KĀSIGA SCHOOL

DEHRADUN

Holiday Homework Summer Break 2020

Advanced Level

ENGLISH

Analyse the speech below

From The Tragedie of Richard III

Actus Primus. Sceena Prima.

Enter Richard Duke of Gloster, solus.

Now is the Winter of our Discontent,
Made glorious Summer by this Son of Yorke:
And all the clouds that lowr'd vpon our house
In the deepe bosome of the Ocean buried.
Now are our browes bound with Victorious Wreathes,
Our bruised armes hung vp for Monuments;
Our sterne Alarums chang'd to merry Meetings;
Our dreadfull Marches, to delightfull Measures,
Grim-visag'd Warre, hath smooth'd his wrinkled Front:
And now, in stead of mounting **Barbed Steeds**,
To fright the Soules of fearfull Aduersaries,
He capers nimbly in a Ladies Chamber,
To **the lasciuious pleasing** of a Lute.
But I, that am not shap'd for sportiue trickes,
Nor made to court an amorous Looking-glasse:
I, that am Rudely stampt, and **want** loues Maiesty,
To strut before a wonton **ambling** Nymph:
I, that am curtail'd of this faire Proportion,
Cheated of Feature by dissembling Nature,
Deform'd, vn-finish'd, sent before my time
Into this breathing World, scarse halfe made vp,
And that so lamely and vnfashionable,
That dogges barke at me, as I **halt** by them.
Why I (in this weake **piping** time of Peace)
Haue no delight to passe away the time,
Vnlesse to see my Shadow in the Sunne,
And **descant** on mine owne Deformity.
And therefore, since I cannot proue a Louer,
To entertaine these faire well spoken dayes,
I am determined to proue a Villaine,
And hate the the idle pleasures of these dayes.
Plots haue I laide, **Inductions** dangerous,
By drunken Prophesies, Libels, and Dreames,
To set my Brother Clarence and the King
In deadly hate, the one against the other:
And if King Edward be as true and iust,
As I am Subtle, False, and Treacherous,
This day should Clarence closely be **mew'd vp**:
About a Prophesie, which sayes that G,
Of Edwards heyres the murtherer shall be,
Diue thoughts downe to my soulle; here Clarence comes.

PURE MATHEMATICS 3

1. Using the substitution $u = e^x$, or otherwise, solve the equation

$$e^x = 1 + 6e^{-x},$$

giving your answer correct to 3 significant figures. [4]

2. The parametric equations of a curve are

$$x = 3(1 + \sin^2 t), \quad y = 2\cos^3 t.$$

Find $\frac{dy}{dx}$ in terms of t, simplifying your answer as far as possible. [5]

3. The polynomial $x^4 + 3x^3 + ax + 3$ is denoted by $p(x)$. It is given that $p(x)$ is divisible by $x^2 - x + 1$.

(i) Find the value of a. [4]

(ii) When a has this value, find the real roots of the equation $p(x) = 0$. [2]

4. **(i)** By sketching a suitable pair of graphs, show that the equation

$$\sec x = 3 - \tfrac{1}{2}x^2,$$

where x is in radians, has a root in the interval $0 < x < \frac{1}{2}\pi$. [2]

(ii) Verify by calculation that this root lies between 1 and 1.4. [2]

(iii) Show that this root also satisfies the equation

$$x = \cos^{-1}\left(\frac{2}{6 - x^2}\right).$$ [1]

(iv) Use an iterative formula based on the equation in part **(iii)** to determine the root correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

5. **(i)** Express $\cos x + 3\sin x$ in the form $R\cos(x - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$, giving the exact value of R and the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation $\cos 2\theta + 3\sin 2\theta = 2$, for $0° < \theta < 90°$. [5]

6. Let $f(x) = \dfrac{12 + 8x - x^2}{(2 - x)(4 + x^2)}$.

(i) Express $f(x)$ in the form $\dfrac{A}{2 - x} + \dfrac{Bx + C}{4 + x^2}$. [4]

(ii) Show that $\displaystyle\int_0^1 f(x)\,dx = \ln\left(\tfrac{25}{2}\right)$. [5]

7. Expand $\frac{16}{(2+x)^2}$ in ascending powers of x, up to and including the term in x^2, simplifying the coefficients. [4]

8. The equation of a curve is $y = \frac{e^{2x}}{1+e^{2x}}$. Show that the gradient of the curve at the point for which $x = \ln 3$ is $\frac{9}{50}$. [4]

9. **(i)** Express $8\cos\theta + 15\sin\theta$ in the form $R\cos(\theta - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation $8\cos\theta + 15\sin\theta = 12$, giving all solutions in the interval $0° < \theta < 360°$. [4]

10. The polynomial $p(x)$ is defined by

$$p(x) = ax^3 - x^2 + 4x - a,$$

where a is a constant. It is given that $(2x - 1)$ is a factor of $p(x)$.

