Series : 2KNLM

Set – 4

रोल नं.
Roll No.

प्रश्न-पत्र कोड
Q.P. Code **104**

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।
Candidates must write the Q.P. Code on the title page of the answer-book.

कृत्रिम बुद्धिमत्ता {}

ARTIFICIAL INTELLIGENCE

निर्धारित समय : 2 घण्टे *अधिकतम अंक : 50*
Time allowed : 2 hours *Maximum Marks : 50*

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **21** प्रश्न हैं ।
- **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें ।**
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains **23** printed pages.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **21** questions.
- **Please write down the serial number of the question in the answer-book at the given place before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

सामान्य निर्देश :

(i) *कृपया निर्देशों को ध्यान से पढ़ें ।*

(ii) *इस प्रश्न-पत्र में **दो** खण्डों में **21** प्रश्न हैं : **खण्ड-क** और **खण्ड-ख** ।*

(iii) ***खण्ड-क** में वस्तुपरक प्रकार के प्रश्न हैं, जबकि **खण्ड-ख** में विषयपरक प्रकार के प्रश्न हैं ।*

(iv) *दिये गए **(5 + 16) = 21** प्रश्नों में से, उम्मीदवार को **2** घंटे के आबंटित (अधिकतम) समय में **(5 + 10) = 15** प्रश्नों के उत्तर देने हैं ।*

(v) *किसी विशेष खण्ड के सभी प्रश्नों को सही क्रम में करने का प्रयास किया जाना चाहिए ।*

(vi) ***खण्ड-क : वस्तुपरक प्रकार के प्रश्न (24 अंक) :***

(a) *इस खण्ड में **5** प्रश्न हैं ।*

(b) *कोई नकारात्मक अंकन नहीं है ।*

(c) *दिए गए निर्देशों के अनुसार कीजिए ।*

(d) *प्रत्येक प्रश्न/भाग के सामने आबंटित अंकों का उल्लेख किया गया है ।*

(vii) ***खण्ड-ख : विषयपरक प्रकार के प्रश्न (26 अंक) :***

(a) *इस खण्ड में **16** प्रश्न हैं ।*

(b) *उम्मीदवार को **10** प्रश्न करने हैं ।*

(c) *दिए गए निर्देशों के अनुसार कीजिए ।*

(d) *प्रत्येक प्रश्न/भाग के सामने आबंटित अंकों का उल्लेख किया गया है ।*

खण्ड – क

(वस्तुपरक प्रकार के प्रश्न)

1. रोज़गार कौशल पर दिये गये **6** प्रश्नों में से किन्हीं **4** प्रश्नों के उत्तर दीजिए : **4 × 1 = 4**

(i) अनिवार्य वाक्य को पहचानिए : **1**

(A) सामने का दरवाजा बंद करो ।

(B) वह एक प्रतिभाशाली कलाकार है ।

(C) क्या आप बेहतर महसूस कर रहे हैं ?

(D) आप अद्‌भुत थे !

General Instructions :

(i) *Please read the instructions carefully.*

(ii) *This Question Paper consists of **21** questions in **two** sections : **Section-A** & **Section-B**.*

(iii) ***Section-A** has Objective Type Questions, whereas **Section-B** contains Subjective Type Questions.*

(iv) *Out of the given **(5 + 16) = 21** questions, a candidate has to answer **(5 + 10) = 15** questions in the allotted (maximum) time of **2** hours.*

(v) *All questions of a particular section must be attempted in the correct order.*

(vi) ***Section-A : Objective Type Questions (24 Marks) :***

(a) *This section has **5** questions.*

(b) *There is no negative marking.*

(c) *Do as per the instructions given.*

(d) *Marks allotted are mentioned against each question/part.*

(vii) ***Section-B : Subjective Type Questions (26 Marks) :***

(a) *This section has **16** questions.*

(b) *A candidate has to do **10** questions.*

(c) *Do as per the instructions given.*

(d) *Marks allotted are mentioned against each question/part.*

Section – A

(Objective Type Questions)

1. Answer any **4** out of the given **6** questions on Employability skills : **4 × 1 = 4**

(i) Identify the imperative sentence : **1**

(A) Shut the front door. (B) She is talented artist.

