2915/303
INDUSTRIAL CHEMISTRY II
AND QUALITY ASSURANCE
Oct./Nov. 2021
Time: 4 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ANALYTICAL CHEMISTRY

MODULE III

INDUSTRIAL CHEMISTRY II AND QUALITY ASSURANCE

4 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Non-programmable scientific calculator.
*This paper consists of **TWO** sections; **A** and **B**.*
*Answer **ALL** questions in section **A** and any **THREE** questions from section **B**.*
*Each question in section **A** carries **4** marks while each question in section **B** carries **20** marks.*
Maximum marks for each part of the question are indicated.
Candidates should answer the questions in English.

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (40 marks)

*Answer **ALL** the questions in this section.*

1. State **four** beneficial effects of pesticides. (4 marks)

2. (a) Define the term "fumigants" as used in pesticides control. (2 marks)

   (b) List **two** classes of pesticides. (2 marks)

3. Differentiate between organic and mineral fertilizers. (4 marks)

4. Distinguish between paraffinic and asphaltic oils. (4 marks)

5. (a) Explain the term *bagasse* as used in sugar production. (2 marks)

   (b) State **two** uses of bagasse. (2 marks)

6. List **four** details that a label on a container for commercially sold chemical will indicate. (4 marks)

7. State **four** characteristics of a good management system. (4 marks)

8. Distinguish between certification and accreditation. (4 marks)

9. State **four** characteristics of a good laboratory practice. (4 marks)

10. State **four** environmental factors that may affect quality of a measurement. (4 marks)

SECTION B (60 marks)

*Answer **THREE** questions from this section.*

11. (a) Describe the Kjeldahl method of analysing fertilizers. (8 marks)

    (b) Explain the following parameters as used in the analysis of petroleum products:

    (i) colour;
    (ii) saponification number;
    (iii) acid value;
    (iv) iodine value.

    (8 marks)

    (c) (i) Define the term *records*. (2 marks)
    (ii) State **two** uses of records in the laboratory. (2 marks)

12. The following titre values in cm^3 where obtained during the analysis of magnesium in drinking water samples of titration method of analysis. 25.92, 26.00, 26.20, 25.00.

(a) Explain why the analysis was carried out **four** times and not once. (2 marks)

(b) Calculate the:

(i) mean litre volume; (3 marks)
(ii) standard deviation of the litre volume; (12 marks)
(iii) standard error in the values at the 99.5% confidence limit. (3 marks)
Hint : *Use the critical values of t-distribution provided.*

13. (a) Explain **four** uses of certified reference materials in an analysis. (8 marks)

(b) Explain **six** steps of conducting an internal quality audit. (12 marks)

14. (a) (i) Define the term *quality manual*. (2 marks)
(ii) Explain **four** importance of quality manuals to an organization. (8 marks)

(b) (i) List **four** importance of benchmarking to an organization. (4 marks)
(ii) Explain any **three** principles of quality control as used in an organization. (6 marks)

15. (a) Explain **five** ways of reducing petroleum pollutant in the environment. (10 marks)

(b) Define the following types of polymers , giving examples in each case:

(i) Natural polymers;
(ii) Semi-synthetic polymers;
(iii) Synthetic polymer.

(6 marks)

(c) List **four** parameters tested in a national cement production company. (4 marks)

