



DIPLOMA IN EDUCATION MANAGEMENT EXAMINATION

PAPER 7: SCIENCE, TECHNOLOGY AND INNOVATION

TIME: 2 HOURS

DATE: 9th August, 2019

INSTRUCTIONS

This paper consists of **TWO** sections

Answer **ALL** the questions in **SECTION A**

Answer any **THREE** questions from **SECTION B**

Answer all the questions in the answer booklet provided

Use of mobile phones in the examination room is prohibited

SECTION A (COMPULSORY)~ 40 MARKS

ANSWER ALL QUESTIONS IN THIS SECTION

1. The Government has embarked on the promotion of digital learning in schools. Integration of ICT in Education is intended to inculcate knowledge and skills that are relevant in the 21st century.
 - (a) Explain **two** ways that the prehistoric man survived by using technology and innovation of the time **(4marks)**
 - (b) Explain **three** ways through which such integration of ICT in Education would promote Science Technology & Innovation in Kenya **(6marks)**
2. Continuous training is a powerful way of enabling educators to acquire various capacities and capabilities for developing and applying Science Technology & Innovation in education.

- (a) Explain **two** functions of Human Resource Development in promoting ST&I in Schools **(4marks)**
- (b) Discuss how education managers would be empowered through professional development training courses **(6 marks)**
3. Over the years, performance in mathematics and sciences in the Kenya Certificate of Secondary Examination (KCSE) in many schools has been unsatisfactory. It would be prudent for schools to strengthen Science Technology and Innovation (ST&I) capabilities as one of the strategies to help improve performance in the said subjects.
- (a) Outline **four** requirements that would empower a school to enhance its ST&I capabilities **(4marks)**
- (b) Explain **three** instructional approaches that you would recommend to mathematics and science teachers so as to improve the performance **(6marks)**
4. It was one joyous Monday morning last month for Benjamin as his several years of hard work were rewarded with his promotion to the position of a Principal. He was then transferred to Amani Secondary School which he realized, had a dire need for a Science laboratory.
- (a) Outline **two** benefits of a Science Laboratory in a school in promoting ST&I **(2marks)**
- (b) Discuss **four** issues that he needs to consider when mobilizing resources for the project **(8marks)**

SECTION B - 60 MARKS

ANSWER ANY THREE QUESTIONS IN THIS SECTION

- 5.
- (a) Explain **five** factors that have contributed to dismal performance in mathematics and sciences in schools in Kenya **(10marks)**

- (b)
- (i) Give **two** reasons for the enactment of the ST&I Act (2013) **(2marks)**
 - (ii) You have been appointed to chair a committee to spearhead the setting up of a modern chemistry laboratory in your school. Explain **four** standards that the laboratory should meet **(8marks)**
6. The following is an excerpt from a speech delivered by Dr. Manu Chandaria, a leading Industrialist during the launch of a business incubation centre at Kenyatta University:
- “Today in Kenya, we have a huge number of intelligent people. Our manpower is the best we can talk about in Eastern part of Africa. Without creation of wealth, there is no way the Country will go anywhere.”
- (a) Explain **five** services that can be provided by ST&I incubation centers **(10marks)**
 - (b) Discuss **five** ways through which Science Technology & Innovation incubation centres can lead to creation of wealth **(10marks)**
7. The Kenya Vision 2030 recognizes Technical and Vocational Education and Training (TVET) as the leading engine that the economy must rely upon to produce adequate levels of middle level manpower to drive the economy.
- (a)
 - (i) Outline the **four** objectives of TVET in Kenya **(4marks)**
 - (ii) Explain **five** challenges facing TVET **(10marks)**
 - (b) Explain **three** achievements of the TVET Sector in Kenya **(6marks)**
- 8.
- (a) Discuss how the characteristics of innovations can influence adoption of technology in teaching and learning **(10marks)**
 - (b) During the Annual Science fair activities, students demonstrate their expertise in Science Technology & Innovation by exhibiting unique

products that they have developed. Sadly, though, the initiatives do not benefit the students and the potential users' dues to lack of technology transfer.

