Photovoltaic Systems 1
5265

GENERAL CERTIFICATE OF EDUCATION BOARD
Technical and Vocational Education Examination

JUNE 2025 **INTERMEDIATE LEVEL**

Specialty Name and Acronym	**ELECTRONICS – ELN**
Centre No. & Name	
Candidate No.	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

5265 PHOTOVOLTAIC SYSTEMS 1: MULTIPLE CHOICE QUESTION PAPER

Duration: One and a Half Hours

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the examination begins:

3. Check that this question booklet is headed "**Intermediate Level – 5265 PHOTOVOLTAIC SYSTEMS 1**.
4. Insert the information required in the spaces above.
5. Insert the information required in the spaces provided on the answer sheet using your HB pencil:

   Candidate Name, Exam Session, Subject Code, Centre Number and Candidate Number.

   Take care that you do not erase or fold the answer sheet or make any marks on it other than those asked for in these instructions.

How to answer the questions in this examination:

6. Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.
7. Each question has FOUR suggested answers: **A, B, C** and **D**. Decide which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.

   For example, if **C** is your correct answer, mark **C** as shown below:

   [A] [B] ~~[C]~~ [D]

8. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.
9. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.
10. Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
11. **You must not take this booklet and the answer sheet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.**
12. **Non programmable calculators area allowed.**

1. Solar collector converts solar energy into:
   A Chemical energy
   B Mechanical energy
   C Thermal energy
   D Electrical energy

2. Why is renewable energy termed eco-fiendly?
   A Because it has a low maintenance cost
   B Because it being replenished as it is being used
   C Because it is given by nature
   D Because it does not pollute the environment

3. Choose from the list below the factor that affects solar radiation.
   A Wind
   B Tild angle
   C Size of panel
   D Cloud cover

4. Which of the following forms of renewable energy has been traditionally used for over centuries?
   A Hydro-electric
   B Wind
   C Solar energy
   D Fossil fuel

5. Give the name of the energy source that is responsible for the main energy on earth.
   A The wind
   B Water
   C Tides
   D The sun

6. Name a disadvantage of solar energy.
   A It pollutes the atmosphere
   B It has a high maintenance cost
   C It has a high initial cost of installation
   D It makes a lot of noise

7. The measure of the energy density of sunlight is termed:
   A irradiation
   B irradiance
   C air mass
   D peak sun

8. The measure of the power density of sunlight is termed:
   A irradiantion
   B irradiance
   C air mass
   D peak sun

9. What is the name of the energy generated from wood?
   A Biomass
   B Solar
   C Hydro
   D Coal

10. Give the name of the instrument used in measuring the amount of solar irradiation reaching a given surface.
   A Sunshine recorder
   B Solarimeter
   C Thermometer
   D Radiometer

11. Which of the following is an example of a pentavalent atom?
   A Boron
   B Phosphorus
   C Indium
   D Gallium

12. A semiconductor with impurities is known as a/an
   A Conductor
   B Dopant
   C Extrinsic
   D Intrinsic

13. What is dopping?
   A It is the process of adding impurities to a semiconductor material
   B It is the process of bonding two atoms
   C It is the process by which an electron moves to fill a hole
   D It is the process of ionisation

14. Select from the list below the material that is mostly used for producing solar cells.
   A Cadmium
   B Silicon
   C Germanium
   D Selenium

15. How many cells are there in a 100W, 18.4V solar panel if a cell produces 0.46V?
   A 40
   B 32
   C 18
   D 16

16. If ten solar cells of 2A each are connected in series and one of the is shaded, what will be the resulting output current?
   A 0A
   B 20A
   C 10A
   D 2A

17. The power output of a PV module at Standard Test Conditions STC is at an irrandance of
A 1KWh
B 1KW/m²
C 1Wh/m²
D 1KWh/m²

18. Which of the I-V characteristics curves numbered 1 to 4 (Figure 1) represents two solar cells connected in parallel?

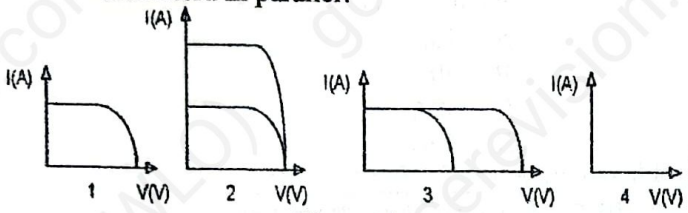

Figure 1

A 1
B 2
C 3
D 4

19. If two solar panels of rating 12V/10A are connected in series, calculate the output of the system.
A 12V/10A
B 24V/20A
C 24V/10A
D 12V/20A

20. If two solar panels of rating 12V/10A are connected in parallel, find the output of the system.
A 12V/10A
B 24V/20A
C 24V/10A
D 12V/20A

