Student's Assessment Number.....

THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

081 ELECTRONICS AND COMMUNICATION ENGINEERING

Time: 2:30 Hours **Year: 2022**

Instructions

1. This paper consists of sections **A, B** and **C** with a total of **ten (10)** questions**.**
2. Answer **all** questions.
3. Section **A** and **C** carry **fifteen (15)** marks each, section **B** carries **seventy (70)** marks.
4. Cellular phones and any unathorized materials are **not** allowed in the assessmenmt room.
5. Write your **Assessment Number** at the top right hand corner of every page.

FOR ASSESSOR'S USE ONLY		
QUESTION NUMBER	**SCORE**	**ASSESSOR'S INITIALS**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
TOTAL		
CHECKER'S INITIALS		

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SECTION A (15 MARKS)

Answer **all** questions in this section

1. Select the correct answer from the given alternatives by writing the letter of the most correct answer in the box provided.

   i) The ISO specifies size of technical drawing sheets according to different uses. Which ISO standards would you use for correct measurements of A3 paper sheet size?

   A. 494×841

   B. 297×420

   C. 420×494

   D. 491×420

   ii) Two lamps rated 100W are connected in series across a 200 V supply. How much will the power be consumed?

   A. 25 W

   B. 50 W

   C. 100 W

   D. 200 W

   iii) For a small value of drain to source voltage, JFET behaves like a passive component. Which of the components has the same behavior?

   A. Diode

   B. Rectifier

   C. Inductor

   D. Ics

   iv) A technician used a measuring instrument to test a television power cable when the supply was off and discovered that it was defective. Select the instrument, which was used to discover the problem.

A. An Ammeter

B. Voltmeter

C. Ohmmeter

D. Signal generator

v) A student was asked to measure the amplitude of the output signal wave form. Identify the equipment used in his assignment.

A. Oscillator

B. Multimeter

C. Signal generator

D. CRO.

vi) In modifying the properties of a pure semiconductor material in a certain industry, a pentavalent element is added. Identify the type of extrinsic semiconductor obtained by the industry.

A. NPN-type

B. PNP-type

C. P-type

D. N-type.

vii) You have decided to help your friend who got a minor burn on his hand. What will be your first action to casualty?

A. Call the medical doctor

B. Flush the burn with cold water

C. Cover the burn with a dry dressing

D. Remove any burnt material from the wound

viii) What will be the outcome if the channel block in Figure 1 is removed?

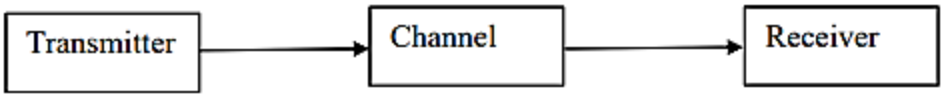

Figure 1

A. The transmitter will fail to transmit the information

B. The information will easily pass to the channel

C. The transmitter will cross over the information to the receiver

D. Information will not reach to the receiver

ix) What is the status of transistor when it operates in cut-off and saturation condition?

A. It behaves like a linear amplifier.

B. It acts like a switch.

C. It behaves like a variable capacitor.

D. It can vary resistance as a variable resistor.

x) Why does a full-wave rectifier has a twice the efficiency of a half-wave rectifier?

A. It utilizes both half cycle of the input.

B. It uses a center tape transformer.

C. It has less an increased ripple factor.

D. It has a double output frequency.

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2. Match the diode characteristics interpretations in List A with the corresponding diode characteristics in List B by writing the letter of the correct response below the item number in the table provided.

LIST A	**LIST B**
i) Minimum reverse voltage at which PN junction down fall with sudden rise in reverse current. ii) Forward voltage at which the current through the junction start to increase rapidly. iii) Highest power that can be dissipated at the junction without damage. iv) Maximum reverse voltage that can be applied to PN junction without damaging the junction. v) Highest forward current that a PN junction can conduct without damage to the junction.	A. Maximum forward current. B. Peak inverse voltage. C. Peak forward junction current. D. Maximum power transfer. E. Minimum power transfer. F. Maximum power rating. G. Knee voltage. H. Break down voltage

ANSWERS

List A	(i)	(ii)	(iii)	(iv)	(v)
List B					

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SECTION B (70MARKS)

Answer **all** questions from this section

3. A transformer with voltage rate of 240 V to 12 V failed to operate in a certain power system. You are assigned to reconstruct the specified transformer by using 800 turns primary winding,

   (a) calculate the number of turns for its secondary winding,

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   (b) estimate the secondary and primary current when the transformer supplies a 12V,12W system.