(C) Are you feeling better ? (D) You were amazing !

(ii) बड़े लक्ष्यों को छोटे-छोटे हिस्सों में तोड़ने से लक्ष्य _____ बन जायेगा । **1**

(A) विशिष्ट (B) मापने योग्य

(C) प्राप्य (D) यथार्थवादी

(iii) 'समय प्रबंधन' शब्द को परिभाषित कीजिए । **1**

(iv) एक मजबूत पासवर्ड में क्या होना चाहिए ? **1**

(A) केवल अक्षर (B) संख्या और विशेष वर्ण

(C) किसी व्यक्ति का नाम (D) अक्षर, संख्याएँ और विशेष वर्ण

(v) एक उद्यमी के बारे में एक गलत धारणा यह है – **1**

उद्यमी _____ होते हैं, _____ नहीं ।

(vi) वह विकल्प चुनें जो संयुक्त राष्ट्र के अनुसार सतत विकास लक्ष्य नहीं है । **1**

(A) जनसंख्या (B) कोई गरीबी नहीं

(C) गुणवत्तापूर्ण शिक्षा (D) कम असमानताएँ

2. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) अनीता और सुरजीत एक एआई एप्लीकेशन तैयार कर रहे हैं जो फलों के विभिन्न प्रकारों को वर्गीकृत करेगा । कम्प्यूटर विज़न टास्क (Computer Vision Task) जो फल के प्रकार की पहचान करेगा और इसे एक लेबल देगा, को कहा जाता है _____ । **1**

(A) विभाजन (Segmentation)

(B) वर्गीकरण (Classification)

(C) वर्गीकरण + स्थानीयकरण (Classification + Localization)

(D) वस्तु का पता लगाना (Object Detection)

(ii) Breaking down big goals into smaller parts will make the goal _____. **1**

(A) specific (B) measurable

(C) achievable (D) realistic

(iii) Define the term 'Time Management'. **1**

(iv) What should a strong password consist of ? **1**

(A) Only letters

(B) Numbers and special characters

(C) Name of a person

(D) Letters, numbers and special characters

(v) A misconception about an entrepreneur is : **1**

Entrepreneurs are _____, not _____.

(vi) Choose the option which is NOT a Sustainable Development Goal according to United Nations. **1**

(A) Population (B) No poverty

(C) Quality education (D) Reduced Inequalities

2. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) Anita and Surjit are creating an AI application that will classify different types of fruits. The Computer Vision task that will identify the type of fruit and assign a label to it is called _____. **1**

(A) Segmentation

(B) Classification

(C) Classification + Localization

(D) Object Detection

(ii) निम्नलिखित वाक्य पर विचार कीजिए : 1

अपने पुत्र का परिणाम देख कर, पूजा का चेहरा क्रोध से लाल हो गया ।

"लाल" शब्द प्राकृतिक भाषा की किस विशेषता को दर्शाता है ?

(A) अतिरिक्तता (Redundancy)

(B) संदर्भ-आधारित अर्थ (context-dependent meaning)

(C) व्याकरणीय संरचना (Grammatical structure)

(D) अस्थायी परिवर्तन (Temporal change)

(iii) नैतिक फ्रेमवर्क (Ethical frameworks) मुख्य रूप से किसके लिए डिजाइन किए जाते हैं ? 1

(A) एआई एल्गोरिद्म (AI algorithms) की कार्यक्षमता बढ़ाना ।

(B) यह सुनिश्चित करना कि लिए गए निर्णयों से अनजाने में कोई नुकसान न हो ।

(C) एआई विकास की लागत घटाना ।

(D) एआई प्रोजेक्ट चक्र में तेजी लाना ।

(iv) **कथन 1** : ओवरफिटिंग (overfitting) तब होती है जब एक मॉडल लर्निंग पैटर्न (learning patterns) के स्थान पर प्रशिक्षण डेटा (training data) को याद रखता है । 1

कथन 2 : प्रशिक्षण और मूल्यांकन के लिए एक ही डेटा का प्रयोग करने से मॉडल को सही परिणाम देने में सहायता मिलती है ।

