

6. Explain the central problem of “for whom to produce”.

OR

Explain the central problem of “choice of technique”.

7. What is meant by price ceiling? How can the Government ensure that it succeeds?

8. Given the price of a good, how will a consumer decide as to how much quantity to buy of that good? Explain.

OR

What is Indifference Curve? Is it possible to have Straight Line or L-shaped Indifference Curves.

9. When the price of a commodity changes from Rs. 4 per unit to Rs. 5 per unit, its market supply rises from 100 units to 120 units. Calculate the price elasticity of supply. Is supply elastic? Give reason.

10. Explain the conditions of producer's equilibrium in terms of marginal revenue and marginal cost. Why is the profit maximum at this point?

11. State three characteristics of monopolistic competition. Which of the characteristics separates it from perfect competition and why?

OR

Explain the implications of the following:

(a) Freedom of entry and exit of firms under perfect competition

(b) Non-price competition under oligopoly

12. Explain the conditions of consumer's equilibrium using Indifference

Curve Analysis. Can you suggest a condition of Consumer equilibrium when he is buying more than 2 commodities?

SECTION B

13. Why does consumption curve not start from the origin?

14. The central bank can increase availability of credit by: (Choose the correct alternative)

- (a) Raising repo rate
- (b) Raising reverse repo rate
- (c) Buying government securities
- (d) Selling government securities

15. Define money supply.

16. Which of the following affects national income? (Choose the correct alternative)

- (a) Goods and Services tax
- (b) Corporation tax
- (c) Subsidies
- (d) None of the above

17. Why should we have 3 methods for Collecting National Income data?

18. Which among the following are final goods and which are intermediate goods? Give reasons.

- (a) Milk purchased by a tea stall
- (b) Bus purchased by a school
- (c) Juice purchased by a student from the school canteen.

19. The Economy is going through an inflationary period. Under Five year Plan the Government is planning to invest in Developmental projects and wants Private Sector also to come forward and do the same. Suggest a suitable mix of Monetary and Fiscal Policy measures (at least six) to achieve stability as well as growth.



20. Explain the role of the Reserve Bank of India as the ‘‘lender of last resort’’. Should RBI help Banks in redress due to scams?

21. How will the working of the Investment Multiplier be affected by the introduction of ‘Government Sector’ and ‘Open Economy’ in the Keynesian two sector Model. Calculate the marginal propensity to consume if the value of multiplier is 4.

22. Calculate (a) Net National Product at market price, and (b) Gross Domestic Product at factor cost: (in Rs. Crores)

(i)	Rent and interest	6,000
(ii)	Wages and salaries	1,800
(iii)	Undistributed profit	400
(iv)	Net indirect taxes	100
(v)	Subsidies	20
(vi)	Corporation tax	120
(vii)	Net factor income to abroad	70
(viii)	Dividends	80
(ix)	Consumption of fixed capital	50
(x)	Social security contribution by employers	200
(xi)	Mixed income	1,000

23. Explain the meaning of the following:

- (a) Revenue deficit
- (b) Fiscal deficit
- (c) Primary deficit

Which of these is more important in a country like India and why?

24. (a) Explain the impact of rise in exchange rate on national income.

(b) Explain the concept of ‘deficit’ in balance of payments.

Appendix 1(G) - CBSE Question Paper analysis of History and Model Paper

Question Paper Analysis					
Subject: <u>Economics, Class XII</u>			SET 2		
Year:- <u>2018</u>			Code No. :- <u>58/2</u>		
S. No.	Unit	Blooms Taxonomy Level	LA/SA/VSA	Marks	
1		Apply	VSA	1	
2		Remember	VSA	1	
3		Remember	VSA	1	
4		Understand	VSA	1	
5		Understand	SA	3	
6		Understand	SA	3	
7		Remember + Analyse	SA	1 + 3	
8		Apply	SA	4	
9		Remember	SA	4	
10		Apply + Analyse	SA	3 + 1	
11		Understand	LA	6	
12		Remember + Understand	LA	3 + 3	
13		Understand	LA	4	
14		Remember	VSA	1	
15		Remember	VSA	1	
16		Remember	VSA	1	
17		Understand	VSA	1	
18		Remember + Understand + Apply	SA	1 + 1 + 1	
19		Understand	SA	3	
20		Apply	SA	4	
21		Understand	SA	4	
22		Remember + Understand	SA	1 + 3	
23		Apply	LA	6	
24		Understand	LA	6	
25		Understand	LA	6	
		TOTAL			
Remember	Understand	Apply	Analyse	Evaluate	Create
15	46	19	4	0	0

Total is > 80 as 8th question has an optional question with different BT Level of 4 marks

Summary for Model Paper for History Paper (027) as per Bloom's Taxonomy

1. Students will have a broader analytical view of the subject rather than the conventional method of learning.
2. Application of mind as per bloom's taxonomy is very high than any other method of learning.
3. It discourages students from rote learning.
4. Students will have a comprehensive understanding of the subject..
5. There is participative learning where students and teachers interact more with each other for the subject they have to study.
6. This method will nurture the ability to think, articulate the subject students have learnt.
7. Few direct question are assessed from the text.
8. Nurtures the hidden potential of the child to pursue the career of their choice.

Series _____

Set - 1

Code No. _____

Candidate Name													
Center Number						Candidate Roll Number							

HISTORY 027[Model Paper]

Time duration: 3 Hours

Maximum Marks: 80

READ THESE INSTRUCTIONS FIRST

Please check that this question paper contains _____ printed pages.
Code Number given on the right hand side of the question paper should be written on the title page of the answer-booklet by the candidate. Write the details on the question paper too.
If you have been given an answer booklet, follow the instructions on the front cover of the booklet.
Write your Centre number, candidate number and name in all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions. The question number(s) must be **clearly** shown. Write the Serial Number of the question **before** attempting it.

You are reminded of the need for clear presentation in your answers.
At the end of the examination, fasten all your work securely together.
The total number of marks for this paper is 80.

15 minutes has been allotted to read this question paper. The question paper will be distributed at 10:15 a.m. from 10:15 a.m. to 10:30 a.m, the students will read the question paper only and **will not write** any answer on the answer booklet during this period.

All questions are compulsory. Some questions have internal choice.



Answers to Q.no. 1 to 3 are very short answer questions and carry 2 mark each.

Answers to Q.no. 4 to 9 (Section I) are short answer questions carrying 4 marks. Attempt any five questions in this section.

Q. no 10 (for 4 marks) is a value based question and compulsory.

Answers to Q.no. 11 to 13 are also long answer questions and carry 8 marks each.

Q.no. 14 to 16 are source based questions and carry 7 marks each.

Q. no.17 is a map based question and carry 5 marks. Attach the map with the Answer booklet.

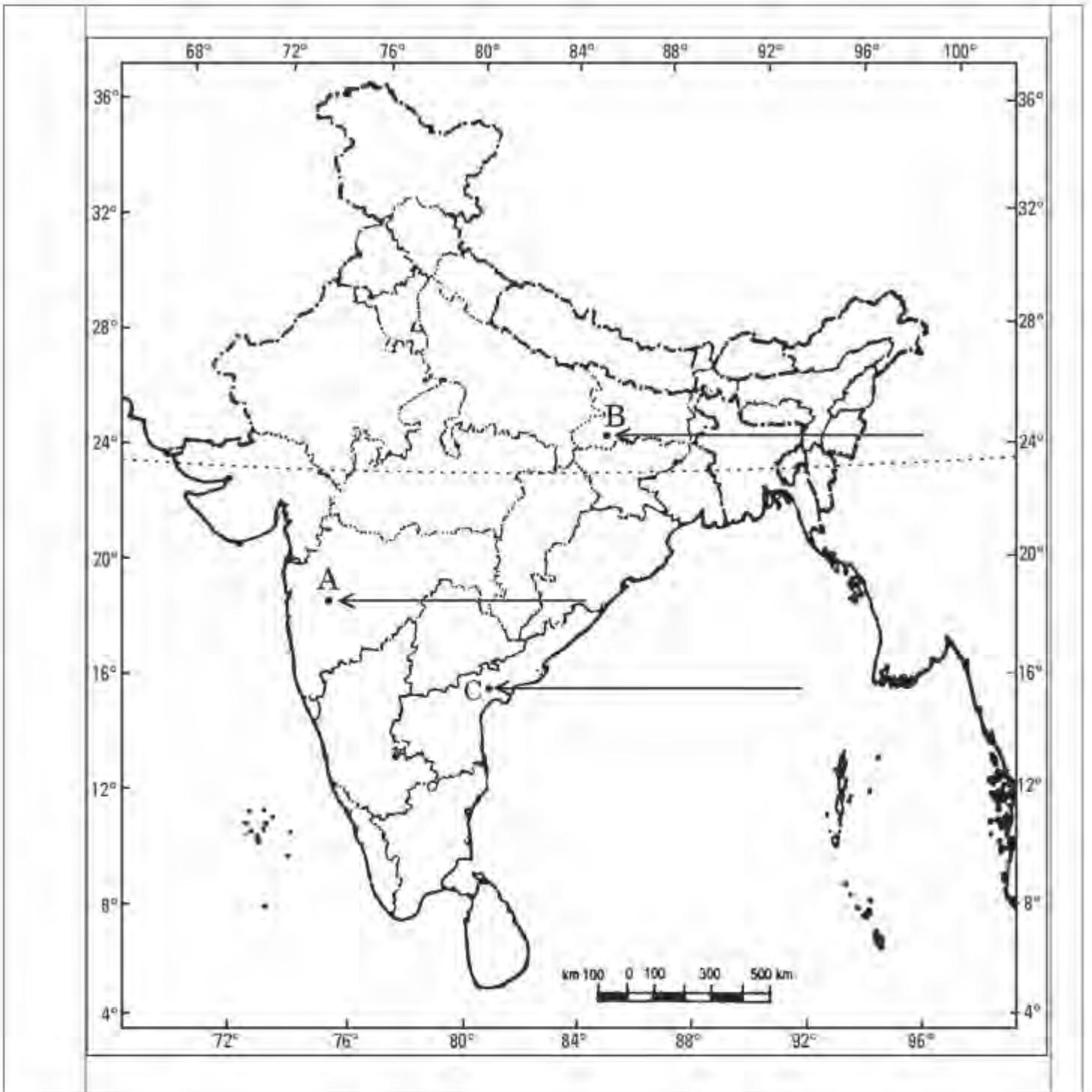
PART A		
1.	Is there any findings of centres of craft productions in Harappan culture.? Support your answer with appropriate points.	2
2.	To what extent did the revenue of Village Panchayat contribute to the Mughal Empire?	2
3.	The Britishers enacted the Limitation Laws in 1859. Do you think this law succeeded in achieving its objective?	2
PART B SECTION I (Any 5)		
4.	“There are indications of complex decisions being taken and implemented in the Harappan society.” In the light of this statement, explain whether there may have been rulers to rule over the Harappan society.	4
5.	The economic and social conditions of the people living in rural areas from c. 600 BCE to 600 CE underwent changes. Analyse the statement..	4
6.	“Ibn Battuta found cities in the Indian subcontinent full of exciting opportunities.” How far it is justified with reference to Delhi	4
7.	How did Sufism evolve as a reaction to the growing materialism of the Caliphate as a religious and political institution? Elucidate.	