(i) Find the value of a and hence factorise $p(x)$. [4]

(ii) When a has the value found in part **(i)**, express $\frac{8x - 13}{p(x)}$ in partial fractions. [5]

11. **(i)** Use the substitution $u = \tan x$ to show that, for $n \neq -1$,

$$\int_0^{\frac{1}{4}\pi} (\tan^{n+2} x + \tan^n x)\,dx = \frac{1}{n+1}.$$ [4]

(ii) Hence find the exact value of

(a) $\int_0^{\frac{1}{4}\pi} (\sec^4 x - \sec^2 x)\,dx$, [3]

(b) $\int_0^{\frac{1}{4}\pi} (\tan^9 x + 5\tan^7 x + 5\tan^5 x + \tan^3 x)\,dx$. [3]

PSYCHOLOGY

1. With the help of internet prepare a write up on given topics.-
   - Symptoms of Schizophrenia
   - Causal factors
   - Treatment modalities

   Refer to the various case studies and patients reports published on the web pages of different hospitals (mention the findings in short and try to relate them with the studies given in course book)

2. Screen any movie relevant to the field of abnormal Psychology and prepare a case study on the chosen disorder.

ECONOMICS

Project 1: Externalities, Market Failures and the Role of the Government in the context of COVID 19

Project 2: Use of cost-benefit analysis in decision-making

Learners need to focus on any suitable 4 projects in their own country such as:

- subsidies on biofuels
- greater competition in markets, such as the postal service
- the reduction of income and wealth inequality, such as through a minimum wage or an increase in the top rate of income tax
- the introduction of carbon trading to reduce CO_2 emissions
- a major infrastructure project, such as building a new motorway
- relaxing planning controls on the building of new houses
- building a flood-relief scheme
- constructing a new power station
- Producing genetically modified food.

Each learner then researches the necessary information for their project on the internet and writes a report on the extent to which cost-benefit analysis can be applied and what it implies.

Some standard instruction to prepare the report:

1. Font and font size: Times new Roman, 12
2. For headings font size: 14
3. Maximum no of pages: 20 (including the cover page)
4. Cover page information contains Title of the project, Name of the students, admission no, Class, and Subject
5. Submission date of the report: 4th July, 2020

History

Answer the following questions after referring to the internet. Answer the questions in a register which can later be used as a class work copy.

1. Why and how was the period between late 1940s and 1950s a time of economic prosperity in USA? Answer the question keeping the following points in the mind.
   a. The growth of the US middle class
   b. The consumer economy
   c. The role of the Federal government
2. How great was the social change experienced by USA in the late 1940s and 1950s? Answer keeping the following points in the mind.
   a. The growth of the suburbs and exurbs
   b. The role and status of women
   c. The impact of new mass media
3. How far was the period from late 1940sto the 1950s a time of political stability in USA? Answer keeping the following points the mind.
   a. The election of Truman in 1948
   b. McCarthyism and the Red Scare
   c. Eisenhower's domestic policies
4. Watch the film 'Escape from Sobibor' and describe the life of the Jews in the death camps under Nazi rule.

PHYSICS

Topic: Hall Voltage

Make a PowerPoint presentation to include the following points (the submission is not the PowerPoint file, but the spoken presentation you will give, with the aid of the file):

derive the expression $V_H = \frac{BI}{ntq}$ for the Hall voltage, where t = thickness

describe and analyse qualitatively the deflection of beams of charged particles by uniform electric and uniform magnetic fields

explain how electric and magnetic fields can be used in velocity selection

explain the main principles of one method for the determination of v and $\frac{e}{m_e}$ for electrons

The duration of the presentation should be 5-7 minutes. Include as many examples as you can, and try to make it interactive.