(A) दोनों कथन सही हैं ।

(B) दोनों कथन गलत हैं ।

(C) कथन 1 सही है, परंतु कथन 2 गलत है ।

(D) कथन 1 गलत है, परंतु कथन 2 सही है ।

(v) कार को सही ढंग से पार्क करने के लिए AI model को प्रशिक्षित करने हेतु कौन सा शिक्षण तरीका (learning approach) सबसे उपयुक्त होगा ? 1

(A) सुपरवाइज्ड लर्निंग (Supervised Learning)

(B) अनसुपरवाइज्ड लर्निंग (Unsupervised Learning)

(C) ट्रांसफर लर्निंग (Transfer Learning)

(D) रिइनफोर्समेंट लर्निंग (Reinforcement Learning)

(ii) Consider the following sentence : **1**

On seeing her son's result, Pooja's face turned red with anger.

The word "red" demonstrates which characteristic of natural language ?

(A) Redundancy

(B) Context-dependent meaning

(C) Grammatical structure

(D) Temporal change

(iii) Ethical frameworks are primarily designed to : **1**

(A) Increase the efficiency of AI algorithms.

(B) Ensure that choices made do not cause unintended harm.

(C) Reduce the cost of AI development.

(D) Speed up the AI project cycle.

(iv) **Statement 1 :** Overfitting occurs when a model memorizes the training data rather than learning patterns.

Statement 2 : Using the same data for training and evaluation helps the model give accurate results. **1**

(A) Both statements are correct.

(B) Both statements are incorrect.

(C) Statement 1 is correct but statement 2 is incorrect.

(D) Statement 1 is incorrect but statement 2 is correct.

(v) Which learning approach would be most suitable for training an AI model to park the car correctly ? **1**

(A) Supervised Learning (B) Unsupervised Learning

(C) Transfer Learning (D) Reinforcement Learning

(vi) AI प्रोजेक्ट चक्र की किस अवस्था में नए डेटा पर मॉडल की टेस्टिंग की जाती है ? **1**

(A) डेटा अन्वेषण (Data exploration)

(B) मॉडलिंग (Modelling)

(C) मूल्यांकन (Evaluation)

(D) डिप्लॉइमेंट (Deployment)

3. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) स्वायत्त वाहन सुरक्षा प्रणालियों (autonomous vehicle safety systems) के संदर्भ में, किस प्रकार की त्रुटि को न्यूनतम करना सबसे अधिक महत्त्वपूर्ण होगा ? **1**

(A) गलत सकारात्मक (खतरा खोजना जब कोई खतरा न हो)

(B) गलत नकारात्मक (वास्तविक खतरा पहचानने में चूकना)

(C) सही सकारात्मक (खतरे का सही ढंग से पता लगाना)

(D) सही नकारात्मक (सही ढंग से पहचानना कि खतरा नहीं है)

(ii) एक बाइट इमेज फॉर्मेट (byte image format) में संभव पिक्सेल मानों (pixel values) की रेंज क्या है ? **1**

(A) 0 से 100 (B) 0 से 255

(C) 1 से 256 (D) – 128 से 127

(iii) एक ई-कॉमर्स प्लेटफॉर्म "जिन ग्राहकों ने प्रॉडक्ट **X** खरीदा उन्होंने प्रॉडक्ट **Y** भी खरीदा" यह संस्तुति (recommend) करने के लिए ग्राहकों के क्रय पैटर्नों का विश्लेषण करता है । इसमें प्रयोग किया जाता है : **1**

(A) वर्गीकरण मॉडल (Classification model)

(B) रिग्रेशन मॉडल (Regression model)

(C) एसोसिएशन मॉडल (Association model)

(D) क्लस्टरिंग मॉडल (Clustering model)

(vi) Which stage of the AI Project Cycle involves testing the model on newly fetched data ? **1**

(A) Data Exploration (B) Modelling

(C) Evaluation (D) Deployment

3. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) In the context of autonomous vehicle safety systems, which type of error would be most critical to minimize ? **1**

(A) False Positive (detecting danger when there isn't any)

(B) False Negative (failing to detect actual danger)

(C) True Positive (detecting danger correctly)

(D) True Negative (correctly identifying that there is no danger)

(ii) What is the range of possible pixel values in a byte image format ? **1**

(A) 0 to 100 (B) 0 to 255

(C) 1 to 256 (D) –128 to 127

(iii) An e-commerce platform analyzes customer purchase patterns to recommend "Customers who bought product **X** also bought product **Y**." This uses : **1**