8	“The dispossession of Nawab was responsible for the taluqdars to participate in the revolt of 1857”. Do you agree?	4
9	How were the hill stations beneficial to the Britishers?	4
SECTION II		
10	<p>“By 1922 Gandhiji had transformed Indian nationalism, thereby redeeming the promise he made in his BHU speech of February 1916. It was no longer a movement of professionals and intellectuals; now, hundreds of thousands of peasants, workers and artisans also participated in it. Many of them venerated Gandhiji, referring to him as their ‘Mahatma’. They appreciated the fact that he dressed like them, lived like them and spoke their language, unlike other leaders he did not stand apart from the common folk, but empathised and even identified with them.”</p> <p>In light of the above passage, highlight any four values upheld by Mahatma Gandhi</p>	4
PART - C		
11	<p>CULTURAL DEVELOPMENTS (600 BCE-600 CE)</p> <p>1. To what extent the teachings of Buddha helped in the growth of Buddhism?</p> <p style="text-align: center;">OR</p> <p>2. The stupa at Sanchi survived while Amravati did not. What factors were responsible for it? How were the stupas constructed?</p>	8
12	<p>THE MUGHALS (16-17 centuries)</p> <p>1. The recruitment of the nobility from different races and religious groups was critical for the Mughal rulers in India. How far do you agree with this statement.</p> <p style="text-align: center;">OR</p> <p>2. The role played by women of the imperial household was crucial in the Mughal Empire”. How far do you agree with this statement</p>	8
13	<p>PARTITION (1947-1948)</p> <p>1. “The communal politics that started during the early decades of the 20th century was largely responsible for the partition of the country.” Examine the statement.</p> <p style="text-align: center;">OR</p> <p>2. “Partition of India had made nationalists fervently opposed to the idea of separate electorates.” Examine the statement.</p>	8
PART - D		



14	<p>Read the following extract carefully and answer the questions that follow :</p> <p style="text-align: center;">“Proper” Social Roles</p> <p>Here is a story from the <i>Adi Parvan</i> of the <i>Mahabharata</i> :</p> <p>Once Drona, a Brahmana who taught archery to the Kuru princes, was approached by Ekalavya, a forest-dwelling <i>nishada</i> (a hunting community). When Drona, who knew the <i>dharma</i>, refused to have him as his pupil, Ekalavya returned to the forest, prepared an image of Drona out of clay, and treating it as his teacher, began to practise on his own. In due course, he acquired great skill in archery. One day, the Kuru princes went hunting and their dog, wandering in the woods, came upon Ekalavya. When the dog smelt the dark <i>nishada</i> wrapped in black deer skin, his body caked with dirt, it began to bark. Annoyed, Ekalavya shot seven arrows into its mouth. When the dog returned to the Pandavas, they were amazed at this superb display of archery. They tracked down Ekalavya, who introduced himself as a pupil of Drona. Drona had once told his favourite student Arjuna, that he would be unrivalled amongst his pupils. Arjuna now reminded Drona about this. Drona approached Ekalavya, who immediately acknowledged and honoured him as his teacher. When Drona demanded his right thumb as his fee, Ekalavya unhesitatingly cut it off and offered it. But thereafter, when he shot with his remaining fingers, he was no longer as fast as he had been before. Thus, Drona kept his word : no one was better than Arjuna.</p> <p>What can you learn from this extract about the interpretation and approach of the historian who wrote it? Use the extract and the knowledge of Mahabharata to explain your answer.</p>	7
15	<p>Read the following extract carefully and answer the questions that follow :</p> <p style="text-align: center;">Colin Mackenzie</p> <p>Born in 1754, Colin Mackenzie became famous as an engineer, surveyor and cartographer. In 1815 he was appointed the first Surveyor General of India, a post he held till his death in 1821. He embarked on collecting local histories and surveying historic sites in order to better understand India’s past and make governance of the colony easier. He says that “it struggled long under the miseries of bad management ... before the South came under the benign influence of the British government.” By studying Vijayanagara, Mackenzie believed that the East India Company could gain “much useful information on many of these institutions, laws and customs whose influence still prevails among the various Tribes of Natives forming the general mass of the population to this day.”</p> <ol style="list-style-type: none"> 1. Who was Colin Mackenzie ? (2) 2. How did Mackenzie try to rediscover the Vijayanagara Empire ? (2) 3. How was the study of the Vijayanagara Empire useful to the East India Company ? (3) 	7
16	<p>Read the following extract carefully and answer the questions that follow :</p> <p style="text-align: center;">“Tomorrow we shall break the salt tax law”</p> <p>On 5 April, 1930, Mahatma Gandhi spoke at Dandi :</p> <p>When I left Sabarmati with my companions for this seaside hamlet of Dandi, I was not certain in my mind that we would be allowed to reach this place. Even while I was at Sabarmati there was a rumour that I might be arrested. I had thought that the Government might perhaps let my party come as far as Dandi, but not me certainly. If someone says that this betrays imperfect faith on my part, I shall not deny the charge. That I have reached here is in no small measure due to the power of peace and non-</p>	7

	<p>violence : that power is universally felt. The Government may, if it wishes, congratulate itself on acting as it has done, for it could have arrested every one of us. In saying that it did not have the courage to arrest this army of peace, we praise it. It felt ashamed to arrest such an army. He is a civilised man who feels ashamed to do anything which his neighbours would disapprove. The Government deserves to be congratulated on not arresting us, even if it desisted only from fear of world opinion.</p> <p>Tomorrow we shall break the salt tax law. Whether the Government will tolerate that is a different question. It may not tolerate it, but it deserves congratulations on the patience and forbearance it has displayed in regard to this party. ...</p> <p>What if I and all the eminent leaders in Gujarat and in the rest of the country are arrested ? This movement is based on the faith that when a whole nation is roused and on the march no leader is necessary.</p> <p>1. What were the apprehensions of Mahatma Gandhi when he started his Dandi March ? (2)</p> <p>2. Why did Gandhiji say that the Government deserved to be congratulated ? (2)</p> <p>3. Why was the 'Salt March' very significant ? (3)</p>	
	PART-E	
17	<p>17.1 On the given political outline map of India locate and label the following appropriately : (2)</p> <p>(a) Amritsar □ an important centre of National Movement. (b) Agra □ a territory under Babur.</p> <p>17.2 On the same political map On the same political outline map of India, three places which are major Buddhist sites have been marked as A, B and C. Identify them and write their correct names on the lines drawn (3)</p>	5



Appendix 1(H) - CBSE Question Paper analysis of Geography and Model Paper

Question Paper Analysis			
Subject: Geography, Class XII		SET-3	
Year:- 2018		Code No. :-64/3	
Question No.	Blooms Taxonomy Level	LA/SA/VSA	Marks
1	5	SA	1
2	1	SA	1
3	1	SA	1
4	1	VSA	1
5	4	SA	1
6	4	SA	1
7	1	VSA	1
8	1 + 2	SA	3 (1+2)
9	5	SA	3
10	4	SA	3
11	5	SA	3
12	5	SA	3
13	2	SA	3
14	2	LA	5
15	4	LA	5
16	2	VSA	5
17	4	LA	5
18	1 + 2	LA	5 (1+4)
19	2	LA	5
20	5	LA	5
21	2	VSA	5
22	2	VSA	5

TOTAL

Remember	Understand	Apply	Analyse	Evaluate	Create
6	34	0	15	15	0



Model Question Paper

Class XII

Geography

1. What is the average sex ratio in the world? 1
2. Why the age structure is considered an important indicator of population composition? Give one reason. 1
3. Name the state of India with the highest literacy rate as per 2011 Census. 1
4. State one importance of irrigation for agriculture in India. 1
5. What is the significance of Bio-energy to humankind in India? 1
6. Describe how barter system is practiced in any tribal community of the world. 1
7. Differentiate between Co-operative farming and Collective Farming stating any 1 point of difference. 1
8. Examine the functioning of WTO. 1
9. Leading a long and healthy life is an important aspect of human development. Give an argument to support the statement. 1
10. The nature and Human beings are so intricately intertwined that they can't be separated. Substantiate the statement. 1
11. State the three stages of Demographic Transition Theory. 3
12. Discuss the environmental consequences of migration. 3
13. Explain why the causes of male and female migration are different in India. 3
14. Study the table given below and answer the questions that follow:

Continent	Early 1950	Mid 1970	Mid 2000
Europe	23	30	58
Asia	32	69	206
North & Central America	16	36	69
South America	8	17	46
Australia	3	8	43
Africa	2	2	6
World total	84	162	438

- a) Give the meaning of Mega City.
- b) Name the two continents which have shown lowest growth rate of Million Cities.

- c) What reasons will you assign for this growth rate? 1+1+1
15. Demonstrate how 'Erratic Monsoons' & 'Indebtedness' are the major problems of Indian Agriculture. 3
16. Differentiate between 'Hamletted' & 'Dispersed' rural settlements of India. 3
17. "The knowledge and Understanding of the laws of Nature are extremely valuable to mankind. Explain the values that can help to use the gifts of nature in a sustainable manner. 3
18. "Many of the modern towns in India were developed during the period of British domination." Support your answer with evidence. 3
19. Why is the distribution of roads not uniform in India? 5
20. Explain the importance of 'communication services' in the world. 5
21. Describe any five characteristics of 'plantation agriculture' in the world. 5
22. Trans- Canadian Railway line is considered as the Economic Artery of Canada. Support the statement with suitable examples. 5
23. Fragmentation of land holding and degradation of cultivable land are some serious problems of Indian agriculture. Suggest measures to overcome these problems. 5
24. What is tourism? Analyse any four tourist attractions in the world. 5
25. Examine the success of watershed management programme implemented in Jhabua District of M.P. 5
26. Locate and label the following on the given political map of India with appropriate symbols: 6
- State having the highest density of population
 - State with smallest rural population.
 - Mayurbhanj an iron ore mining area
 - An oil refinery in Karnataka
 - The Head Quarter of South Central Railway Zone.
 - The integrated Iron and Steel plant located in Chattisgarh.



Appendix 1(I) - CBSE Question Paper analysis of Political Science and Model Paper

CBSE AISCE Syllabus & Question Paper Analysis as per Bloom's Taxonomy

Syllabus 2018		Question Paper 2018; Set 1; Code- 59/1		Model Question Paper	
Typology (Cognitive Skill)	Percentage of Syllabus (%)	Typology (Cognitive Skill)	Percentage of Paper (%) TOTAL MARKS 100	Typology (Cognitive Skill)	Percentage of Paper (%)
Remembering		Q2,5,8,9,16,18,21,23	1+1+2+2+4+5+5+6= 26MARKS (26%)	Q1,5,18,21,23	1+1+5+5+6= 18MARKS
Understanding		Q1,4,15,17,19,20,22,25	1+1+4+5+5+5+6+6= 33MARKS(33%)	Q2,4,15,17,19,20,22,25	1+1+4+5+5+5+6+6= 33 MARKS
Application		Q7	2MARKS (2%)	Q26	6 MARKS
High Order Thinking Skills(Synthesis & Analysis		Q3,10,11,14,24,26	1+2+4+4+6+6=23MARKS(23%)	Q10,11,12,14,16,24	2+4+4+4+4+6= 24MARKS
Evaluation		Q6,12,13,27	2+4+4+6=16MARKS(16%)	Q3,6,7,8,9,13,27	1+2+2+2+2+4+6= 19MARKS

Maximum Marks : 100

SET-1

POLITICAL SCIENCE

1. What is the Political Ideology behind 'Western Alliance' ?
2. Majoritarianism leads to political instability and violence. Support the statement by citing an example of the same from the Indian Subcontinent.
3. Out of the various reasons identified by political analysts, which according to you was the biggest reason for the defeat of the Congress Party in 1977.
4. Is the present NDA government in India a Coalition Government. If yes, why?
5. Which popular movement led to the empowerment of women ?
6. Assess the main contribution of the Non-Aligned Movement to the newly independent countries.
7. Cultural homogenisation is good and bad for citizens of the modern states. Substantiate the statement by citing relevant examples.
8. What do you understand by common but differentiated responsibilities? How will this phenomena work in dealing with the cause of sustainable development?
9. The SRC recommendations and the decision to have linguistic states was a necessary evil. Is the statement true or false? Give one reason to support your standpoint.
10. Highlight any two aspects of the Indian Foreign Policy which makes it a great example for preserving sovereignty and enhancing cooperation.
11. Explain and analyse some of the major differences between USSR's Shock therapy and China's 4 modernisation model? Which according to you was a better model for economic adjustment. Give reasons.
12. "India is not going to become a permanent member of the UNSC" Do you agree with the statement? Give any 4 arguments for or against the statement.
13. Evaluate any two benefits and negative impact of the 'Green Revolution' on Indian state and society.
14. Why and how did India distance herself from the two superpower camps? Explain two major critiques targeted against India for this decision.
15. Describe the reason and objective of the Dalit Panthers. What according to you was the reason behind their downfall?
16. "Tolerance of factions and Ideological coalitions are a thing of the past". Analyse the statement by highlighting some characteristics of the governments in India post 1990.



17. Read the passage given below carefully and answer the following questions :

The 'Cuban Missile Crisis' was a high point of what came to be known as the Cold War. The Cold War referred to the competitions, the tensions and a series of confrontations between the United States of America and the Soviet Union, backed by their respective allies. Fortunately, however, it never escalated into a 'hot war'.

- (a) Explain the meaning of 'hot war'.
- (b) Why was the 'Cuban Missile Crisis' considered as the high point of the Cold War ?
- (c) "Ideological conflict was also a cause of the Cold War." How far do you agree with the statement ?

18. Read the passage given below carefully and answer the following questions :

The Congress evolved from its origins in 1885 as a pressure group for the newly educated, professionals and commercial classes to a mass movement in the twentieth century. This laid the basis for its eventual transformation into a mass political party and its subsequent domination of the political system. Thus the Congress began as a party dominated by the English speaking, upper caste, upper middle class and urban elite. But with every Civil Disobedience Movement it launched, its social base widened.