- (i) What is technology transfer **(2marks)**
- (ii) Discuss **four** technology transfer activities that can be used to promote products developed during science fairs **(8marks)**



DIPLOMA IN EDUCATION MANAGEMENT EXAMINATION
PAPER 7: SCIENCE, TECHNOLOGY AND INNOVATION

TIME: 2 HOURS

DATE: 22nd July, 2021

INSTRUCTIONS

This paper consists of **TWO** sections

Answer **ALL** the questions in **SECTION A**

Answer any **THREE** questions from **SECTION B**

Answer all the questions in the answer booklet provided

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SECTION A (COMPULSORY)- 40 MARKS

ANSWER ALL QUESTIONS IN THIS SECTION

1. African indigenous and traditional knowledge provide the foundation to addressing Africa's development challenges.
 - (a) Explain the role of Educational Institutions in preserving African Indigenous knowledge **(2 marks)**
 - (b) Citing specific examples, explain **four (4)** uses of African indigenous knowledge towards promotion of Science, Technology and Innovation **(8marks)**
2. Institutions of learning are supposed to provide opportunities for learners to acquire relevant functional knowledge and skills. Science education should therefore inculcate self-discipline, scientific literacy and commitment in the mind of learners. To realize this, science teachers are called upon to make teaching and learning process practical so as to generate interest and motivate the learners.

Using relevant examples, discuss how the following instructional approaches promote teaching and learning of science in the Institutions of learning.

- (a) Inquiry-based learning (2marks)
- (b) Demonstration (2marks)
- (c) Education visit (2marks)
- (d) Collaborative learning (2marks)
- (e) Role-play (2marks)

3. Science, Technology and Innovation play an important role as a driver to the socio-economic development of a Country. Therefore, Education Institutions are supposed to ensure that adequate and relevant skills are available to learners. To achieve this, teachers need a rich conceptual knowledge of science and teaching skills to provide an interesting, engaging and meaningful science education.

- (a) Discuss three (3) ways through which educational institutions can help the learners to acquire ST&I capabilities (6marks)
- (b) Various Institutions have been established by the government to manage the ST&I sub-sector in Kenya. Describe two (2) functions for each of the following bodies (4marks)
 - (i) National Commission for Science, Technology and Innovation (NACOSTI)
 - (ii) The Kenya National Innovation Agency (KENIA)

4. Successful implementation of ST&I programmes and activities require effective coordination and integration of ST&I into National and Institutional Programmes.

- (a) State two (2) reasons why it is important to integrate ST&I into National and Institutional Programmes (2marks)
- (b) Discuss four (4) roles of educational Institutions in mainstreaming ST&I (8marks)

SECTION B - 60 MARKS

ANSWER ANY THREE QUESTIONS IN THIS SECTION

5. Innovation in the Institutions of learning encourages teachers and students to explore, research and use all the tools to discover new concepts. It involves a different way of looking at problems and providing solutions to the society. However, adoption of such innovations by the society is not automatic but requires a conscious decision of whether to use a particular good or service.
- (a) Describe **five (5)** characteristics that determine adoption of an innovation in the society **(10marks)**
 - b) Explain the following stages of innovation
 - (i) Idea Generation and Mobilization **(2mark)**
 - (ii) Advocacy and Screening **(2mark)**
 - (iii) Experimentation **(2mark)**
 - (iv) Commercialization **(2mark)**
 - (v) Diffusion and Implementation **(2mark)**
6. Learners in education institutions in Kenya in the past have produced many innovations which have failed to reach potential users. Technology transfer helps the Country's economy by making products more competitive in local and international markets.
- (a) Explain **four (4)** benefits of technology transfer for economic development **(8marks)**
 - (b) Identify **two (2)** activities that could help promote technology transfer **(4marks)**
 - (c) State **four (4)** ways through which intellectual property and products can be protected **(8marks)**
7. As part of transforming the ST&I system, Kenya has taken progress in shaping effective policy framework for ST&I through some progressive changes. Despite making some steps, the ST&I face different challenges.
- (a) Highlight **five (5)** issues that inhibit ST&I capabilities in various sectors in Kenya **(10marks)**

- (b) Information and Communication Technology (ICT) sector play an important role by contributing to rapid technological progress and productive growth. ICT support the creation, storage, manipulation and communication of information.

Describe five (5) ways through which ICT can be used to enhance ST&I in education institutions **(10marks)**

8. Rebranding Technical and Vocational Education and Training (TVET) to make it attractive to the youth is necessary given that TVET is expected to play a major role in reducing unemployment and under-employment among youth.