(A) Classification model

(B) Regression model

(C) Association model

(D) Clustering model

(iv) चूँकि AI का प्रयोग वास्तव में एक निर्णय लेने/प्रभावित करने के टूल के रूप में किया जा रहा है, हमें यह सुनिश्चित करने की आवश्यकता है कि AI नैतिक रूप से स्वीकार्य सिफारिशें करे । निम्नलिखित में से कौन सा एक प्रमुख कारक (Key factor) है जो एक AI मॉडल डिजाइन करते समय हमारे निर्णय लेने को जान-बूझकर या अनजाने में प्रभावित कर सकता है ? **1**

(A) अन्तर्ज्ञान और मूल्य (Intuition and values)

(B) एल्गोरिद्म क्षमता (Algorithm efficiency)

(C) डेटा स्टोरेज क्षमता (Data storage capacity)

(D) प्रोसेसिंग स्पीड (Processing speed)

(v) कौन सा NLP एप्लीकेशन वास्तविक-समय (real time) में स्वाभाविक स्पीच (Natural speech) को टेक्सट (text) में रूपान्तरित करने में सहायक है ? **1**

(A) कीवर्ड एक्सट्रैक्शन टूल (Keyword Extraction tool)

(B) पुस्तकों का अंग्रेजी से हिंदी भाषा में अनुवाद

(C) यू-ट्यूब में स्वत: सृजित कैप्शंस (Auto generated captions on YouTube)

(D) रॉ टेक्सट (raw text) को पूर्व-परिभाषित (pre-defined) समूहों में वर्गीकृत करना ।

(vi) सुपरवाइज्ड लर्निंग (Supervised learning) में, टेस्टिंग डेटासेट (testing dataset) का क्या उद्देश्य है ? **1**

(A) मॉडल को प्रशिक्षित करना ।

(B) मॉडल की सटीकता (accuracy) का मूल्यांकन करना ।

(C) नए फीचर बनाना ।

(D) डेटा को लेबल करना ।

4. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) एक फायर अलार्म सिस्टम में, यदि मॉडल "Fire Present" बताता है जबकि वास्तव में कोई आग नहीं है तो इसे _____ के रूप में वर्गीकृत किया जाता है । **1**

(A) सही सकारात्मक (TP) (B) सही नकारात्मक (TN)

(C) गलत सकारात्मक (FP) (D) गलत नकारात्मक (FN)

(iv) As AI is essentially being used as a decision making / influencing tool, we need to ensure that AI makes morally acceptable recommendations. Which of the following is a key factor that can knowingly or unknowingly influences our decision-making while designing an AI model ? **1**

(A) Intuition and Values (B) Algorithm efficiency

(C) Data storage capacity (D) Processing speed

(v) Which NLP application helps in converting natural speech into text in real time ? **1**

(A) Keyword Extraction tool

(B) Translation of books from English to Hindi language

(C) Auto generated captions on YouTube

(D) Classifying raw text into pre-defined groups

(vi) In supervised learning, what is the purpose of the testing dataset ? **1**

(A) To train the model.

(B) To evaluate the model's accuracy.

(C) To create new features.

(D) To label the data.

4. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) In a fire alarm system, if the model predicts "Fire Present" when there is actually no fire, this is classified as : **1**

(A) True Positive (TP) (B) True Negative (TN)

(C) False Positive (FP) (D) False Negative (FN)

(ii) **अभिकथन (A)** : जैव-नैतिकता (Bioethics) AI के लिए वैल्यू बेस्ड फ्रेमवर्क (value-based framework) का एक उदाहरण है । **1**

कारण (R) : जैव-नैतिकता (Bioethics) स्वास्थ्य, दवा और जीव विज्ञान संबंधी नैतिक विषयों से संबंधित है ।

(A) (A) और (R) दोनों सही हैं और (R), (A) का सही स्पष्टीकरण है ।

(B) (A) और (R) दोनों सही हैं, परंतु (R), (A) का सही स्पष्टीकरण नहीं है ।

(C) (A) सही है, परंतु (R) गलत है ।

(D) (A) गलत है, परंतु (R) सही है ।

(iii) कौन सा परिदृश्य एक रिग्रेशन (regression) प्राब्लम को सबसे अच्छा दर्शाता है ? **1**