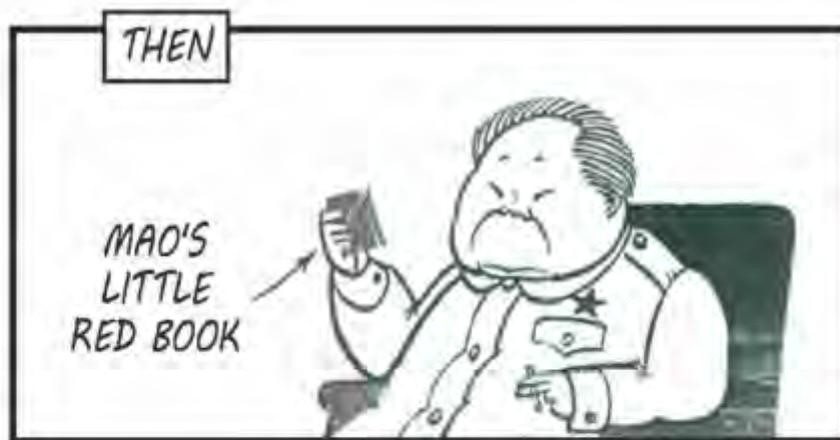
- (a) What is meant by a pressure group ?
- (b) Explain the reason for the Congress to be transformed into a rainbow-like social coalition by the time of Independence.
- (c) What made the Congress into a mass political party in the twentieth century ?

19. Read the passage given below carefully and answer the following questions :

The Janata Party made the 1977 elections into a referendum on the Emergency. Its election campaign was focused on the non-democratic character of the Congress rule and on the various excesses that took place during this period. In the backdrop of arrests of thousands of persons and the censorship of the Press, the public opinion was against the Congress.

- (a) What is meant by 'referendum' ?
- (b) "Acts like arrests of thousands of persons and the censorship of the Press during the Emergency period were non-democratic." Do you agree with the statement ? Justify your answer with one suitable argument for/against each act.
- (c) In spite of winning the 1977 elections with a thumping majority, why could the Janata Party remain in power only for a short period ? Explain.

20. Study the cartoon given below carefully and answer the following questions :



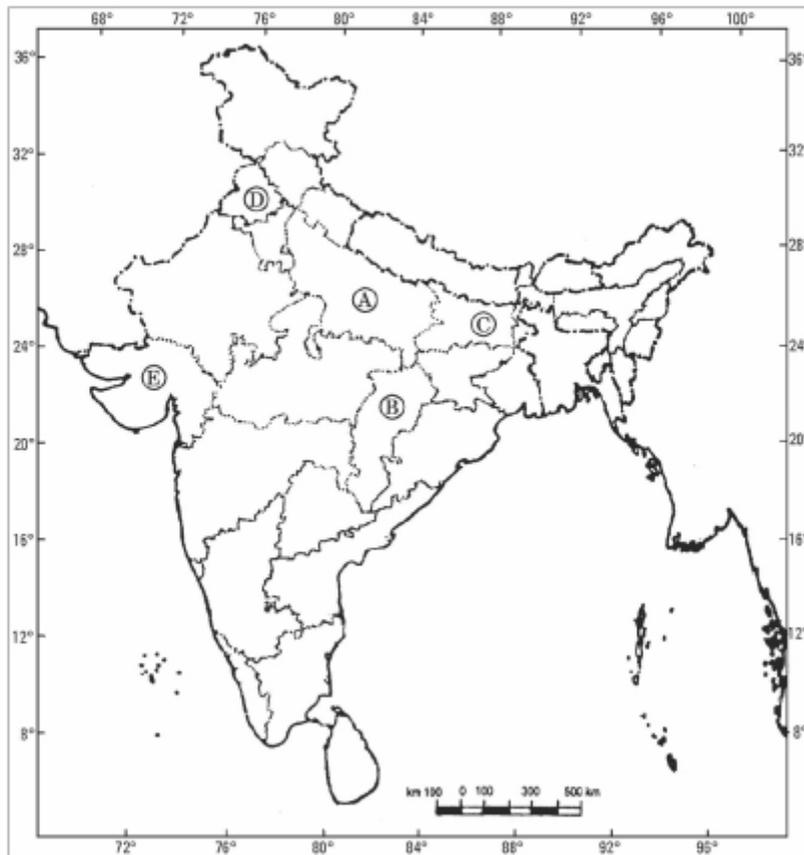
- (a) Which country does this cartoon refer to ?
- (b) Evaluate any two changes in the economic policies of this country from 'then' to 'now'.
- (c) Assess any two outcomes of the latest changes that took place in this country.

21. In the given political outline map of India (on page 12), five States have been marked as and . Identify these States on the basis of the information given below and write their correct names in your answer-book along with the respective serial number of the information used and the concerned alphabet as per the following format :

1. The State where the Jallianwalla Bagh massacre took place.
2. The State where a Dairy Cooperative Movement under the name 'Amul' was launched.
3. The State which was benefitted by the 'Green Revolution'.
4. The State which was created in 2000.
5. The State which faced a near-famine situation during the 1960s.

Outline Map of India (Political)





22. Explain the idea of New International Economic Order (NIEO) for the development of Least Developed Countries (LDCs). Highlight any three reforms proposed by the United Nations Conference on Trade and Development in 1972 to improve the global trading system.

23. Describe what according to you are the three most important reasons of conflict between India and Pakistan. Also suggest any two immediate reforms or changes that the Indian Government should take to mend this relationship.

24. Cooperation and coordination between states is a prerequisite to ensure Peace and security. Analyse the statement by highlighting any three new sources of threats and their possible solutions.

25. Unstable and undemocratic governments are severely punished by citizens. Analyse and evaluate the statement by decoding the 1977 general elections.

26. If you were the environment minister and have a chance of making any three reforms in India's Environment Policy, What policy changes will you bring about and why?

27. "Jammu and Kashmir is one of the living examples of plural society and politics." Justify the statement with any three suitable arguments.

Comparative Analysis of CBSE Political Science Paper and Proposed Model Paper

CBSE Paper	Model Paper
Factual Question, Knowledge	Factual understanding question but the student will have to mention the key words i.e. Liberalism and Capitalism
Factual Question with a singular response, Knowledge.	Question is based on background knowledge around the concept of majoritarianism and post that the students need to identify the polity referred in the question i.e. Sri Lanka.
The questions has analysis as the verb but specific facts are given in the textbook.	The students will have to evaluate the various reasons of the defeat and choose the biggest or the most important reason which led to the downfall.
Understanding questions but the students just need to remember and write the definition.	The students can only answer this question if they have understood the basics well as they have to identify the key characteristics and identify if the present day qualifies or not.
One word, knowledge based factual question	Knowledge based but the students will have to apply what they remember to guess the right movement.
Evaluation Question, No change.	Evaluation Question, No change.
Application, but the question has a negative tone	Application as the students need to explain the concept and substantiate with valid standpoints.
Knowledge based factual questions.	Application as the students need to explain the concept and substantiate with valid standpoints.
Knowledge based factual questions.	Application as the students need to explain the concept and substantiate with valid standpoints.
Analysis question but fixed points given in the text which the students will write without explaining the rationale.	Analysis question but the students will have synthesise and make connection between India's foreign policy and ideas preserved by the Indian preamble.
Synthesis question but facts given in the text has to be produced in the answer.	Analysis question but the students will have synthesise and make connection between USSR's and China's methodology of opening their economy and also pick a more favourable option by giving reasons.
Synthesis question but facts given in the text has to be produced in the answer.	Synthesis question however the students are expected to either go with or against the statement keeping in mind the suggestions of the UNGA. No right or wrong answers. Marks allocated on the basis of defence presented by students.
Evaluation but facts and points mentioned in the textbook.	Evaluation but facts and points have to be presented both for and against the statement so that the students learn the right way or critiquing.
Synthesis question but facts given in the text has to be produced in the answer.	Synthesis but facts and points have to be presented both for and against the notion so that the students learn the right way or critiquing and defending an argument.
Understanding question which only explores one part of the concept that to a generic concept.	Understanding question but more holistic as this explores methods, objectives and downfall.



Knowledge based factual question.	Analysis question but the students will have synthesise and make connection between the present day governments and the old congress system.
Understanding based passage question. No change.	Understanding based passage question. No change.
Knowledge based passage question, no change.	Knowledge based passage question, no change.
Understanding and Knowledge based passage question, no change.	Understanding and Knowledge based passage question, no change.
Understanding based cartoon question, No change	Understanding question based on cartoons, No change
Knowledge based Map Question, No change	Knowledge based Map Question, No change
Understanding based question, No change	Understanding based question, No change
Knowledge based factual question.	Knowledge based application question as the students will have to use their knowledge to resolve the issue mentioned.
Synthesis question but facts given in the text has to be produced in the answer.	Synthesis and open ended question, Explores two concepts and also demands problem resolution.
Understanding question which only explores one part of the concept.	Understanding question but more holistic as this explores the reasons of downfall.
Analysis and evaluation question but fixed points given in the text.	Application question, targets problem resolution.
Evaluation Question, No change.	Evaluation Question, No change.

Appendix 2: Internal Assessments

GRADE 9-10

Existing CBSE				CBSE Proposed on 6.3.19			FICCI Proposal			Remarks
	Subjective	Objective	Internal Assessment	Subjective	Objective	Internal Assessment	Subjective	Objective	Internal Assessment	
Math & All Subjects	80	0	20 (10+5+5)	60	20	20 (5+5+5+5)	50	30 (OMR, MCQ)	20 (5+5+5+5)	OMR will help improve the Evaluation process and reduce the burden from child of Single Exam, and reduce the work of Evaluators. Both can be analysed to validate result too.

GRADE 11-12

Existing CBSE				CBSE Proposed on 6.3.19			FICCI Proposal			Remarks
	Subjective	Objective	Internal Assessment	Subjective	Objective	Internal Assessment	Subjective	Objective	Internal Assessment	
Math + Lang + Pol.Sc + Legal Studies	100	0		60	20	30	50	30 (OMR, MCQ)	(5+5+5+5)	Same as above. OMR based Objective Questions conducted as Paper II
								30 (OMR, MCQ)		
Sciences	70		30	53	17 (atleast 25%)	30	50	30 (OMR, MCQ)	(5+5+5+5)	Same
								30 (OMR, MCQ)		
Commerce	80		20	60	20	20	50	30 (OMR, MCQ)	(5+5+5+5)	Same



Appendix 3:

Specific tabulated recommendations on reforms by CBSE in pipeline

Topic	Recommendations	Challenges to meet recommendations	Solutions to meet challenges
Making learning outcomes compulsory	<p>Assessments can be made accurate by ensuring that evaluations are not seen as an isolated event, the same can be achieved through a well-defined 'rubric' as an evaluation tool</p> <p>There are three components within rubrics namely (i) criteria / performance Indicator: the aspects of performance that will be assessed, (ii) descriptors: characteristics that are associated with each dimension, and (iii) scale/level of performance: a rating scale that defines students' level of mastery within each criterion</p> <p>Proposed Marks distribution of Internal Assessments is shared in Annexure 2</p>	<p>Absence of an updated common guideline for administering assessments and examinations</p> <p>Lack of appropriate orientation of all stakeholders to the new evaluation framework</p>	<p>A comprehensive handbook to be developed for administering CBSE assessments and examinations</p> <p>The guideline to also include training modules, ethical practices and well defined penalties for all relevant stakeholders- Teachers, Examiners, Paper setters and Assessors</p> <p>There must be a series of exhaustive training sessions to provide orientation for the new evaluation framework and introduce educators and learners to the key components and help them develop a common understanding</p> <p>Leverage technology for maximizing outreach for trainings</p> <p>A common code of ethics to be put in place for all relevant stakeholders- Teachers, Examiners, Paper setters and Assessors</p>
Combining internal assessment marks with theory marks	<p>Internal Assessment evidences for 9th and 10th to be uploaded by 15th October of the academic year of 10th class in specified size of files for student, providing sufficient time for review and suggest moderations, if needed</p> <p>Process of practical examination to change, to be exploratory and research based experimental lab work. Likewise, for the non-Science subjects the Internal Assessments must be research based original work.</p> <p>Leverage artificial intelligence for accurate and diagnostic assessments</p> <p>Marking scheme has to be in sync with the design of the question paper</p> <p>Marking scheme to be developed for each criterion with a level descriptor and shared with all stakeholders including students</p>	<p>Existence of biases/malpractice of inflation of marks in Internal Assessments</p>	<p>Engage relevant stakeholders in developing rubrics for evaluations</p>
Change in marking scheme	<p>The rubrics for evaluations need to be clearly defined with focus on knowledge and skills to be assessed. This will improve reliability and enhance credibility of CBSE</p>		<p>Conduct a series of exhaustive training sessions to provide orientation for the new evaluation framework and introduce educators and learners to the key components and help them develop a common understanding</p> <p>Leverage technology for maximizing outreach</p>

Appendix 4:

Brief Overview on Experiential Learning

Learning means “mastery of the way of self-improvement”. The word learning originated with the Indo- European noun meaning “track” or “furrow.” To “learn” came to mean gaining experience and creating experience by following a track - presumably for a lifetime. [Fifth Discipline Fieldbook by Peter Senge et. al.]