- (a) Discuss three (3) reasons why TVET programs are not attractive to the youth **(6marks)**
- (b) Suggest three (3) ways of making TVET program attractive to the youth **(6marks)**
- (c) Discuss any four (4) initiatives that the Government of Kenya has undertaken to improve the Performance of TVET sub-sector **(8marks)**.



DIPLOMA IN EDUCATION LEADERSHIP AND MANAGEMENT EXAMINATION

PAPER 7: LEADERSHIP IN SCIENCE, TECHNOLOGY, AND INNOVATION

TIME: 2 HOURS

DATE: 22nd September, 2022

INSTRUCTIONS

This paper consists of **TWO** sections

Answer **ALL** the questions in **SECTION A**

Answer any **THREE** questions from **SECTION B**

Answer all the questions in the answer booklet provided

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SECTION A (COMPULSORY)~ 40 MARKS

ANSWER ALL QUESTIONS IN THIS SECTION

1. Indigenous communities in sub-Saharan Africa have always found value in their local forms of knowledge. Societies in the world too depend on their indigenous knowledge to solve their day to day socio-economic problems.
 - (a) Highlight **six (6)** benefits of indigenous knowledge in the education system in Kenya **(6 marks)**
 - (b) State four (4) ways in which Science Technology and Innovation (ST&I) help in the realization of Vision 2030 **(4 marks)**
2. The Kenyan Government has put an effort in Environmental Management by combining Science, Policy, and Economic application in finding

solutions to practical problems that people face in cohabitation with the environment.

Explain five (5) strategies that enhance conservation and Management of the environment (10 marks)

3. Knowledge is created through Research, Science and Technology development.

(a) Explain three (3) ways in which Research contributes in the innovation process (6 marks)

(b) Highlight four (4) reasons why collaboration between the world of work and training Institutions is important (4 marks)

4. Innovation in education encourages students, teachers, and school Managers to research, explore and use all the tools to uncover something new. Innovators are said to have certain characteristics.

As an educator and Innovative Mentor, describe five (5) traits that determine innovation in a school (10 marks)

SECTION B - 60 MARKS

ANSWER ANY THREE QUESTIONS IN THIS SECTION

5. It is argued that solutions to problems that currently plague the continent must proceed from an understanding of local capacities such as the role of indigenous knowledge in promoting sustainable development. This can be achieved by integrating indigenous knowledge into formal education system to address some of the knowledge deficiencies for development that are currently formulated from the Western perspective.

(a) Discuss four (4) roles that indigenous knowledge could play in the teaching/learning process in the various educational systems (12marks)

(b) Discuss four (4) challenges of integrating indigenous knowledge into Kenya's system of education (8 marks)

Students of Osun Secondary School have developed a technology app aimed at solving societal issues. The programme which was the grand finale of 6 months of intensive training for over 300 girls across the country from Public and Private Secondary Schools in coding climaxed with the presentation of an app designed by 12 girls said to be the best app.

- a) Describe five (5) characteristics that will influence the adoption of the app by users **(10 marks)**
- b) “Using innovative teaching methods triggers innovative thinking, ignites a passion for learning and provides students with the tools they need to succeed in the innovation economy. Teachers are however faced with many barriers as they try to embrace daily classroom innovation.”

In view of the above:

- (i) Identify five (5) barriers that hinder innovation in the Kenyan Education ecosystem **(5 marks)**
- (ii) Outline five (5) mitigation measures for the barriers identified in (i) **(5marks)**

In the current educational climate, learners are not performing well in most subjects especially in mathematics and sciences. Learners are unable to see the connection between what they do in the classroom and what they do when they grow up or how their academic achievement can get them there. If we want to have a great future workforce, there is a need for stakeholders in the education sector to consider integrating Science, Technology, Engineering and Mathematics (STEM) Model into the curriculum.