(A) पहचानना कि क्या कोई ई-मेल स्पैम (spam) है ।

(B) व्यवहार के अनुसार ग्राहकों को समूहीकृत करना (grouping) ।

(C) कल के तापमान का पूर्वानुमान करना ।

(D) फोटो में चेहरों को पहचानना ।

(iv) निम्नलिखित में कौन पिक्सेल (pixels) और इमेज रिज़ोल्युशन (image resolution) के बीच संबंध का सबसे अच्छा वर्णन करता है ? **1**

(A) ज्यादा पिक्सेल होने से इमेज क्वालिटी कम हो जाती है ।

(B) पिक्सेल और रिज़ोल्युशन एक दूसरे से जुड़ी हुई अवधारणाएँ नहीं हैं ।

(C) रिज़ोल्युशन केवल इमेज फाइल के आकार (साइज़) पर निर्भर करता है ।

(D) एक इमेज में पिक्सलों की संख्या को रिज़ोल्युशन के रूप में जाना जाता है ।

(v) प्रिसिज़न (Precision) को इस रूप में परिभाषित किया जाता है : **1**

(A) सही अनुमानित सकारात्मक ऑब्जर्वेशन (observation) और कुल ऑब्जर्वेशन (observation) का अनुपात

(B) सही अनुमानित सकारात्मक ऑब्जर्वेशन (observation) और कुल अनुमानित सकारात्मक ऑब्जर्वेशन (observation) का अनुपात

(C) सही अनुमानित नकारात्मक ऑब्जर्वेशन (observation) और कुल ऑब्जर्वेशन (observation) का अनुपात

(D) सही सकारात्मक (true positive) और सही नकारात्मक (true negative) का अनुरूप मध्यमान (harmonic mean)

(ii) **Assertion (A) :** Bioethics is an example of a Value-based Framework for AI.

Reason (R) : Bioethics deals with ethical issues related to health, medicine, and biological sciences. **1**

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

(iii) Which scenario best represents a regression problem ? **1**

(A) Identifying whether an email is spam.

(B) Grouping customers by behaviour.

(C) Predicting tomorrow's temperature.

(D) Recognizing faces in photos.

(iv) Which of the following best describes the relationship between pixels and image resolution ? **1**

(A) More pixels result in lower image quality.

(B) Pixels and resolution are unrelated concepts.

(C) Resolution depends only on image file size.

(D) The number of pixels in an image is known as resolution.

(v) Precision is defined as : **1**

(A) The ratio of correctly predicted positive observations to total observations.

(B) The ratio of correctly predicted positive observations to total predicted positive observations.

(C) The ratio of correctly predicted negative observations to total observations.

(D) The harmonic mean of true positives and true negatives.

(vi) किस प्रकार के चैट बॉट (chat bot) के लिए कोडिंग (coding) की आवश्यकता होती है और वह बड़े डेटा बेसेस (databases) पर सीधे ही कार्य करता है ? **1**

(A) स्क्रिप्ट बॉट (Script bot)

(B) स्मार्ट बॉट (Smart bot)

(C) पारम्परिक बॉट (Traditional bot)

(D) नियम-आधारित बॉट (Rule-based bot)

5. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) एक मूल्य तुलना (price comparison) वेबसाइट बनाने के लिए कौन सा AI डोमेन (domain) सर्वाधिक उपयुक्त होगा ? **1**

(A) कम्प्यूटर विजन (Computer Vision)

(B) प्राकृतिक भाषा प्रोसेसिंग (Natural Language Processing)

(C) सांख्यिकीय डेटा (Statistical Data)

(D) रोबोटिक्स (Robotics)

(ii) **अभिकथन (A)** : टेक्सट प्रिप्रोसेसिंग (text pre-processing) में टेक्सट को छोटे अक्षरों (lower case) में परिवर्तित करना बेहतर है । **1**

कारण (R) : यह सुनिश्चित करता है कि मशीन द्वारा "Hello" और "hello" को एक समान ही माना जाता है ।