Experiential learning is a method of educating through first-hand experience. Skills, knowledge, and experience are acquired outside of the traditional academic classroom setting, and may include internships, field visits, field research, and service-learning projects.

The concept of experiential learning was first explored by John Dewey and Jean Piaget, among others. It was made popular by education theorist David A. Kolb, who, along with Ron Fry, developed the experiential learning theory – ‘learning is a process whereby knowledge is created through transformation of experience’. It is based on four main elements which operate in a continuous cycle during the learning experience:

- Concrete experience
- Reflective Observation
- Abstract Conceptualisation
- Active Experimentation

Experiential learning leverages the local context and the prior knowledge of the child to construct new understanding. It involves the integrated functioning of the whole being - thinking, feeling, perceiving, connecting and acting.

Principles of Experiential Learning

1. Learning is a continuous process grounded in the personal experiences of the learner.
2. Learning requires abilities that are polar opposites. When we use both the concrete and abstract modes to take in our experiences and when we both reflect and act on that experience, we expand our potential to learn.
3. Learning involves transaction/interaction/flow between the person and the environment/experiences and both get essentially changed during the process of learning.
4. Knowledge is a transformative process, being continuously created and recreated, not an independent entity to be acquired or transmitted. The learners develop an understanding of how knowledge creation happens and in the process become empowered to take responsibility for their learning and growth. The skill learnt is used to decode, analyze and understand the world around.

Designing Multidisciplinary Learning Expeditions is an effective way of implementing Experiential Learning pedagogy. The structure of the expeditions provide concrete real life experiences for the child to observe and reflect and then begin to construct, assimilate and conceptualize her understanding of concepts. This self-construction is constantly scaffolded through teacher led mini-lessons and supporting material for the child to deepen her understanding. The expeditions provide real-time opportunities for the child to test and apply her newly-found knowledge and understanding to real-life issues and problems.

Experiential learning helps establish lasting behaviour change. Rather than simply understanding a new subject or gaining a skill, the learner develops new habits and behaviours.



Appendix 5:

Sample Curriculum for Sports Sciences being offered in Australian Schools



PDF generated on: 2018-03-03 17:45:58 AEST

Sport Science

LEVEL 3	15 TCE CREDIT POINTS
COURSE CODE	SPT315118
COURSE SPAN	2018 – 2021
COURSE STATUS	LIVE
READING AND WRITING STANDARD	NO
MATHEMATICS STANDARD	NO
COMPUTERS AND INTERNET STANDARD	NO

The course is intended to provide learners with broad experience and awareness of contemporary practice across the Sport Science fields

In preparation for further study and/or vocational pathways the course also aims to develop understandings around how Sport Science practices are applied in various amateur, semi-professional and high performance sport settings and a wide range of sports, industry and related roles. Learners are encouraged to undertake high-order thinking and are challenged to consider the complex cross-discipline links between core areas of study in addition to completing scientific investigative studies.

Rationale

Sport Science is a Level 3 course in the Sport group of the Health and Physical Education (HPE) suite of courses. *Sport Science* is a rapidly expanding field* which encompasses the physiological, psychological and skill acquisition components involved with planning and analysing human performance.

This course balances a theoretical focus with a range of applied experiences designed to allow learners to develop their skills, knowledge and understanding of issues related to the training and performance of athletes of all ages and levels.

The course integrates science, literacy and numeracy concepts developed in the Australian Curriculum F–10 and helps connect to future learning in a range of: allied health; exercise science; human movement; and performance sport related areas.

The course is intended to provide learners with broad experience and awareness of contemporary practice across the *Sport Science* fields. In preparation for further study and/or vocational pathways the course also aims to develop understandings around how *Sport Science* practices are applied in various amateur, semi-professional and high performance sport settings and a wide range of sports, industry and related roles.

Learners are encouraged to undertake high-order thinking and are challenged to consider the complex cross-discipline links between core areas of study in addition to completing scientific investigative studies.

* <http://www.deakin.edu.au/students/faculties/faculty-of-health/school-of-exercise-and-nutrition-sciences/careers/exercise-and-sport-science/sport>

Aims

Sport Science aims to provide learners with opportunities to:

- Examine human systems and function during exercise, and how physical activity impacts health from cellular to the broader holistic level
- Explore a variety of specialized fields and discipline areas related to HPE and how, individually and in combination, they can contribute to developing and improving performance
- Organize and reflect on relevant content and through analysis and discussion, connect key concepts in relation to contemporary practice and the broader HPE learning area context
- Build a range of academic and lifelong learning skills in preparation for tertiary study or employment
- demonstrate specific knowledge of key concepts, language, conventions, ethos, and areas of study specific to this field experience the specialized skills, standards, practices, expectations needed to pursue pathways of future work or study related to the sport sciences.

Learning Outcomes

On successful completion of this course, learners will be able to:

- Analyze and interpret theory supporting current practices in exercise physiology, skill acquisition, and sport psychology differentiate and explain how exercise physiology, skill acquisition, and sport psychology, contribute in isolation and combination to influence sporting performance
- Utilize analytical and interpretive skills to solve problems and process data
- Undertake scientific research activities and summarize ethical issues related to human research studies
- Identify, describe and recall facts, definitions, terminology and principles as they relate to various contexts through the study, observation of, and engagement in, physical activity
- Integrate and apply understanding across the disciplines of exercise physiology, skill acquisition, and sport psychology to develop appropriate strategies for improving performance in various sporting contexts
- Select, interpret, analyze and manipulate information from a variety of sources
- Identify and communicate solutions to problems or practical situations and scenarios in exercise physiology, skill acquisition, and sport psychology

Access

Learners must have basic knowledge and understanding of the body's respiratory, circulatory and muscular systems:

Pathways

Sport Science Level 3 builds on concepts from the Australian Curriculum 9–10 Health and Physical Education v8.2:

Strand – Personal Social and Community Health

Focus Areas:

- Communicating and interacting for health
- Wellbeing contributing to healthy active communities



Strand – Movement and Physical Activity

Focus Areas:

- Understanding movement

Sport Science – Foundation Level 2, Athlete Development Level 2 or courses in the broader area of human biology provide pathways into this course.

This course provides a strong basis for students going on to further vocational and/or tertiary study including: Health and Allied Health careers; Human Movement; Exercise Science; Education; Health Science; Physiotherapy; Personal Training; coaching and other sport- related careers.

Resource Requirements

Providers of this course must ensure learners have access to video camera(s) and ICT tools for the movement analysis investigative study.

Suitable packages – such as SkillSpector, Kinovea, and Hudl technique – are available without cost.

High-performance sport is an evolving, dynamic and technology-connected area. Sport Science research tasks and laboratory sessions will require students to be able to access a range of suitable performance testing equipment, software and facilities. Movement analysis will also require students to use suitable filming devices, IT software and hardware.

Course Size and Complexity

This course has a complexity level of 3.

At Level 3, the learner is expected to acquire a combination of theoretical and/or technical and factual knowledge and skills and use judgment when varying procedures to deal with unusual or unexpected aspects that may arise. Some skills in organising self and others are expected. Level 3 is a standard suitable to prepare learners for further study at tertiary level. VET competencies at this level are often those characteristic of an AQF Certificate III.

This course has a size value of 15.

Course Description

Sport Science is the practical application of scientific principles and knowledge to exercise and sport.

This course is designed for learners who wish to expand their skills and understanding in Sport Science through a theoretical and applied understanding of the factors which influence sporting performance.

The course is underpinned by a focus on understanding the world of competitive sport, and is delivered in the context of building moral and professional ethics, exploring the balance required for maximising holistic outcomes for athletes and relating theory knowledge and concepts to their application in various performance settings.

Sport Science encompasses the individual and collective significance of physiological, skills acquisition and psychological components in analysing and improving human sports performance.

The course examines three discipline areas:

1. **Exercise Physiology**, including: the study and preparation of athletes; how to improve their performance under stress in both training and competition; how their bodies produce energy for physical activity; understanding how they recover; the theory behind training programs; and what it means physiologically to be fit.
2. **Skill Acquisition**, including motor skills and learning, particularly focussing on: teaching and coaching; the importance of reaction time; and the study of biomechanics, including the use of technology to analyse and improve skill execution.
3. **Sport Psychology** examines the mental aspects required for preparing participants for sporting activities. It also considers the cognitive processes that occur and how they impact on sporting performance.

The field of Sport Science requires an understanding of connections and cross-discipline links between various performance components. This integration across related disciplines working in synergy is what enables high-performance athletes to consistently generate, analyse, develop and replicate or build on their peak performances.

Learners will undertake a range of practical laboratory experiences and applied activities. Learners will also engage in high order thinking as they are challenged to consider complex cross-discipline links between core areas of study as they complete classwork, practical activities and scientific investigative studies

Relationship to Other TASC Accredited and Recognized Senior Secondary Course

Sport Science Level 3 extends on some of the topics and content areas which appear in the Sport Science – Foundation Level 2 and Athlete Development Level 2 courses.

While learners who are studying these courses either sequentially or concurrently may have some advantages in dealing with familiar terms and broad concepts, Sport Science examines those topics with much greater depth and detail and a significantly different perspective.

Course Requirements

There are five (5) Units in this course.

Learners will undertake study of ALL units and ALL topics/subtopics.

In Unit 5, learners will complete one (1) compulsory study, and one (1) selected study.

Course Delivery

The order for delivery and assessment of Units in this course is not prescribed. Within each Unit, it is recommended that the given sequence of topics/sub-topics is retained.

Cross-Discipline Links

Complex cross-discipline links exist between Exercise Physiology (Units 1 and 2), Skill Acquisition (Unit 3) and Sport Psychology (Unit 4), hence the various units and topics they contain may have more limited meaning if they are treated discretely.

Learners are required to identify and explain links between the topics/sub-topics studied across the three discipline areas Units. For example, there are many links between topics covered in Unit 3 (Skill Acquisition) and those studied in Unit 1 and 2 (Exercise Physiology), and Unit 4 (Sport Psychology).



A specific example of this is how an athlete's response time (Skill Acquisition) can be improved through isotonic resistance training (Exercise Physiology).

The study of such cross-discipline links involves applying logical, critical and innovative thinking to a range of problems and ideas, and transferring knowledge and skills, as well as making connections between the three disciplines.

The study of cross-discipline links should be:

1. Integrated during the year, and
2. Reinforced following the delivery of all the Units.

Timing of the study of cross-discipline links will necessarily vary depending on the provider's choices regarding the sequence of delivery of Units and topics/sub-topics.

Course Content

There are five (5) units in this course:

- Unit 1: Exercise Physiology A
- Unit 2: Exercise Physiology B
- Unit 3: Skill Acquisition
- Unit 4: Sport Psychology
- Unit 5: Scientific Investigative Methodologies and Skills

While each of the Units is presented below as a discrete Unit, they are closely interrelated. Providers can be flexible in the way they choose to arrange the delivery of the content at the Unit and topic level. For example, to create an opportunity to highlight a cross-discipline link a provider may choose to deliver a topic from Unit 3 and reinforce or make comparisons with a topic from Unit 1.

Cross-discipline links between Units/topics will be identified and discussed as they occur.

It is recommended that Units 1, 2, 3 and 4 are allocated approximately equal delivery time.

Unit topics/sub-topics may be delivered as purely theoretical studies or as studies contextualized within practical activities.