- a) Discuss five (5) approaches you can use to promote an innovative and creative environment for learning **(10 marks)**
- b) Explain how the following three Technology can be used to improve teaching and engage learners in a classroom.
- (i) Robots **(2 marks)**
- (ii) Coding **(2 marks)**

- (c) Explain **four (4)** strategies that can be used to encourage learners to study STEM education **(4 marks)**
8. Vision 2030 has placed special demands on Technical and Vocational Education and Training (TVET) as the leading engine that the economy must essentially rely upon to produce adequate levels of middle-level professionals needed to drive the economy towards the attainment of Vision 2030.
- (a) List and discuss **four (4)** strategies the Government of Kenya should put in place to ensure TVET play its role towards achieving Vision 2030 **(12 marks)**
- (b) Explain **four (4)** ways through which TVET can foster youth empowerment and entrepreneurship **(8 marks)**



DIPLOMA IN EDUCATION LEADERSHIP AND MANAGEMENT EXAMINATION

PAPER 7: LEADERSHIP IN SCIENCE, TECHNOLOGY, AND INNOVATION

TIME: 2 HOURS

DATE: 19th JANUARY, 2023

INSTRUCTIONS

This paper consists of **TWO** Sections

Answer **ALL** the questions in **SECTION A**

Answer any **THREE** questions from **SECTION B**

Answer all the questions in the answer booklet provided.

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SECTION A (COMPULSORY)- 40 MARKS

ANSWER ALL QUESTIONS IN THIS SECTION

1. Kenya has continued to experience drought and worsening food security over the years. Science, technology and innovation can play an important role in addressing the issue of food security through the use of new, existing and emerging technologies such as synthetic biology, artificial intelligence and tissue engineering which may have potential implications for the future of crop and livestock agriculture. Environmental degradation has been recognized locally and globally. Environmental conservation is a fundamental issue that needs to be addressed to battle climate change and global warming. Application of ST&I to all aspects of management of the environment would enhance sustainability.

- (a) Discuss three (3) ways through which the Kenyan Government can harness the potential of such technologies to improve food security (6 marks)
 - (b) Discuss two (2) strategies that Education Institutions can adopt to conserve and manage environment (4 marks)

2. Many Education Institutions do not copyright their products thereby exposing them to imitation. As a result, the products become less competitive and diminishes chances of benefitting from them.
 - (a) With justification, identify two (2) types of innovations in the Education Sector that require protecting (4 marks)
 - (b) Describe three (3) other methods apart from copyright that Education Institutions can adopt to legally protect their innovations (6marks)

3. Technology and Vocational Education and Training (TVET) has emerged as one of the most effective human resource development strategies that Kenya needs to embrace in order to train and modernize their technical workforce for rapid industrialization and national development.
 - (a) Discuss three (3) barriers that has prevented TVET from effectively developing human resources that Kenya needs for rapid industrialization and national development (6 marks)
 - (b) Discuss two (2) initiatives that can make TVET an enabler of Kenyan Vision 2030 (4 marks)

4. Science, Technology, Engineering and Mathematics (STEM) education is a critical component in education for all, that contributes to development of innovative skills. Research has proved that innovation is correlated to superior skills in science and technology and therefore, teachers are expected to adopt strategies that make teaching of STEM subjects more interesting.
 - (a) Identify five (5) barriers to successful implementation of STEM education in Kenya (5 marks)
 - (b) Discuss how the barriers identified in 4(a) can be addressed (5marks)

SECTION B - 60 MARKS

ANSWER ANY THREE QUESTIONS IN THIS SECTION

- 5.
- (a) Discuss five (5) factors that can positively influence the performance of Mathematics and Science in schools **(10marks)**
 - (b) Science laboratories are key to the teaching of Science and implementation of curriculum in schools. What are the minimum standards for Science laboratories as recommended by international baccalaureate **(10 marks)**
6. “It is possible to conclude that the more senses that are used in acquiring knowledge, the deeper the impression that is made on the mind and the more likely that the knowledge will be retained”. (Jacinta & Regina, 1981)
- (a) Explain five (5) benefits of active learning **(10 marks)**
 - (b) Discuss five (5) strategies recommended for incorporating the inquiry approach into Institutions **(10 marks)**
7. Technology transfer is a process through which technical information and products developed by innovators is provided to potential users.
- (a) Explain five (5) benefits of technology transfer **(10 marks)**
 - (b) Discuss five (5) practices that enhance creativity in education **(10marks)**
8. TVET Institutions are one of the main engines that economy must essentially rely upon to produce adequate manpower needed to drive economy towards attainment of Vision 2030
- (a) Outline six (6) good practices that a TVET Institution must focus on **(6 marks)**
 - (b) Outline four (4) objectives of TVET in Kenya **(4 marks)**
 - (c) Identify five (5) challenges facing TVET Institutions in Kenya **(5marks)**
 - (d) Discuss measures that can be adopted to mitigate the challenges mentioned in 8(c) **(5 marks)**