Critical Values of the t - Distribution

	Level of significance for two-tailed test						
df (v)	0.2	0.1	0.05	0.02	0.01	0.005	0.001
	20%	10%	5%	2%	1%	0.5%	0.1%
1	3.077684	6.313752	12.706205	31.820516	63.656741	127.321336	636.619249
2	1.885618	2.919986	4.302653	6.964557	9.924843	14.089047	31.599055
3	1.637744	2.353363	3.182446	4.540703	5.840909	7.453319	12.923979
4	1.533206	2.131847	2.776445	3.746947	4.604095	5.597568	8.610302
5	1.475884	2.015048	2.570582	3.364930	4.032143	4.773341	6.868827
6	1.439756	1.943180	2.446912	3.142668	3.707428	4.316827	5.958816
7	1.414924	1.894579	2.364624	2.997952	3.499483	4.029337	5.407883
8	1.396815	1.859548	2.306004	2.896459	3.355387	3.832519	5.041305
9	1.383029	1.833113	2.262157	2.821438	3.249836	3.689662	4.780913
10	1.372184	1.812461	2.228139	2.763769	3.169273	3.581406	4.586894
11	1.363430	1.795885	2.200985	2.718079	3.105807	3.496614	4.436979
12	1.356217	1.782288	2.178813	2.680998	3.054540	3.428444	4.317791
13	1.350171	1.770933	2.160369	2.650309	3.012276	3.372468	4.220832
14	1.345030	1.761310	2.144787	2.624494	2.976843	3.325696	4.140454
15	1.340606	1.753050	2.131450	2.602480	2.946713	3.286039	4.072765
16	1.336757	1.745884	2.119905	2.583487	2.920782	3.251993	4.014996
17	1.333379	1.739607	2.109816	2.566934	2.898231	3.222450	3.965126
18	1.330391	1.734064	2.100922	2.552380	2.878440	3.196574	3.921646
19	1.327728	1.729133	2.093024	2.539483	2.860935	3.173725	3.883406
20	1.325341	1.724718	2.085963	2.527977	2.845340	3.153401	3.849516
21	1.323188	1.720743	2.079614	2.517648	2.831360	3.135206	3.819277
22	1.321237	1.717144	2.073873	2.508325	2.818756	3.118824	3.792131
23	1.319460	1.713872	2.068658	2.499867	2.807336	3.103997	3.767627
24	1.317836	1.710882	2.063899	2.492159	2.796939	3.090514	3.745399
25	1.316345	1.708141	2.059539	2.485107	2.787436	3.078199	3.725144
26	1.314972	1.705618	2.055529	2.478630	2.778715	3.066909	3.706612
27	1.313703	1.703288	2.051830	2.472660	2.770683	3.056520	3.689592
28	1.312527	1.701131	2.048407	2.467140	2.763262	3.046929	3.673906
29	1.311434	1.699127	2.045230	2.462021	2.756386	3.038047	3.659405
30	1.310415	1.697261	2.042272	2.457262	2.749996	3.029798	3.645959
31	1.309464	1.695519	2.039513	2.452824	2.744042	3.022118	3.633456
32	1.308573	1.693889	2.036933	2.448678	2.738481	3.014949	3.621802
33	1.307737	1.692360	2.034515	2.444794	2.733277	3.008242	3.610913
34	1.306952	1.690924	2.032244	2.441150	2.728394	3.001954	3.600716
35	1.306212	1.689572	2.030108	2.437723	2.723806	2.996047	3.591147
40	1.303077	1.683851	2.021075	2.423257	2.704459	2.971171	3.550966
45	1.300649	1.679427	2.014103	2.412116	2.689585	2.952079	3.520251
50	1.298714	1.675905	2.008559	2.403272	2.677793	2.936964	3.496013
60	1.295821	1.670649	2.000298	2.390119	2.660283	2.914553	3.460200
70	1.293763	1.666914	1.994437	2.380807	2.647905	2.898734	3.435015
80	1.292224	1.664125	1.990063	2.373868	2.638691	2.886972	3.416337
90	1.291029	1.661961	1.986674	2.368497	2.631565	2.877884	3.401935
100	1.290075	1.660234	1.983971	2.364217	2.625891	2.870652	3.390491
120	1.288646	1.657651	1.979930	2.357825	2.617421	2.859865	3.373454
df (v)	10%	5%	2.5%	1%	0.5%	0.25%	0.05%
	0.1	0.05	0.025	0.01	0.005	0.0025	0.0005
	Level of significance for one-tailed test						

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