UNIT 1: EXERCISE PHYSIOLOGY A

Topics

- 1.1 Energy and Energy Systems
- 1.2 Oxygen Delivery
- 1.3 Effects of Training

1.1 Energy and Energy Systems

- Energy
- Role of ATP:
 - Structure
 - High energy bonds
- Energy sources to replenish ATP:
 - Creatine phosphate
 - Carbohydrates (low glycemic index foods and high glycemic foods) fats
 - Protein
 - Concept of "Hitting the Wall"
 - Glycogen sparing

- quantity of ATP production (relative, i.e. not a specific amount) limitations
 - by-products
 - duration (predominant) intensity
 - provide sporting examples
 - muscle fibre type
 - lactic acid removal (fate of lactic acid)
- Aerobic System:
 - basic equations/flow chart, includes basic outline of Krebs Cycle and Electron Transport System (not including enzymes) fate of
 - the by-products (heat, water and carbon dioxide)
 - glycolysis
 - lipolysis
 - characteristics
 - metabolism (method of energy production) fuel
 - sources
 - speed of ATP production
 - quantity of ATP production (relative, i.e. not a specific amount) limitations
 - by-products
 - duration (predominant) intensity
 - provide sporting examples
 - muscle fibre type
- Oxygen Transport in muscles; role of myoglobin
- Energy Continuum: interplay of the different energy systems: contribution
 - of energy systems varies depending on
 - duration
 - intensity aerobic
 - fitness
 - aerobic energy system makes a greater contribution earlier than previously thought
 - discussion: fat adapted vs glycogen adapted metabolism
- Muscle Fibre Types: Slow (Type I) and Fast (Type IIa and Type IIb): profile
 - characteristics of each

1.2 Oxygen Delivery

- Oxygen Deficit Aerobic
- Steady State VO_2 and
- VO_2 Max:
 - absolute and relative VO_2 Max (including making calculations)
 - in relation to athletes in different sports and fitness levels
 - discuss demands of endurance sports, intermittent team sports, player roles, etc... comparison in
 - typical novice, intermediate and high performance athletes
 - factors that affect an individual's VO_2 Max
 - aerobic fitness
 - body size
 - gender
 - heredity
 - age
- Lactate Inflection Point (Onset of Blood Lactate Accumulation):
 - variability of Lactate Inflection Point (LIP) as a percentage of VO_2 maximum and maximum heart rate
 - improving your Lactate Inflection Point (LIP)
 - buffering
 - LIP and VO_2 Max

1.3 Effects of Training

- Acute Responses (immediate effects) of exercise:
 - cardiovascular responses to exercise respiratory
 - responses to exercise



- ATP production:
 - During resting conditions during exercise
 - ATP splitting
 - ATP storage and transportation
- Phosphagen (ATP – CP or Anaerobic Alactic System):
 - Basic equations (not including enzymes) characteristics:
 - Metabolism (method of energy production) fuel sources
 - Speed of ATP production
 - Quantity of ATP production (relative, i.e. not a specific amount) limitations
 - Duration (predominant) intensity
 - Provide sporting examples muscle fibre type
- Lactic acid (Anaerobic Glycolysis) system:
 - Equations of the energy system (not including enzymes)
 - Lactate clearance, lactate accumulation, Hydrogen Ions and Acidosis
 - Characteristics:
 - Metabolism (method of energy production)
 - Fuel sources
 - Speed of ATP production
 - Quantity of ATP production (relative, i.e. not a specific amount)
 - Limitations
 - By-products
 - Duration (predominant)
 - Intensity
 - Provide sporting examples
 - Muscle fibre type
 - Lactic acid removal (fate of lactic acid)
- Aerobic System:
 - Basic equations/flow chart, includes basic outline of Krebs Cycle and Electron Transport System (not including enzymes)
 - Fate of the by-products (heat, water and carbon dioxide)
 - Glycolysis lypolysis
 - Characteristics
 - Metabolism (method of energy production)
 - Fuel Sources
 - Speed of ATP production
 - Quantity of ATP production (relative, i.e. not a specific amount) limitations
 - Limitations
 - By-products
 - Duration (predominant)
 - Intensity
 - Provide sporting examples
 - Muscle fibre type
- Oxygen Transport in muscles; role of myoglobin
- Energy Continuum: interplay of the different energy systems:
 - Contribution of Energy systems varies depending on
 - Duration
 - Intensity
 - Aerobic Fitness
 - Aerobic energy system makes a greater contribution earlier than previously thought
 - Discussion: fat adapted vs glycogen adapted metabolism
- Muscle Fibre Types: Slow (Type I) and Fast (Type IIa and Type IIb):
 - Profile characteristics of each

1.2 Oxygen Delivery

- Oxygen Deficit
- Aerobic Steady State
- $\dot{V}O_2$ and $\dot{V}O_{2\text{ Max}}$:
 - Absolute and relative $\dot{V}O_{2\text{ Max}}$ (including making calculations)
 - In relation to athletes in different sports and fitness levels
 - Discuss demands of endurance sports, intermittent team sports, player roles, etc...
 - Comparison in typical novice, intermediate and high-performance athletes
 - Factors that affect an individual's $\dot{V}O_{2\text{ Max}}$:
 - Aerobic fitness
 - Body size
 - Gender
 - Heredity
 - Age
- Lactate Inflection Point (Onset of Blood Lactate Accumulation):
 - Variability of Lactate Inflection Point (LIP) as a percentage of $\dot{V}O_2$ maximum and maximum heart rate
 - Improving your Lactate Inflection Point (LIP)
 - Buffering
 - LIP and $\dot{V}O_{2\text{ Max}}$

1.3 Effects of Training

- Acute Responses (immediate effects) of exercise:
 - Cardiovascular responses to exercise
 - Respiratory responses to exercise
 - Muscular responses to exercise
- Chronic Circulorespiratory Adaptations (long term effects) of exercise may be observed:
 - At rest
 - During submaximal exercise
 - During maximum exercise
- Chronic Muscular Adaptations (long term effects) of exercise as a result of:
 - Endurance training
 - Non- endurance (anaerobic and resistance) training

Minimum Work Requirements – Unit 1

<i>Task</i>	<i>Example Products</i>	<i>Criteria</i>
Task 1.1 Energy Systems Assignment (400–800 words or multi-modal equivalent)	1. In-class or online assessment 2. Review summary paper/presentation	1, 8
Task 1.2 LIP/ $\dot{V}O_2$ Max Lab Report, including results and tables (1000 words)	1. Lab Report 2. Investigative Study (see 5.2)	1, 5, 7, 8
Task 1.3 Unit Summary Report: (400–800 words or multi-modal equivalent)	End of unit reflection and review	1, 5 and 6 (if two Units have been covered)



UNIT 2: EXERCISE PHYSIOLOGY B

Topics

2.1 Training Programs

2.2 Recovery

2.1 Training Programs

- Components of fitness (such as flexibility, aerobic capacity and muscle strength):
 - Major categories and application
- The Training Session:
 - Warm-up
 - Purposes and approaches
 - Elements
 - Physiological responses (refer acute training effects)
 - Conditioning
 - Skill development
 - Cool-down
 - Purpose
 - Techniques
 - Physiological responses (refer to recovery)
- Principles:
 - Specificity
 - Progressive overload
 - Frequency
 - Intensity
 - Duration
 - De-training
 - Variety
 - Individuality
 - Diminishing returns
- Methods – a number of key methods underpin all types of training program:
 - FITT formula (Frequency, Intensity, Time and Type)
 - Continuous
 - LISS (Low Intensity Steady State)/Long Slow Distance training
 - Lactate threshold training/MAS (Maximum Aerobic Speed)
 - Fartlek
 - Interval: (key variables and applications)
 - Work interval
 - Recovery interval
 - Sets
 - Repetitions
 - Resistance
 - Isotonic weight training
 - Isometric resistance training
 - Resistance models, for example, but not limited to: bodyweight, pilates, machines/cables/bands, supersets, dropsets, etc...
 - Exercise ball (fit ball) training
 - Resistance training key terms – repetition, set and repetition maximum
 - Discussion – common principles and variables – manipulating volume/reps/sets

- Plyometric
 - Principles
 - Safety considerations
- Flexibility
 - Dynamic
 - Proprioceptive neuromuscular facilitation
 - Static
- Circuit
 - Aims and advantages
 - Methods
- Cross Training
 - Aims and advantages
 - Methods

Trend towards application and design of various emerging or popular methods (such as cross fit, boxercise, HITT, tabata, trx, etc.) and their links to general categories.

- The Training Year:
 - Periodisation
 - Preparatory pre-season (general preparation and specific preparation)
 - Competitive phases/in-season (pre-competitive and competitive)
 - Transition/off-season
 - Tapering and Peaking

2.2 Recovery

- Physiological causes of fatigue, concept of rest days, overtraining
- Recovery Strategies:
 - Cool down (exercise or active recovery)
 - Stretching
 - Passive recovery
 - Rehydration
 - Commonly used techniques (including but not limited to)
 - Cold-water immersion (CWI)/cryotherapy
 - Contrast water therapy (CWT)
 - Hot-water immersion (HWI)
 - Massage
 - Compression
 - Low intensity pool sessions
- Role of the O transport system in recovery (EPOC) and O Debt:
 - Alactacid Debt – replenishment of ATP and PC Stores, O resaturation of myoglobin and haemoglobin
 - Lactacid Debt – removal of Lactic Acid (includes fate or removal)
- Nutritional Replenishment:
 - Consumption of CHO: suggested time frame
 - Consumption of Protein: suggested time frame
 - Muscle glycogen replenishment
 - Rehydration: fluids & electrolytes



- Delayed Onset Muscle Soreness (DOMS)
 - Characteristics
 - Actions for minimizing impact/prevention

Minimum Work Requirements – Unit 2

<i>Task</i>	<i>Example Products</i>	<i>Criteria</i>
Task 2.1 Training Review (400–800 words)	<ol style="list-style-type: none"> 3. Produce a table or graphic that compares common training methods by matching them to adaptation focus areas 4. Students participate in a training session and identify relevant training methods and link with fitness components 5. Planning a training session applying the theory relating to the training year, training principles and methods 	2, 6, 7, 8
Task 2.2 Lab Report, including results and tables (1000 words)	<ol style="list-style-type: none"> 1. Comparison of Heart Rate during 4 different workout regimes 2. Influence of post-exercise recovery techniques on recovery heart rate 3. Relationship of fatigue and recovery 4. The relationship between recovery time and performance using the ATP/CP system 5. Investigative Study 	2, 5, 7, 8
Task 2.3 Unit Summary Report (400–800 words or multi-modal)	End of Unit reflection and review	2, 5 and 6 (if two Units have been covered)

UNIT 3: SKILL ACQUISITION

Topics

- 3.1 Motor Skills
- 3.2 Practicing Skills
- 3.3 Information Processing (Input, Processing, Output, Feedback)
- 3.4 Reaction Time and Decision Making
- 3.5 Memory
- 3.6 Feedback
- 3.7 Movement Analysis

3.1 Motor Skills

- Motor Skills:
 - Motor programs
 - Subroutines
- Classifying motor skills:
 - Movement precision
 - Fine
 - Gross

- Type of movement
 - Discrete
 - Continuous
 - Serial
- Environmental predictability
 - open
 - closed
- Concept of classification along a continuum
- Fitts and Posner Model for Stages of Skill Learning – cognitive, associative and autonomous:
 - Characteristics for each stage
 - Key points for instructional (coaches) support
 - Skill Learning Continuum
- Factors affecting skill acquisition – discussion to include, but not limited to:
 - Age and maturity
 - Gender
 - Heredity
 - Motivation
 - Quality of instruction

3.2 Practicing Skills

- Classification of Practice Types:
 - Massed practice and distributed practice
 - Whole practice and part practice
 - Fixed/drill practice and varied practice (including problem solving and game sense approach)
- Schema development (Schema theory Schmidt 1975) in the role of Varied Practice:
 - Aligning choice of practice type to learner and skill scenarios

3.3 Information Processing (Input, Processing, Output, Feedback)

- Basic outline and application of the learning process – Information Processing Model:
 - Sensory input
 - Processing
 - Stimulus identification
 - Response selection
 - Response programming
 - Mental and neural fatigue
 - Output (movement)
 - Feedback
- Receiving Information (Sensory Input):
 - Cues
 - Senses
 - Vision
 - Equilibrium (balance)
 - Proprioception (kinesthesia and touch)
 - Hearing
 - Signal detection
 - Orienting
 - Selective attention
 - How a coach can help to improve a player's selective attention



3.4 Reaction Time and Decision Making

- Reaction Time, Movement Time, Response Time:
 - Importance
 - Types of reaction time
 - Simple RT
 - Choice RT (Hick's Law)
- Factors Influencing Reaction Time:
 - Number of stimulus-response alternatives (Choice RT)
 - Age
 - Gender
 - Intensity of the stimulus
 - The probability of the stimulus occurring
 - The presence or absence of warning signals
 - Signal detection
 - Previous experience
 - Selective attention
 - Psychological Refractory Period (successive presentation of cues)
 - Stimulus-response compatibility
 - Mental fatigue
- Reducing Reaction Time:
 - Practice and the effect on choice RT
 - Anticipation
 - Spatial (or event) anticipation
 - Temporal anticipation
 - Benefits of anticipation

3.5 Memory

- Memory Capacity:
 - Short term sensory storage
 - Short term memory
 - Long term memory
- Short-term sensory store
- Short-term memory (influence of selective attention)
- Factors that affect short-term memory:
 - Relevance & meaningfulness
 - Interference (distractions)
 - Chunking or coding
 - Rehearsal or practice
 - Overloading
- Long-term memory:
 - Muscle memory
- Application of memory to learning and refining sporting skills:
 - Schema

3.6 Feedback

- Main roles of Feedback:
 - Motivate
 - Reinforcement
 - Regulate or change the performance – during activity
 - Inform and improve future performance – post activity

- Sources of Feedback:
 - Internal/intrinsic (sensory: vision, audition, touch, proprioception, forces, smell)
 - External/extrinsic (augmented)
- Nature of Feedback:
 - Knowledge of performance (KP)
 - Knowledge of results (KR)
- Timing of the Feedback:
 - Continuous (concurrent)
 - Terminal (discrete)

3.7 Movement Analysis

It is recommended that relevant aspects of the theory of movement analysis described below be delivered in conjunction with Study One of Unit 5: Scientific Investigative Methodologies.