(A) (A) और (R) दोनों सही हैं और (R), (A) का सही स्पष्टीकरण है ।

(B) (A) और (R) दोनों सही हैं, परंतु (R), (A) का सही स्पष्टीकरण नहीं है ।

(C) (A) सही है, परंतु (R) गलत है ।

(D) (A) गलत है, परंतु (R) सही है ।

(vi) Which type of chat bot requires coding and works on bigger databases directly ? **1**

(A) Script bot

(B) Smart bot

(C) Traditional bot

(D) Rule-based bot

5. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) Which AI domain would be most suitable for developing a price comparison website ? **1**

(A) Computer Vision

(B) Natural Language Processing

(C) Statistical Data

(D) Robotics

(ii) **Assertion (A) :** Converting text to lowercase is preferable in text preprocessing.

Reason (R) : It ensures that "Hello" and "hello" are treated as the same word by the machine. **1**

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

(iii) कम्प्यूटर विज़न बनाम इमेज प्रोसेसिंग (Computer Vision vs Image Processing) के संदर्भ में कौन सा कथन उनमें सही अंतर करता है ? **1**

(A) कम्प्यूटर विज़न और इमेज प्रोसेसिंग वास्तव में एक ही हैं ।

(B) कम्प्यूटर विज़न इमेज को बेहतर बनाता है जबकि इमेज प्रोसेसिंग नहीं ।

(C) कम्प्यूटर विज़न इमेज प्रोसेसिंग का सुपरसेट (superset) है ।

(D) इमेज प्रोसेसिंग कम्प्यूटर विज़न का सुपरसेट (superset) है ।

(iv) बताएँ सही है या गलत : **1**

मशीन लर्निंग (machine learning) में त्रुटि (error) का प्रयोग यह देखने के लिए किया जाता है कि मॉडल डेटा को कितनी सटीकता से पूर्वानुमान (predict) कर सकता है ।

(v) एक कंपनी, संतुष्टि स्तर (satisfaction level) को समझने के लिए ग्राहकों के रिव्यूज़ (reviews) का विश्लेषण करना चाहती है । इसके लिए कौन सा NLP एप्लीकेशन सबसे उपयुक्त होगा ? **1**

(A) टेक्सट वर्गीकरण (Text classification)

(B) सेंटीमेंट विश्लेषण (Sentiment analysis)

(C) कीवर्ड एक्सट्रैक्शन (Keyword extraction)

(D) भाषा अनुवाद (Language translation)

(vi) एक AI मॉडल को 1000 टेस्ट नमूनों के साथ परीक्षण किया गया । यदि सही सकारात्मक (TP) = 200, सही नकारात्मक (TN) = 600, गलत सकारात्मक (FP) = 100, गलत नकारात्मक (FN) = 100 थे, तो कुल कितने पूर्वानुमान (Predictions) सही थे ? **1**

(A) 300 (B) 600

(C) 800 (D) 900

(iii) In the context of Computer Vision vs Image Processing, which statement correctly differentiates them ? **1**

(A) Computer Vision and Image Processing are exactly the same.

(B) Computer Vision enhances the image while Image Processing does not.

(C) Computer Vision is a superset of Image Processing.

(D) Image Processing is a superset of Computer Vision.

(iv) State True or False : **1**

In machine learning, the error is used to see how accurately the model can predict data.

(v) A company wants to analyze customer reviews to understand satisfaction levels. Which NLP application would be most suitable ? **1**

(A) Text classification

(B) Sentiment analysis

(C) Keyword extraction

(D) Language translation

(vi) An AI model was tested with 1000 test samples. If True Positive (TP) = 200, True Negative (TN) = 600, False Positive (FP) = 100, False Negative (FN) = 100, how many total predictions were correct ? **1**

(A) 300 (B) 600

(C) 800 (D) 900

खण्ड–ख

(विषयपरक प्रकार के प्रश्न)

रोज़गार कौशल पर दिए गए **5** प्रश्नों में से किन्हीं **3** प्रश्नों के उत्तर दीजिए । प्रत्येक प्रश्न का उत्तर **20-30** शब्दों में दीजिए । **3 × 2 = 6**

6. संचार के सात C's लिखिए । **2**

7. (a) भावनात्मक बुद्धिमत्ता क्या है ?