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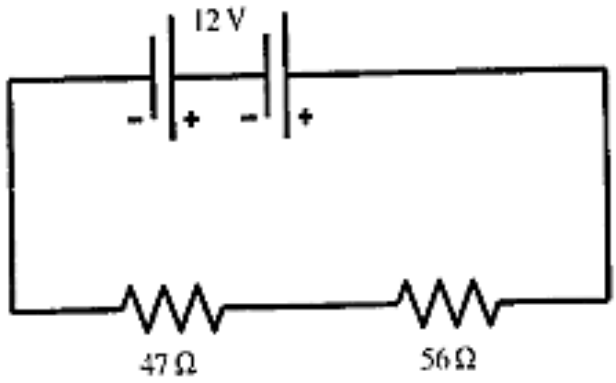
   (c) Represent the transformer you constructed by its schematic symbol

4. Electrical quantities in a circuit can be measured by using measuring instruments or calculations. Study the figure below carefully and then answer the questions that follow.



a) Calculate the total current flowing in the circuit.

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b) Calculate the p.d across each resistor.

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c) Calculate the sum of the p.d

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5. (a) You are required to construct a common emitter amplifier with an input resistance of 2.5 k Ω and a voltage gain of 200. The input signal voltage is 5 mV and the value of β is 350. You have realized that your circuit will not operate properly because some important parameters are missing. Calculate the following missed parameters in order to accomplish the circuit requirements.

i) Base current

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ii) Collector current

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iii) Power gain.

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(c) Why the common emitter amplifier is commonly used rather than common base and common collector amplifiers? Give three reasons.

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6. (a) During working practice sessions, the teacher required every student to wear hard hat, goggles, ear defender, gloves, overcoat and a mask a before entering the workshop. What is the importance of each item rquested by the teacher?

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(b) Every student who studies elecctronics and communication engineering must be conversant and adhere to four main safety signs used at work place. Brielfy explain the significance of each sign

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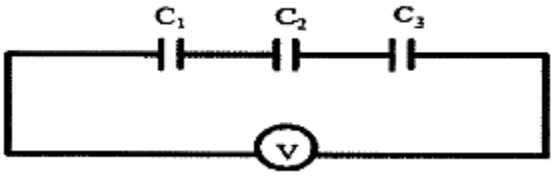
7. The figure below is a basic electric circuit with three capacitors connected in series across a supply voltage (V). Study it carefully and then answers the questions that follow.



How would you determine mathematically the following parameters of the given circuit?

a) Charge on each capacitor.

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b) Voltage across each capacitor.

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c) Voltage supplied in a circuit.

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d) Total capacitance in a circuit.

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e) Energy stored in a circuit.

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8. During group discussion, your fellow students selected you to explain about different types of diodes. Simplify your explanation by using schematic symbols to illustrate six types of diodes.

Name of Diode	**Symbol of diode**
(a)	
(b)	
(c)	
(d)	
(e)	
(f)	

9. When an A.C voltage (V) of a frequency (f) is applied to a capacitor (C) which is connected in series with a coil (L) of a resistance (R), the resonance which occurred causes minimum impedance and large voltages across (C) and (L). If the value of V = 24 V, R = 100 Ω, C = 10 μF, L = 2.0 H, f = 50 Hz, determine:

   a) The inductive reactance

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   b) Capacitive reactance

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   c) The impedance of the circuit

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d) The r.m.s current

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SECTION C (15 MARKS)

Answer **all** questions from this section

10. An isometric block can be seen from different views. Justify this fact by producing three views in third angle projections. Note: Put your measurements in milimetres (mm).