- Introduction to Biomechanics:
 - Biomechanical concepts and their application in sport science
 - Understanding and use of common anatomical terms, e.g. flexion, abduction, anterior, etc...
- Kinematics: studies the description of motion:
 - Velocity
 - Motion
 - Linear
 - Angular
 - General
 - Projectile Motion
 - Factors affecting projectile motion
 - Velocity of release
 - Angle of release
 - Height of release
 - Shape
 - Air resistance/friction
 - Spin
- Kinetics: studies influences on the movement of a body:
 - Mass and momentum
 - Force – Newton’s Laws of Motion 1, 2 ($F = ma$) and 3
 - Levers
 - Balance
 - Base of support
 - Centre of gravity
 - Stability
 - Sporting examples – discuss key situations where each of the biomechanical principles are prominent
- Principles of the Application of Biomechanical Knowledge – according to Amezdroz, Dickens, Hosford, Stewart and Davis (2010), Queensland Senior Physical Education, 3rd Ed. Australia, Macmillan Education Australia:
 - Using observation (naked eye and video analysis) techniques
 - Determine the objective of the skill
 - Divide the skill into skill phases (key subroutines) identify the movement patterns involved identifying starter mechanisms
 - Detecting errors: application of the biomechanical principles (kinematics and kinetics) listed above



Minimum Work Requirements – Unit 3

<i>Task</i>	<i>Example Products</i>	<i>Criteria</i>
Task 3.1 Lab Report, including results and tables (1000 words)	<ol style="list-style-type: none"> 1. Classification of motor skills 2. Receiving Information (Input) 3. Practice types and classification 4. Reaction time, movements time or response time tests 5. Factors affecting reaction time test 6. How memory impacts performance 7. Classification of feedback 	3, 5, 7, 8
Task 3.2 Investigative Study (2000–4000 words or equivalent)	Refer to compulsory Task 5.1	3, 5, 7, 8
Task 3.3 Unit Summary Report (400–800 words or multi-modal equivalent)	End of Unit reflection and review	3, 5 and 6 (if two Units have been covered)

UNIT 4: SPORT PSYCHOLOGY

Topics

- 4.1 Self-Confidence in Sport and Exercise
- 4.2 Self-Confidence in Sport and Exercise
- 4.3 Goal Setting
- 4.4 Preparation for Competition
- 4.5 Motivation
- 4.6 Arousal/Stress and Anxiety
- 4.7 Concentration
- 4.8 Visualisation
- 4.9 Self-Confidence in Sport and Exercise

4.1 Self-Confidence in Sport and Exercise

- Self Confidence:
 - Definition
- Self-efficacy in Sport and Exercise (task specific self-confidence):
 - Value/importance
 - High self-efficacy traits
 - Low self-efficacy traits
 - The relationship between self-efficacy and sport performance, i.e. overconfidence
- Four main antecedents of self-efficacy
Bandura (1977, Psychological Review, Vol 84(2), 1921–215)
(key variables that influence the level and strength of self-efficacy)
 - Performance accomplishments
 - Vicarious experiences (also called modelling)
 - Verbal persuasion
 - Physiological states

4.2 Goal Setting

- Types of Goals:
 - Process
 - Performance
 - Outcome
 - Short and long term
 - The Staircase/Stepping Stone model of short- and long-term goals
- Benefits of Goal Setting:
 - Goals enhance focus and concentration
 - Goals boost self-confidence
 - Goals help create a positive mental attitude
 - Goals increase intrinsic motivation to excel
 - Goals improve the quality of practices by making training more challenging
 - Goals enhance playing skill, techniques and strategies
 - Goals improve overall performance
- Guidelines for goal setting – SMARTER:
 - Specific
 - Measurable
 - Achievable or action-oriented or agreed or accepted
 - Realistic
 - Time-framed or phased
 - Evaluate or exciting
 - Recorded or reviewed

4.3 Preparation for Competition

- Pre-competition Strategies:
 - Lead up to event
 - Rest
 - Diet
 - Equipment check
 - Spare time
 - Travel plans
 - Mental preparation
 - At the competition venue
 - Arrival time
 - Who to report to
 - Physical preparation
 - Mental preparation
 - Dressing for the contest
 - Team meetings/individual discussion with the coach
 - Who to spend time with
 - Final personal preparation
- Competition Strategies:
 - Your personal/team's game plan
 - Key statistics/performance reference points/checks
 - Monitoring KPIs/task relevant factors
 - Mood/cue words
- Coping Strategies:
 - Explanation and purpose – secondary plans
 - What ifs?
 - Preparation to improve an athlete's ability to cope
 - Managing pain and/or physical discomfort
 - A hostile crowd
 - Discuss other scenarios, e.g. missed bus, equipment failure, violent team mate, media,



- Debriefing:
 - Guidelines for debriefing
 - As soon after the performance as possible
 - Involve the athlete
 - Identify positive and negative aspects of performance, i.e. what went right/wrong?

4.4 Motivation

- Explanation
- Self Determination Theory
- Types of Motivation:
 - Positive
 - Negative
 - Intrinsic
 - Extrinsic – tangible and intangible rewards
 - Amotivation
- Motivational Techniques for Coaches and Athletes – may include, but is not limited to:
 - Goal setting
 - Using extrinsic rewards
 - Motivational music
 - Positive self-talk

4.5 Arousal/Stress and Anxiety

- Stress – sources of stress (stressors)
- The Influence of Arousal on Sporting Performance
 - Arousal
 - Yerkes and Dodson’s Inverted-U Hypothesis
 - Relationship affected by the
 - Individual athlete (personality, experience, etc...)
 - Type of skill or sport: fine/gross, simple/complex
 - Catastrophe Theory
- Anxiety:
 - Competitive anxiety
 - State anxiety
 - Trait anxiety
 - Choking
- Symptoms of Anxiety:
 - Psychological (behavioural changes, emotional responses and cognitive functioning)
 - Physiological changes (somatic)
- Techniques to Control Arousal Levels:
 - To raise arousal levels
 - To lower arousal levels (includes identifying various relaxation techniques)
 - Coach vs self-regulation

4.6 Concentration

- Concentration and Attention
- Robert Nideffer’s attentional dimensions (Reference: Nideffer, R.M. 1976, ‘Test of attentional and interpersonal style’, *Journal of personality and Social Psychology*, 34, 394–404):
 - Width (broad and narrow) and direction (internal and external) dimensions
 - Four types of attention
 - Broad external
 - Narrow external
 - Broad internal
 - Narrow internal
 - Advantages, disadvantages and sporting applications of each attentional style

- Causes of Attentional Errors:
 - Attentional mismatch (due to dominant attentional style) under stressful conditions which may be inappropriate
 - Inability to adopt or maintain appropriate attentional focus
 - Internal and external overloads
 - Involuntary internal narrowing
- Flow State

4.7 Visualisation

- What is Visualisation – according to Syer, J and Connolly, C. (1998), 'Sporting Body, Sporting Mind: An athlete's guide to mental training', London, Simon and Schuster:
 - Why visualise?
 - Senses involved in
 - Seeing/visual
 - Hearing/auditory
 - Touch/feeling/kinaesthetic
- Using Visualisation:
 - Mental rehearsal is the process of imagining yourself performing a specific movement or skill
 - Mental rehearsal techniques
 - Performance practice
 - Instant preplay
 - Instant replay
 - During performance
 - Performance review
 - Problem solving
 - Using visualisation to
 - Aid concentration
 - Reduce anxiety and physical tension
 - Suggest possible course of action
- Guidelines to Improve the Quality and Effectiveness of the Exercise (mental rehearsal):
 - Start with a relaxation
 - Stay alert
 - Use the present tense
 - Set realistic goals
 - Set specific goals
 - Use all your senses
 - Visualise from the inside out and from the outside in
 - Visualise at the correct speed
 - Practice regularly, etc...



Minimum Work Requirements – Unit 4

<i>Task</i>	<i>Example Products</i>	<i>Criteria</i>
Task 4.1 Sport Psychology Task (800–1200 words)	<ol style="list-style-type: none"> 1. Goal Setting in sport tasks: students set individual SMARTER goals and analyse the benefits of doing so 2. Design pre-competition, competing and coping strategies for a sport of choice 3. Investigating reasons why people play sport i.e what motivates them 4. Group brainstorm session followed by individual report 5. Sport psychology skills for travelling 6. Flyer/Handout 7. Sport psychology case studies 	4, 6 (if possible), 7, 8
Task 4.2 Lab Report, including results with graphs/tables (1000 words)	<ol style="list-style-type: none"> 1. Self-efficacy in sport Likert Scale 2. Investigating what motivates people to play sport 3. Application of the Inverted-U hypothesis or Catastrophe Theory 4. The Test of Attention and Interpersonal Style (TAIS) 5. Looking at the effectiveness of the different types of visualisation 6. Investigative study 	4, 5, 7, 8
Task 4.3 Unit Summary Report (400–800 words or multi-modal equivalent)	End of Unit reflection and review	4, 5 and 6 (if two Units have been covered)

UNIT 5: SCIENTIFIC INVESTIGATIVE METHODOLOGIES AND SKILLS (20 Hours Suggested Time)

This Unit develops learners understanding of scientific investigative methodologies and skills within the context of a detailed study of two topics drawn from Units 1–4.

Students **will** undertake TWO (2) studies:

- One (1) study will be a movement analysis (Unit 3)
- One (1) study is selected from a topic chosen from Unit 1 OR Unit 2 OR Unit 4.

Within the given requirements and guidelines there is flexibility to select specific topics/focuses for each study.

These studies are scientific research involving humans. They must take full account of relevant principles and guidelines related to ethical conduct in human research.

Minimum Work Requirements – Unit 5.1

The written product for the Movement Analysis study **MUST** contain and address the following topics:

- Aim/Hypothesis
- Background Research and Ethical Considerations (1000 words submitted electronically)
- Method (equipment list, procedure, etc...)
- Results (including supporting tables, graphs, graphics, etc..., all clearly labelled)
- Discussion (1000–2000 words or equivalent)
- Conclusions and Recommendations
- References (citation) and a reference list/bibliography.

The research methodology for the Movement Analysis study will be guided by the principles of *Application of Biomechanical Knowledge* (according to Amezdroz, Dickens, Hosford, Stewart and Davis (2010), Queensland Senior Physical Education, 3rd Ed. Australia, Macmillan Education Australia):

- Determine the objective of the skill
- Using observation (naked eye and video analysis) techniques
- Identify the movement patterns involved
- Divide the skill into skill phases (key subroutines)
- Detecting errors: application of the biomechanical principles (kinematics and kinetics) listed above
- Identifying starter mechanisms.

The research will involve the use of video and computers to run video analysis software. Students will need some background support learning to develop their skills in the application of Movement Analysis ICT tools:

- Guidelines (procedures) which should be followed for obtaining good video footage
- ICT: application of video analysis software, and its analysis.

The assessment for the Movement Analysis study is based on the degree to which a student can:

- Criterion 3 – Analyse and discuss principles of skill acquisition in sport
- Criterion 5 – Analyse and interpret sport science data and information
- Criterion 7 – Access, research and analyse information
- Criterion 8 – Communicate information in a variety of forms.

5.1 Selected Investigative Study

The topic of this study can be selected from Unit 1, Unit 2 *OR* Unit 4.

The topic must have a direct relationship to course content from the selected Unit.

Learners may work in groups to gather data, but are required to individually complete and submit a written study.

The research topic and methodology employed in the selected study will take full account of relevant principles and guidelines related to ethical conduct in human research.

The assessment for the Selected Investigative Study is based on Criteria 5, 7 and 8, and either Criterion 1 *OR* 2 *OR* 4 (Depending on the Unit of study)



The degree to which a learner can:

Criterion 5 – Analyse and interpret sport science data and information

Criterion 7 – Access, research and analyse information

Criterion 8 – Communicate information in a variety of forms

AND

Criterion 1 – Describe and analyse physiological aspects of exercise

OR

Criterion 2 – Analyse and explain physiological responses to training

OR

Criterion 4 – Examine and discuss how sport psychology influences athletic performance.

Minimum Work Requirements – Unit 5.2

The Selected Investigative Study's written product **MUST** contain and address the following topics:

- Aim/Hypothesis
- Background Research and Ethical Considerations (1000+ words submitted electronically)
- Method (equipment list, procedure, etc...)
- Results (includes tables, graphs, etc..., all clearly labelled)
- Discussion (1000–2000 words)
- Conclusions and Recommendations
- References (citation) and a reference list/bibliography.

The completed product represents a significant scientific research and investigation and should comprise at least 8 pages and approximately 2000 - 4000 words in its written and graphic content.