21. What is the role of a blocking diode in a solar panel?
A Protect charge controllers
B Block return current to the panel
C Prevent short circuit
D Eliminate the effect of partial shading

22. The voltage at the terminal of a PV module when it is charging a battery is called
A Open circuit voltage
B Terminal voltage
C Short circuit voltage
D No-load voltage

23. Which of the following solar panel type is best for warmer regions?
A Polycrystalline
B Monocrystalline
C Amorphous silicon
D Cadmium telluride

24. Choose from the list below the solar panel that has the highest efficiency.
A Polycrystalline
B Monocrystalline
C Amorphous silicon
D Cadmium telluride

25. From the list below, which criteria is being used to calculate the number of PV modules to be connected in series?
A Total array power
B Load power
C System voltage
D Azimuth angle

26. What is the effect of short circuiting the terminals of a battery?
A The battery will charge quickly
B The battery will discharge quickly
C The electrolyte in the battery will dry up
D The battery will be permanently destroyed

27. An advantage of lithium- ion over lead acid battery is that
A it is cheap to buy
B it is common
C it has a higher cell voltage
D it is a general purpose battery

28. During the discharging of a battery,
A chemical energy is converted into electrical energy
B chemical energy is converted into mechanical energy
C chemical energy is converted into potential energy
D chemical energy is converted into solar energy

29. An example of a primary battery is
A zinc carbon
B AGM
C Lead-acid
D lithium polymer

30. One of the main disadvantage of automobile batteries for renewable energy applications is that
A they store very little amount of energy
B they are too heavy to carry
C they are not designed for deep cycle discharge
D they are too expensive

31. Caculate the discharge rate of a 2000Ah battery bank from which 20A current is being drawn.
A 40,000h
B 2020h
C 1800h
D 100h

32. A battery with a charge state of 40% has a discharged state of:
A 40%
B 100%
C 00%
D 60%

33. Choose from the list below a consequence of corrosion on a battery.
A Decrease in battery capacity
B Loss of weight
C Quick discharge
D Slow charge

34. The process by which a battery is submitted to successive cycles of charge/discharge is known as
A Acid stratification
B Erosion
C Corrosion
D Softening

35. If the open cell voltage of a lithium-ion battery is 2V, calculate the no-load output voltage of a battery with 6 cells.
A 1
B 2
C 6
D 12

36. Batteries connected in series are said to be balanced if
A they have the same state of charge
B they are charging
C they are of same type
D They have the same ratings labelled on them

37. An advantage of PWM charge controller over MPPT charge controller is
A less expensive
B higher efficiency
C it draws current out of the panel at maximum power voltage
D it is a smart DC-DC converter

38. If the output current of the solar panel is 40A, then the charge controller rating should be
A 10A
B 50A
C 30A
D 40A

39. What will happen if a charge controller is not installed in a PV system that uses a battery?
A The battery will not charge
B The battery will be supplied with low current
C The battery will be supplied with high current
D The battery will be overcharged

40. Charge controllers are:
A AC to DC converters
B AC to AC converters
C DC to DC converters
D DC to AC converters

41. A device which converts DC into AC is known as a/an:
A Rectifier
B Inverter
C Chopper
D Transformer

42. What is the disadvantage of a modified sine wave inverter?
A Variation in peak voltage with the voltage of the battery
B Higher cost
C Difficult to be found
D Heavier weight

43. What measure should we take while installing a solar panel?
A Short circuit the panel
B Expose the panel to maximum sunlight
C Cover the panel
D Allow the panel to be heated before connecting

44. Which of the following instruments is used to measure the power density of sunlight?
A Pyranometer
B Pyrheliometer
C Thermometer
D Hydrometer

45. The daily load estimate for an establishment is estimated to be 1000Wh at 12V. Calculate its Ah value.
A 83.33
B 988
C 1012
D 12000

46. An electric boiler rated 1500W is allowed to boil for 30 minutes. Calculate the energy consumed by the boiler in Wh.
A 750
B 45,000
C 3000
D 1470

47. If the mean daily energy consumption of a PV system is 1.8KWh/d, select from the list below the best system voltage of the system.
A 12V
B 24V
C 48V
D 60V

48. A local clinic contains a 65W LED TV which is ON for 3 hours and 4 LED bulbs of 7W each and are ON daily for 10 hours. Calculatethe total dailyWh consumption of the clinic.
A 13650
B 936
C 85
D 265

49. In a school made up of 4 offices, the daily Wh consumption of each office is estimated to be 125Wh. Find the total Wh of the school.
A 125
B 129
C 500
D 31.25

50. Suppose the daily energy consumption of a PV home is 4800Wh at a system voltage of 24V and the peak sun (minimum monthly average) for the locality is 3.54, calculate the array current required to charge the system's battery.
A 32,542.37A
B 3.70A
C 403,200A
D 4827.54A

STOP

GO BACK AND CHECK YOUR WORK