

**UNIVERSITY OF BUEA**  
**COLLEGE OF TECHNOLOGY**

**ENTRANCE EXAMINATION INTO FIRST YEAR OF BTECH PROGRAM**  
SUBJECT/ SPECIALTY: MATHEMATICS/ GCE TECHNICAL  
DATE: 27/09/17 TIME: 08.00 – 11.00  
TIME ALLOWED: 3 HOURS COEFFICIENT: 4  
INSTRUCTIONS: - Answer ALL questions

**QUESTION ONE: (5 marks)**

Simplify

$$\frac{\sqrt{27} + \sqrt{75}}{2\sqrt{12}}$$

**QUESTION TWO: (8 marks)**

Use Cramer rule to solve the system

$$2x - 3y = 5$$

$$3x + 4y = -2$$

**QUESTION THREE: (10 marks)**

Prove that

$$\frac{\sin 3\theta}{\cos \theta} + \frac{\cos 3\theta}{\sin \theta} = \cot \theta - \tan \theta$$

**QUESTION FOUR: (8 marks)**

Express in partial fraction

$$\frac{x^3 - 2x^2 - 4x - 4}{x^2 + x - 2}$$

**QUESTION FIVE: (7 marks)**

Evaluate

$$\frac{\log 25 - \log 125 + \frac{1}{2} \log 625}{3 \log 5}$$

**QUESTION SIX: (12 marks)**

If  $z_1 = 1 - j3$ ,  $z_2 = -2 + j5$  and  $z_3 = -3 - j4$  determine in  $a + jb$  form.

a)  $\frac{z_1 z_2}{z_1 + z_2}$       (b)  $z_1 z_2 z_3$

**QUESTION SEVEN: (15 marks)**

Find  $\int \sin^2 t \cos^4 t dt$

**QUESTION EIGHT: (5 marks)**

Find the curve which satisfies the equation

$$xy = (1 + x^2) \frac{dy}{dx}$$

and passes through the point (0,1)

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**ENTRANCE EXAMINATION INTO FIRST YEAR OF BTECH PROGRAM**

**SUBJECT/ SPECIALTY:** PHYSICS/ GCE TECHNICAL

**DATE:** 27/09/17

**TIME:** 12.00 – 15.00

**TIME ALLOWED:** 3 HOURS

**COEFFICIENT:** 4

**INSTRUCTIONS:** - Answer ALL questions

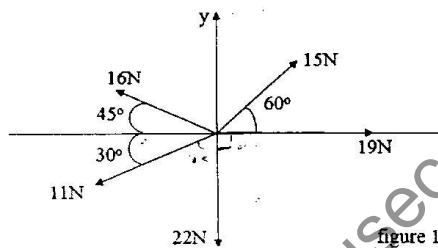
Acceleration due to free fall,  $g = 9.8 \text{ ms}^{-2}$ ; Speed of light in free space,  $c = 3.00 \times 10^8 \text{ ms}^{-2}$ ;

Electronic charge,  $e = -1.6 \times 10^{-19} \text{ C}$ ; Electronvolt,  $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$ ;

Permittivity of free space,  $\epsilon_0 = 8.85 \times 10^{-12} \text{ Fm}^{-1}$ .

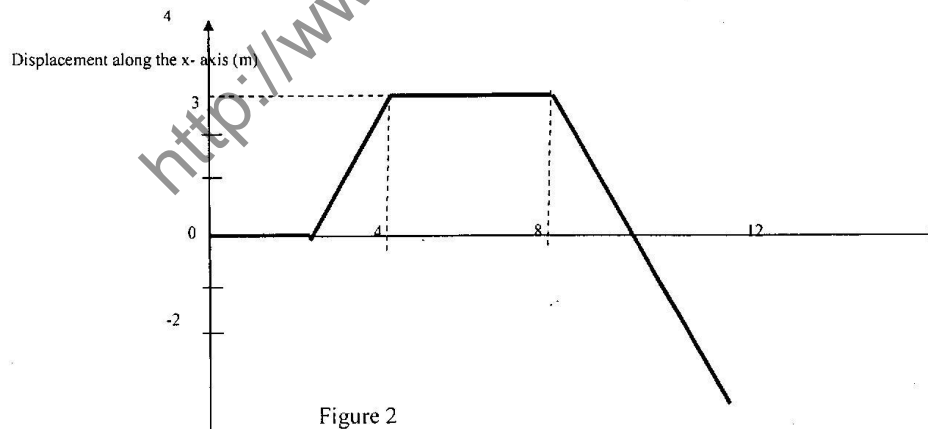
**QUESTION ONE: (15 marks)**

The coplanar, forces shown in figure 1, below act on an object. Find their resultant



**QUESTION TWO: (10 marks)**

An object's one dimensional motion along the x- axis is graphed in figure 2. Describe its motion.



**QUESTION THREE: (9 marks)**

672000J of thermal energy are required to change the temperature of 2kg water at 20° C to 100° C.

Calculate

- The heat capacity of water. ( 3 marks)
- The specific heat capacity of water.( 3 marks)
- The amount of thermal energy transferred from the water when its temperature changes from 80° C to 20° C. ( 3 marks)

**QUESTION FOUR: (10 marks)**

A certain parallel – plate capacitor consists of two plates, each with area 200cm<sup>2</sup>, separated by a 0.4cm air gap.