RECOMMENDED REFERENCING SYSTEMS

- UTas Referencing Practices (current 2106)
- Human Movement – APA
- Exercise and Health Sciences – Harvard

Work Requirements

Summary of Work Requirements

Unit	Example Product	Criteria
1	Task 1.1 Energy Systems Assignment (400-800 words or multi-modal equivalent) Task 1.2 Lab and Report (e.g. LIP/ VO2 max) (1000 words) Task 1.3 Unit Summary Report (400-800 words or multi modal equivalent)	1,8 1, 5, 7, 8 1,5,6
2	Task 2.1 Training Review (400-800 words) Task 2.2 Lab & Report (1000 words) Task 2.3 Unit Summary Report (400-800 words or multi modal equivalent)	2,6,7,8 2,5,7,8 2,5,6
3	Task 3.1 Lab & Report (1000 words) Task 3.2 Investigative Study (see Task 5.1) Task 3.3 Unit Summary Report (400-800 words or multi modal equivalent)	3,7,8 3,5,7,8 3,5,6
4	Task 4.1 Sport Psychology Task (800-1200 words) Task 4.2 Lab & Report (1000 words) Task 4.3 Unit Summary Report (400-800 words or multi modal equivalent)	4,6,7,8 4,5,7,8 4,5,6
5	5.1 Movement Analysis (2000-4000 words or multi-modal equivalent) 5.2 Selected Investigative Study (2000-4000 words or multi-modal equivalent)	3,5,7,8 1,2,4,5 7,8

In keeping with the nature of this field of study, teachers and learners are encouraged to integrate technology to assist in their work practices. Tools like email, [turnitin](http://turnitin.com/) (<http://turnitin.com/>) and VLEs can fill a useful role in managing drafts, building communication, monitoring progress and storing assessment items

Assessment

Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate endpoint of study. Although assessment – as part of the learning program – is continuous, much of it is formative, and is done to help learners identify what they need to do to attain the maximum benefit from their study of the course. Therefore, assessment for summative reporting to TASC will focus on what both teacher and learner understand to reflect end-point achievement.

The standard of achievement each learner attains on each criterion is recorded as a rating 'A', 'B', or 'C', according to the outcomes specified in the standards section of the course.

A 't' notation must be used where a learner demonstrates any achievement against a criterion less than the standard specified for the 'C' rating.

A 'z' notation is to be used where a learner provides no evidence of achievement at all.

Providers offering this course must participate in quality assurance processes specified by TASC to ensure provider validity and comparability of standards across all awards. Further information on quality assurance and assessment processes.



Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

TASC will supervise the external assessment of designated criteria which will be indicated by an asterisk (*). The ratings obtained from the external assessments will be used in addition to internal ratings from the provider to determine the final award.

Quality Assurance Process

The following processes will be facilitated by TASC to ensure there is:

- A match between the standards of achievement specified in the course and the skills and knowledge demonstrated by learners
- Community confidence in the integrity and meaning of the qualification.

Process: TASC gives course providers feedback about any systematic differences in the relationship of their internal and external assessments and, where appropriate, seeks further evidence through audit and requires corrective action in the future.

External Assessment Requirements

The external assessment for this course will comprise a three-hour (3 hours) written examination which assesses Criteria 1, 2, 3, 4, 5 and 6.

For further information, see [external assessment specifications and guidelines](#).

Criteria

The assessment for Sport Science Level 3 will be based on the degree to which the learner can:

1. Describe and analyse physiological aspects of exercise*
2. Analyse and explain physiological responses to training*
3. Analyse and discuss principles of skill acquisition in sport*
4. Examine and discuss how sport psychology influences athletic performance*
5. Analyse and interpret sport science data and information*
6. Examine and discuss cross-discipline links*
7. Access, research and analyse information
8. Communicate information in a variety of forms

Note: * denotes criteria that are both externally and internally assessed

Standards

Criterion 1: Describe and Analyse physiological aspects of exercise

This criterion is both internally and externally assessed.

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Correctly uses specialised terminology when discussing physiological aspects of exercise, and connects and explains physiological terms related to exercise	Correctly uses terminology when discussing physiological aspects of exercise, and correctly explains physiological terms related to exercise	Correctly uses basic terminology when discussing physiological aspects of exercise, and correctly defines common physiological terms related to exercise
Connects and explains concepts related to physiological aspects of exercise with accuracy and clarity	Accurately describes concepts related to physiological aspects of exercise	Describes concepts related to physiological aspects of exercise
Analyses and evaluates similarities, differences and relationships between both distinctive and closely related physiological concepts and systems of exercise	Analyse the similarities, differences and relationships between both distinctive and closely related physiological concepts and systems of exercise	Describes and explains the similarities, differences and relationships between distinctive physiological concepts and systems of exercise
Evaluates and applies a wide range of relevant exercise physiology principles to recommend actions and interventions for a variety of training and competition scenarios	Analyses, relates and applies a range of relevant exercise physiology principles to recommend actions and interventions for given training and competition scenarios	Explains and applies relevant exercise physiology principles to recommend actions and interventions for given training and competition scenarios
Uses a wide range of relevant evidence and/or examples to support their discussion of physiological aspects of exercise	Selects and uses a range of relevant evidence and/or examples to support their discussion of physiological aspects of exercise	Uses relevant evidence and/or examples to illustrate their discussion of physiological aspects of exercise



Criterion 2: Analyse and Explain physiological responses to training

This criterion is both internally and externally assessed.

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Uses physiological profiles and responses to identify and classify relevant factors, and proposes and justifies suggested training modifications	Uses physiological profiles and responses to identify relevant factors and explain suggested training modifications	Uses physiological profiles and responses to identify critical issues and suggest fundamental training modifications
Differentiates and justifies appropriate training program approaches by evaluating and comparing their focus and intended physiological adaptations	Differentiates and justifies appropriate training program approaches by analysing and comparing their focus and intended physiological adaptations	Differentiates some training program approaches by explaining and comparing their focus and intended physiological adaptations
Analyses, selects and explains appropriate training programs and strategies for specific sports and athletes	Selects and explains appropriate training programs and strategies for specific sports and athletes	Explains appropriate training programs and strategies for specific sports and athletes
Evaluates physiological responses to training and recovery and provides appropriate explanations and specific recommendations	Analyses physiological responses to training and recovery and provides appropriate explanations and general recommendations	Reviews physiological responses to training and recovery and provides general observations and recommendations
Evaluates and compares a range of programs used to balance athlete workload and recovery	Analyse and compares a range of contemporary programs used to balance athlete workload and recovery	Explains and compares a range of contemporary programs used to balance athlete workload and recovery
Evaluates, creates and justifies training plans reflecting fundamentals in training program design	Analyses, creates and justifies training plans reflecting fundamentals in training program design	Assesses, creates and justifies training plans reflecting fundamentals in training program design

Criterion 3: Analyse and discuss principles of skill acquisition in sport

This criterion is both internally and externally assessed.

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Correctly uses specialised terminology when discussing skill acquisition, and accurately defines and classifies terms related to skill acquisition	Correctly uses terminology when discussing skill acquisition, and correctly defines and explains terms related to skill acquisition	Correctly uses basic terminology when discussing skill acquisition, and correctly defines common terms related to skill acquisition
Compares, relates and critically analyses principles related to skill acquisition with accuracy and clarity	Compares, relates and analyses principles related to skill acquisition	Describes and explains principles related to skill acquisition
Compare, relate and critically analyses similarities, differences and relationships between both distinctive and closely related principles of skill acquisition	Compares, relates and analyses similarities, differences and relationships between both distinctive and closely related principles of skill acquisition	Describes and explain similarities, differences and relationships between distinctive principles of skill acquisition
Critically analyse a wide range of scenarios to identify and explain relevant skill acquisition principles	Analyse a range of scenarios to identify and explain relevant skill acquisition principles	Explains how to apply a range of relevant skill acquisition principles to given scenarios
Evaluates a wide range of relevant evidence and examples to support their discussion of skill acquisition	Selects and analyses relevant evidence and examples to support their discussion of skill acquisition	Selects relevant evidence and examples to support discussion of skill acquisition
Evaluates and connects specific observations in gross and subtle movement elements when comparing novice and expert performers	Analyses and discusses key observations in gross and subtle movement elements when comparing novice and expert performers	Explains and discusses broad general observations and gross movement elements when comparing novice and expert performers
Analyses and prioritises suggested adjustments to movement elements gathered using biomechanics and skill analysis software	Diagnoses and suggests improvements to movement elements gathered using biomechanics and skill analysis software	Identifies and describes basic movement elements gathered using biomechanics and skill analysis software



Criterion 4: examine and discuss how sport psychology influences athletic performance

This criterion is both internally and externally assessed.

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Correctly uses specialised terminology when discussing sport psychology, and accurately defines and connects terms related to sport psychology	Correctly uses terminology when discussing sport psychology, and correctly defines and relates terms related to sport psychology	Correctly uses basic terminology when discussing sport psychology, and correctly defines common terms related to sport psychology
Evaluates how sport psychology can impact performance	Analyses how sport psychology can impact performance	Describes and explains how sport psychology can impact performance
Analyses the similarities, differences and relationships between distinctive and closely related principles of sport psychology	Compares the similarities, differences and relationships between distinctive and closely related principles of sport psychology	Describes similarities, differences and relationships between distinctive principles of sport psychology
Connects relevant sport psychology concepts and ideas to performance in a wide range of sporting contexts	Connects relevant sport psychology concepts and ideas to performance across a range of sporting contexts	Connects relevant sport psychology concepts and ideas to performance in a limited range of sporting contexts
Evaluates a range of relevant sporting examples to support their illustrations of sport psychology concepts	Select and analyses relevant sporting examples to support their illustrations of sport psychology concepts	Select relevant examples to support their illustrations of sport psychology concepts

Criterion 5: Analyse and interpret sport science data and information

This criterion is both internally and externally assessed.

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Identifies and critically analyses trends, relationships* and anomalies in sport science data and information	Identifies and analyses trends and relationships* that exist in sport science data and information	Identifies trends and relationships* that exist in sport science data and information
Critically analyses and interprets sport science related data and information to make clear, logical and considered predictions	Analyses sport science related data and information to make reasoned predictions	Makes valid predictions based on data and information
Fluently incorporates use of accurate and relevant data/information to justifies a response or argument	Fluently incorporates use of relevant data/information in support of a response or argument	Incorporates use of data/information in support of a response or argument
Draws reasoned and logical conclusions and makes recommendations based on analysis and interpretation of data	Draws valid conclusions, and makes logical connections based on interpretation of data	Draws valid, basic conclusions based on interpretation of data
Correctly operates, calibrates and compares a variety of testing apparatus used to measure, and accurately record data	Correctly operates and calibrates a variety of testing apparatus used to measure, and accurately record data	Correctly operates a variety of testing apparatus used to measure, and record data

*'Relationships' involves comparisons/contrasts, similarities/differences.

Criterion 6: examine and discuss cross-discipline links

This criterion is both internally and externally assessed.

With reference to two of the following discipline areas:

- Exercise Physiology*,
- Skill Acquisition, or
- Sports Psychology,

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Correctly identifies a wide range of cross-discipline links from various sporting scenarios	Correctly identifies a range of cross-discipline links from various sporting scenarios	Correctly identifies key cross-discipline links from various sporting scenarios
Correctly uses specialised terminology when discussing a wide range of cross-discipline links	Correctly uses terminology when discussing a range of cross-discipline links	Correctly uses basic terminology when discussing cross-discipline links
Evaluates relevant cause and effect connections across multiple discipline areas and their effect on sport performance	Analyses relevant cause and effect connections across multiple discipline areas and their effect on sport performance	Explains relevant cause and effect connections across multiple discipline areas and their effect on sport performance
Accurately describes, explains and analyses how aspects in one area might influence sporting performance in another area. The response is logical and valid, and contains accurate explanation regarding how/why this might be so.	Accurately describes and explains how aspects in one area might influence sporting performance in another area. The response is valid and contains some specific detail explaining how/why this might be so.	Describes how aspects in one area might influence sporting performance in another area. The response is generally valid and is described in broad, general terms.
Chooses and compares a range of relevant sporting examples to support their illustrations when discussing cross-discipline links	Chooses and explains relevant sporting examples to support their illustrations when discussing cross-discipline links	Chooses relevant examples to support their illustrations when discussing cross-discipline links

*The discipline area encompassed by Exercise Physiology refers to the combined content from both Unit 1 and Unit 2 in this course.



