Artificial Intelligence and Its Applications

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. AI helps protect the environment by:
   (a) predicting pollution only **(b)** detecting plastic only
   (c) tracking wildlife only **(d)** all of these

2. Detecting changes in forest cover: in which field is AI being used here?
   (a) education **(b)** automation **(c)** environment **(d)** healthcare

3. How can AI help with too few experts to read medical scans?
   (a) signals that change their timing with the traffic
   (b) machines that recognise and separate each kind of waste
   (c) tools that screen scans and flag likely problems
   (d) forecasts that predict pollution so people can plan

4. Which AI domain does forecasting crop yield from rainfall and soil data mainly use?
   (a) data science **(b)** natural language processing
   (c) robotics **(d)** computer vision

5. A waste classifier is tested on new photos: plastic: 19 of 20 correct; paper: 9 of 10 correct; organic: 20 of 20 correct. Which kind does it identify most accurately?
   (a) organic **(b)** paper
   (c) plastic **(d)** all three equally

6. A waste classifier is tested on new photos: plastic: 17 of 20 correct; paper: 25 of 25 correct; organic: 14 of 25 correct. What is its overall accuracy?
   (a) 56% **(b)** 80% **(c)** 100% **(d)** 85%

7. A smart irrigation system waters the field on a day only if the soil moisture is below 40% and the chance of rain is below 40%.
   Mon: moisture 41%, rain chance 20%
   Tue: moisture 23%, rain chance 90%
   Wed: moisture 34%, rain chance 80%
   Thu: moisture 41%, rain chance 60%
   Fri: moisture 66%, rain chance 20%
   Sat: moisture 48%, rain chance 30%
   Sun: moisture 39%, rain chance 0%
   On how many of these days is the field watered?
   (a) 0 **(b)** 6 **(c)** 2 **(d)** 1

8. Sensors in eight bins report how full they are: 75%, 75%, 20%, 20%, 100%, 95%, 70%, 65%. The collection route visits only bins that are at least 60% full. How many bins are visited?
   (a) 5 **(b)** 6 **(c)** 7 **(d)** 2

Section B — Short answer — 8 × 2 = 16 marks

9. How can AI help reduce plastic pollution?

10. A waste classifier is tested on new photos: plastic: 17 of 20 correct; paper: 20 of 20 correct; organic: 15 of 25 correct. What is its overall accuracy?

11. A waste classifier is tested on new photos: plastic: 5 of 10 correct; paper: 23 of 25 correct; organic: 20 of 25 correct. Which kind does it identify (a) most accurately (b) least accurately?

12. A smart irrigation system waters the field on a day only if the soil moisture is below 45% and the chance of rain is below 60%.
Mon: moisture 29%, rain chance 10%
Tue: moisture 50%, rain chance 60%
Wed: moisture 17%, rain chance 30%
Thu: moisture 56%, rain chance 20%
Fri: moisture 17%, rain chance 80%
Sat: moisture 68%, rain chance 0%
Sun: moisture 43%, rain chance 30%
On which days is the field watered? Write them in order.

13. Which AI domain does each mainly use: computer vision, natural language processing or data science? (a) summarising a long article (b) recognising objects in photos

14. How can AI help with each problem? (a) crops damaged before farmers notice (b) animals lost to poaching in forests

15. An AI traffic signal shares an 88-second cycle among three roads in proportion to the vehicles waiting: road P 18, road Q 8, road R 18. How many seconds of green does road P get?

16. A forest camera trap takes 2,300 photos. 80% show an animal, and 20% of the animal photos show a tiger. How many photos show a tiger?

Section C — Word problems — 4 × 4 = 16 marks

17. Design a simple AI project with a no-code tool to help sort waste in your school. What steps would you follow?

18. A waste classifier is tested on new photos: plastic: 16 of 20 correct; paper: 14 of 20 correct; organic: 9 of 20 correct. (a) What is its accuracy on plastic? (b) on paper? (c) overall? (d) Which kind needs more training photos most?

19. A smart irrigation system waters the field on a day only if the soil moisture is below 45% and the chance of rain is below 50%.
Mon: moisture 26%, rain chance 50%
Tue: moisture 26%, rain chance 40%
Wed: moisture 44%, rain chance 70%
Thu: moisture 64%, rain chance 60%
Fri: moisture 33%, rain chance 70%
Sat: moisture 26%, rain chance 50%
Sun: moisture 48%, rain chance 70%
Each watering uses 900 litres. (a) On how many days is the field watered? (b) How much water is used? (c) How much less is that than a timer that waters every day?

20. Smart bins report how full they are: 100%, 100%, 60%, 35%, 50%, 55%, 20%, 30%, 90%, 70%. The truck collects only bins at least 60% full and can empty 3 bins per trip. (a) How many bins are collected? (b) How many trips are needed? (c) How many bins are skipped today?

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Answer key

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Q	Answer	Working
1	**(d) all of these**	—
2	**(c) environment**	—
3	**(c) tools that screen scans and flag likely problems**	—
4	**(a) data science**	—
5	**(a) organic**	plastic 95%, paper 90%, organic 100%
6	**(b) 80%**	56 ÷ 70 × 100
7	**(d) 1**	both conditions must hold: Sun
8	**(b) 6**	bins at or above 60%: 75%, 75%, 100%, 95%, 70%, 65%
9	**By analysing satellite images to find plastic dumps so they can be cleared quickly.**	—
10	**80%**	52 ÷ 65 × 100
11	**(a) paper; (b) plastic**	plastic 50%, paper 92%, organic 80%
12	**Mon, Wed, Sun**	both conditions must hold
13	**(a) natural language processing; (b) computer vision**	—
14	**(a) apps that check crop photos for pests and disease (b) cameras that recognise animals and alert rangers**	—
15	**36 seconds**	88 ÷ 44 = 2 seconds per vehicle; × 18
16	**368**	80% of 2,300 = 1,840; 20% of that
17	**Collect photos of each kind of waste; upload and label them as classes; train the model; test on new items and note mistakes; add more varied photos and retrain.**	—
18	**(a) 80%; (b) 70%; (c) 65%; (d) organic**	39 ÷ 60 × 100 overall
19	**(a) 1; (b) 900 litres; (c) 5,400 litres**	Tue; 1 × 900
20	**(a) 5; (b) 2; (c) 5**	bins at or above 60%: 100%, 100%, 60%, 90%, 70%; 5 ÷ 3, rounded up

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