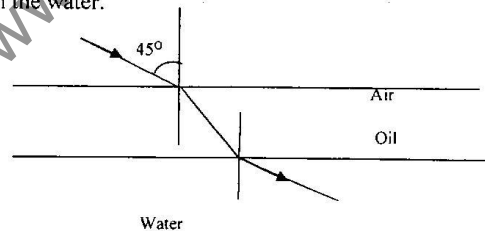
- Calculate the capacitance
- If the battery is connected across a 500V source, find the charge on it, the energy stored in it, and the value of E between the plates.
- If a liquid with  $K=2.6$  is poured between the plates so as to fill the air gap, how much additional charge will flow onto the capacitor from the source?

**QUESTION FIVE: (5 marks)**

- What is refraction
- What is the critical angle for light passing from glass ( $n=1.54$ ) to water ( $n=1.33$ )

**QUESTION SIX: (10 marks)**

A layer of oil ( $n=1.45$ ) floats on water ( $n=1.33$ ). A ray of light shines on to the oil with an incidence angle of 40°. Find the angle the ray makes in the water.



**QUESTION SEVEN: (5 marks)**

A double convex lens has faces of radii 18 and 20cm. When an object is 24cm from the lens, a real image is formed 32cm from the lens. Determine

- The focal length
- The refractive index of the lens material

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**ENTRANCE EXAMINATION INTO FIRST YEAR OF BTECH PROGRAM**

**SUBJECT/ SPECIALTY:** USE OF ENGLISH

**DATE:** 27/09/17

**TIME:** 16.00 – 17.00

**TIME ALLOWED:** 1 HOUR

**COEFFICIENT:** 1

**INSTRUCTIONS:** : - Answer ALL questions  
- Mark an X on the letter corresponding to the correct answer in your answer booklet

1. The match resulted \_\_\_\_ a draw.  
A. in B. to C. by D. into
2. The prosecution charged Ngong \_\_\_\_ rape.  
A. with B. for C. of
3. The man asked \_\_\_\_ and David several questions after the programme.  
A. she B. her
4. Paul and Linda love \_\_\_\_ .  
A. one another B. themselves C. each other
5. The students in my class care for \_\_\_\_ .  
A. themselves B. one another C. each other D. A & B
6. After two days of negotiations the manager convinced the worker's union to \_\_\_\_ the strike.  
A. call off B. call up C. call out
7. All their plans of setting up a new textile factory \_\_\_\_ because of the recession.  
A. fell through B. fell out C. fell off
8. I can't \_\_\_\_ this nonsense any more.  
A. Put down for B. Put up for C. Put up with
9. Linda was so well dressed. In fact, she \_\_\_\_ at the party.  
A. stood off B. stood away C. stood out
10. Boys tend to behave like their fathers. Girls similarly \_\_\_\_ their mothers.  
A. take after B. take off C. take on
11. The meeting has been \_\_\_\_ to a later date.  
A. put off B. put away C. put aside
12. Don't worry we'll have to wait a little longer because I'm sure he'll... soon.  
A. turn up B. turn in C. turn down
13. I couldn't be on time because I was ... by traffic.  
A. held out B. held up C. held down
14. Each of the 70 girls \_\_\_\_ all the regulations.  
A. observe B. observes C. are observing
15. Either the student leaders or Elong \_\_\_\_ responsible for the uprising.  
A. was B. were C. are

16. Ngwang, not his students \_\_\_\_\_ responsible for the disorder.  
**A. were B. was C. is**
17. The family \_\_\_\_\_ occupied with their individual problems.  
**A. is B. are C. was**
18. The trousers you bought \_\_\_\_\_ you so well.  
**A. fit B. fits C. is fitting**
19. The phenomena we observed \_\_\_\_\_ so interesting.  
**A. is B. are C. was**
20. By the time I'm 50 \_\_\_\_\_ 50 million francs.  
**A. will make B. would make C. will have made**
21. Hey, you \_\_\_\_\_ at that computer all day. You should really take a break. (to sit)  
**A. have been sitting B. were sitting C. did sit**
22. He claimed that he had never seen that man, but I know that \_\_\_\_\_. (to see)  
**A. he did B. he had C. he was.**
23. The rebels were \_\_\_\_\_ in spite of international criticism. (hang)  
**A. hung B. hanged C. being hung**
24. \_\_\_\_\_ I in your shoes I wouldn't have done better.  
**A. was B. were C. am**
25. Take this \_\_\_\_\_ of stairs and turn left.  
**A. flock B. flight C. group**
26. The abstract noun formed from 'confide' is \_\_\_\_\_.  
**A. confider B. comfort C. confidence**
27. Antique .....less in London than in Paris.  
**A. furniture costs B. furnitures cost C. furnitures costs**
28. Jane is the ... of the twins.  
**A. tallest B. taller C. most tall**
29. You ought to drive ... in town.  
**A. very slow B. slow C. slowly**
30. Which of these words is the odd one:  
**A. oddly B. happily C. oily**