Criterion 7: Access, Research and Analyse Information

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Critically analyses sources, selects accurate and relevant information, and correctly extracts detailed meaning to form a reasoned response and reach valid, logical conclusions about sport science issues	Analyses sources and selects relevant information, and correctly extracts meaning to form a considered response and reach valid conclusions about sport science issues	Selects information and correctly extracts basic meaning to form a response and reach valid conclusions about sport science issues
Chooses, justifies and applies scientific investigative methodologies appropriate to a specific study	Chooses and applies general scientific investigative methodologies to a specific study	Applies general scientific investigative methodologies as directed
Critically evaluates the accuracy, scope and validity of information collected, and – when appropriate – analyses it in the light of similar studies undertaken by others	Assesses the accuracy and scope of information collected	Makes valid observations regarding the accuracy and scope of the information collected
Identifies relevant principles and guidelines of ethical conduct related to a human research study, and proposes effective actions to address these	Identifies relevant principles and guidelines of ethical conduct related to a human research study, and proposes actions to address these principles and	Identifies relevant principles and guidelines of ethical conduct related to a human research study
Effectively uses suitable online search tools and selectively evaluates information from multiple sources for validity, currency, quality and relevance	Effectively uses suitable online search tools and selectively filters information from multiple sources for currency, quality and relevance	Effectively uses online search tools to collate and store information which is current and relevant

Criterion 8: Communicate Information in a variety of forms

The learner:

<i>Rating A</i>	<i>Rating B</i>	<i>Rating C</i>
Clearly and accurately conveys ideas and information using appropriate formats*	Clearly conveys ideas and information using appropriate formats*	Conveys ideas and basic information using appropriate formats*
Produces written work for a wide range of contexts in which English usage is correct, e.g. correct grammar, spelling of technical/specialised terms, punctuation, complex sentence structure, and effective use of paragraphs	Produces written work for a range of contexts in which English usage is correct, e.g. correct grammar, spelling, punctuation, sentence structure, and use of paragraphs	Produces written work in which basic English usage is correct, e.g. correct grammar, spelling of common words, simple punctuation, sentence structure, and use of paragraphs
Creates appropriate and clear graphs and tables to communicate complex sport science data/information	Creates appropriate and clear graphs and tables to communicate sport science data/information	Creates simple graphs and tables to communicate sport science data/information
Creates complex reports and papers using appropriate formatting conventions, e.g. scientific report, laboratory report, research paper. Reports are clearly and correctly structured, e.g. introduction, methods, results, discussion, references/citation.	Creates reports and papers using appropriate formatting conventions, e.g. scientific report, laboratory report, research paper. Reports follow required structure, e.g. introduction, methods, results, discussion, references/citation.	Creates simple reports and papers using formatting conventions, e.g. scientific report, laboratory report, research paper, as directed. Reports generally follow required structure, e.g. introduction, methods, results, discussion, references/citation.
Clearly identifies sources of the information, images, ideas and words that are not the learner's own	Clearly identifies sources of the information, images, ideas and words that are not the learner's own	Identifies the sources of information, images, ideas and words that are not the learner's own
Referencing conventions and methodologies are followed with a high degree of accuracy	Referencing conventions and methodologies are followed correctly	Referencing conventions and methodologies are generally followed correctly
Creates appropriate, well structured reference lists/bibliographies	Creates appropriate, structured reference lists/bibliographies	Creates appropriate reference lists/bibliographies

*'Formats' might include:

- Using ICT and appropriate software to create a: PowerPoint visual; web-based multimedia or video presentation; website; blog; or Wiki
- Creating a poster, brochure, or flyer
- Giving a class talk or verbal presentation
- Leading/undertaking other roles in a scientific investigation or practical activity
- Written responses



Qualifications Available

Sport Science Level 3 (with the award of):

EXCEPTIONAL ACHIEVEMENT (EA)
HIGH ACHIEVEMENT (HA)
COMMENDABLE ACHIEVEMENT (CA)
SATISFACTORY ACHIEVEMENT (SA)
PRELIMINARY ACHIEVEMENT (PA)

Award Requirements

The final award will be determined by Tasmanian Assessment, Standards and Certification from 14 ratings (8 from the internal assessment, 6 from external assessment).

The minimum requirements for an award Sport Science Level 3 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)

12 'A' ratings, 2 'B' ratings (5 'A' ratings, 1 'B' rating from external assessment)

HIGH ACHIEVEMENT (HA)

6 'A' ratings, 6 'B' ratings, 2 'C' ratings (2 'A' ratings, 3 'B' ratings and 1 'C' rating from external assessment)

COMMENDABLE ACHIEVEMENT (CA)

8 'B' ratings, 5 'C' ratings (2 'B' ratings, 3 'C' ratings from external assessment)

SATISFACTORY ACHIEVEMENT (SA)

12 'C' ratings (4 'C' ratings from external assessment)

PRELIMINARY ACHIEVEMENT (PA)

7 'C' ratings

A student who otherwise achieves the ratings for a CA (Commendable Achievement) or SA (Satisfactory Achievement) award but who fails to show any evidence of achievement in one or more criteria ('z' notation) will be issued with a PA (Preliminary Achievement) award.

Course Evaluation

The Department of Education's Curriculum Services will develop and regularly revise the curriculum. This evaluation will be informed by the experience of the course's implementation, delivery and assessment.

In addition, stakeholders may request Curriculum Services to review a particular aspect of an accredited course.

Requests for amendments to an accredited course will be forward by Curriculum Services to the Office of TASC for formal consideration.

Such requests for amendment will be considered in terms of the likely improvements to the outcomes for learners, possible consequences for delivery and assessment of the course, and alignment with Australian Curriculum materials.

A course is formally analysed prior to the expiry of its accreditation as part of the process to develop specifications to guide the development of any replacement course.

LINE OF SIGHT – Sport Science Level 3

<i>Learning Outcomes</i>	<i>Units</i>	<i>Criteria and Elements</i>
Analyse and interpret theory supporting current practices in exercise physiology, skill acquisition, and sport psychology	1, 2, 3, 4, 5, 6, 7	C1 E1-5; C2 E2-6; C3 E1-7; C4 E1-5; C6 E1-5; C7 E1-5; C8 E1-2
Differentiate and explain how exercise physiology, skill acquisition, and sport psychology, impact in isolation and combination to influence sporting performance	1, 2, 3, 4, 6, 8	C1 E2-5; C2 E1-6; C3 E2-7; C4 E2-5; C6 E1-5; C8 E1-7
Utilise analytical and interpretive skills to solve problems and process data	1, 2, 3, 4, 5, 7	C1 E3-5; C2 E1, 4, 6; C3 E6-7; C4 E2-5; C5 E1-4; C7 E1
Undertake scientific research activities and summarise ethical issues related to human research studies	5, 7, 8	C5 E1-5; C7 E1-5
Identify, describe, recall facts, definitions, terminology and principles as they relate to various contexts through the study, observation of, and engagement in, physical activity	1, 2, 3, 4, 5, 8	C1 E2-5; C2 E1-6; C3 E1-7; C4 E1-5; C8 E1, 5-7
Apply knowledge and understanding of exercise physiology, skill acquisition, and sport psychology to a variety of sporting contexts to develop appropriate strategies in order to maximise athlete performance	1, 2, 3, 4, 5, 6	C1 E4; C2 E1-6; C3 E2-7; C4 E1-5; C6 E1-5
Select, interpret, analyse and manipulate information from a variety of sources	1, 2, 3, 4, 5, 7	C1 E3-5; C2 E1, 3-6; C3 E4-7; C4 E2-5; C5 E1-5; C7 E1, 3
Identify solutions to problems or practical situations and scenarios in exercise physiology, skill acquisition, and sport psychology	1, 2, 3, 4, 5, 6, 8	C1 E4-5; C2 E1-6; C3 E4-7; C4 E3-5; C5 E4; C6 E1-5; C8 E1, 2, 4-7



Appendix 6:

Recent initiatives by CBSE for Examination Reforms

- 1. Change in design of Question Paper:** As per the feedback received from various stakeholders, members of Committee of Courses and the subject experts, the design of the question paper has been changed. In the new design, there is approximately 33% increase in internal choice in all of the major subjects both for classes X and XII. Moreover, 25% objective type questions have been introduced.
- 2. Combining internal assessment marks with theory marks:** The Board has relaxed the Class X passing criteria. The combined marks of Internal Assessment and Theory examinations are considered for deciding the pass criteria.
- 3. Counting of marks in vocational subjects in best of 5 for class X:** If any student fails in any one of the three compulsory subjects (i.e. Science, Mathematics and Social Science) in class X, then it gets replaced by the Vocational subject (offered as a 6th additional subject) and result of Class X Board Examination is computed accordingly.
- 4. Conduct of final exams in Skill Subjects in the month of February:** The Secondary School Certificate Examination (Class X) and Senior School Certificate Examination (Class XII) for all Skill oriented subjects will be conducted in the month of February from the Academic session 2018-2019 onwards. This has been done to ensure earlier results and better chances at admissions in good universities.
- 5. Making Learning Outcomes compulsory:** Most often, teachers are not clear about what kind of learning is desired and the criteria against which it could be assessed. They use textbooks as the complete curriculum and assess children using questions given at the unit end exercises. The learning outcomes developed by NCERT for each class will not only help the teachers to direct their teaching-learning in the desired manner but make other stakeholders responsible and alert towards their role for ensuring quality education. This will enhance the quality of learning in schools, by enabling teachers to ascertain learning skills more accurately and take corrective steps without delay.
- 6. Introduction of Experiential Learning from 2019-20 onwards:** In order to promote self-thinking, creativity and effective study skills among students and to make them lifelong learners, CBSE has introduced Experiential Learning from 2019-20 session onwards. Accordingly, the schools will plan the curricular activities in such a way which enable students to connect the content of their learning areas and subjects with their own lives and the world around them.
- 7. Two Levels of Mathematics:** As per NCF, not only would the two levels of examinations cater for different kinds of learners and allow different levels of testing, it would also reduce overall student stress levels. Keeping in view the above aspect and as evidenced by the Board results, the Board has decided to introduce two levels of examination in Mathematics for the students of Class X who are going to appear in the Board examination for the academic session ending March 2020 onwards.
- 8. Exam Centre Locator:** The Board has developed an Exam Centre Locator (ECL) App. This mobile app has been developed to facilitate CBSE examinees to locate their centres on Google map entering their giving roll number. This also helps to know the shortest route to reach the centre and time required to reach the centre.

9. **Digi-locker:** CBSE has registered with Digi-locker which is a platform for issuance and verification of documents & certificates digitally, thus eliminating the use of physical documents. The Board opens digital lockers of class X & XII students wherein their digitally signed marks sheets, migration certificates and pass certificates with PKI based QR Codes are pushed, immediately on declaration of results. In 2018, all 28 lakhs students were provided the digital academic documents on the same day and at the same time of declaration of results. This will be continued in all Board exams.
10. **Making Sports Mandatory:** In order to promote life skills and values education, CBSE has integrated Health and Physical education with academics. Every school has to provide one period per day for sports which leads to better stress management for children and also creates a better environment for learning.
11. **Special Exams for International Sportspersons:** In order to promote talent in sports, the Board has done a departure from set practice of following the fixed exam schedule. Students who have to represent India at various international sports events during the CBSE board exams are given special permission for appearing in Board Exams on later dates. This policy was introduced in 2018 and so far 9 students who took benefit of this, got medals for India.
12. **Change in Marking Scheme:** This year the marking scheme prepared for the evaluators will highlight that priority has to be given to creative, correct and relevant answers given by students other than the ones mentioned in the Marking Scheme. This has been done to encourage students to have better conceptual understanding and to be able to overcome issues related to rote-learning and rote-evaluation.
13. **Teacher readiness for active learning and objective evaluation:** More than one lakh teachers of CBSE have been trained for active classroom learning, life skill development, sports main streaming and error free and objective evaluation for X/XII Board exams.





FICCI Alliance for Re-Imagining School Education (FICCI ARISE) is a collegium of members representing various facets of the education ecosystem who have come together to promote the need of quality education for all and the role independent schools can play in achieving this. The primary focus of the alliance is **defining norms for standards and transparency, augmenting quality for 21st century readiness, policy advocacy and facilitating Capacity Building and access.** The alliance advocates for a progressive policy environment that brings together public and independent schools to achieve **Universal Quality Education** in India.

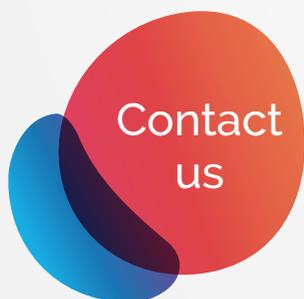
FICCI ARISE endeavours to unify the sectors' voice at States and National level.

We have a national footprint through our National Committee and five Regional Committees. Our members and affiliates are education experts and represent leading schools, industry associations, consulting firms, think tanks, and foundations.



Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies. A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies. The chamber with its presence in 14 states and 10 countries, provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.

Address: FICCI, Federation House, Tansen Marg, New Delhi-110001



education@ficci.com



01123487281/393



www.ficciarise.org | www.ficci.in

Find us on   @FICCIArise