   (b) भावनात्मक बुद्धिमत्ता में शामिल किन्हीं दो कौशलों के नाम बताइए । **1 + 1 = 2**

8. आईसीटी कौशल हमारी दिन–प्रतिदिन की गतिविधियों में कैसे मदद करते हैं ? **2**

9. एक सफल उद्यमी बनने के गुण बताइए । **2**

10. 'सतत विकास' शब्द को परिभाषित कीजिए । **2**

दिए गए **6** प्रश्नों में से किन्हीं **4** प्रश्नों के उत्तर **20-30** शब्दों में दीजिए : **4 × 2 = 8**

11. सेक्टर–आधारित (sector-based) और वैल्यू–आधारित (value-based) नैतिक फ्रेमवर्कों (ethical frameworks) के बीच अंतर समझाइए और प्रत्येक का एक उदाहरण दीजिए । **2**

12. वर्गीकरण मॉडल (Classification Model) की कोई दो विशेषताएँ बताइए । **2**

13. कम्प्यूटर RGB इमेजों (images) को किस तरह स्टोर करते हैं ? **2**

Section – B

(Subjective Type Questions)

Answer any **3** out of the given **5** questions on Employability Skills in **20-30** words each. **3 × 2 = 6**

6. Write the 7 C's of communication. **2**

7. (a) What is emotional intelligence ?

   (b) Name any two skills included in emotional intelligence. **1 + 1 = 2**

8. How ICT skills help us in our day-to-day activities ? **2**

9. State the qualities to become a successful entrepreneur. **2**

10. Define the term 'Sustainable Development' **2**

Answer any **4** out of the given **6** questions in **20-30** words each. **4 × 2 = 8**

11. Explain the difference between sector-based and value-based ethical frameworks with one example of each. **2**

12. Give any two characteristics of a Classification Model. **2**

13. How do computers store RGB images ? **2**

14. सुपरवाइज्ड (supervised) और अनसुपरवाइज्ड (unsupervised) लर्निंग के बीच दो अंतर बताइए । **2**

15. मशीन लर्निंग एल्गोरिद्म (machine learning algorithm) के संबंध में ट्रेन-टेस्ट स्प्लिट टेकनीक (Train-test split technique) समझाइए । **2**

16. स्टेमिंग (Stemming) लेमेटाइजेशन (Lemmatization) से कैसे भिन्न है ? बताइए कि **"Wolves"** शब्द को स्टेमिंग (Stemming) और लेमेटाइजेशन (Lemmatization) द्वारा कैसे प्रोसेस किया जाएगा । **2**

दिए गए **5** प्रश्नों में से किन्हीं **3** प्रश्नों के उत्तर **50-80** शब्दों में दीजिए : **3 × 4 = 12**

17. डीप लर्निंग (Deep Learning), आर्टिफिशियल इंटेलिजेंस (Artificial Intelligence) और मशीन लर्निंग (Machine Learning) के बीच अंतर बताइए । AI, ML और DL के बीच संबंध दर्शाते हुए एक लेबल्ड (labelled) वेन (Venn) रेखाचित्र भी बनाइए । **4**

18. निम्नलिखित परिदृश्यों (scenarios) पर विचार कीजिए और औचित्य सहित यह बताइए कि प्रत्येक के लिए कौन सा AI डोमेन सबसे उपयुक्त होगा ? **4**

(A) एक AI आधारित शिक्षा प्लेटफॉर्म (platform) को हजारों स्टूडेंट के निबंधों को अंग्रेजी भाषा में ट्रांसलेट करने और उनका विश्लेषण करने की जरूरत होती है ताकि ग्रामर (Grammar), कंटेंट क्वालिटी (content quality) और लिखने की स्टाइल पर तुरंत फीडबैक दिया जा सके ।

(B) महानगर के एक व्यस्त चौराहे पर इंस्टाल किया गया एक AI आधारित एप्लीकेशन सबसे व्यस्त ट्रैफिक समय (peak traffic hours) के दौरान उस चौराहे से गुजर रहे सभी वाहनों को स्कैन (scan) करता है और उन्हें चौपहिया वाहनों और दुपहिया वाहनों में श्रेणीबद्ध करता है ।

14. Give two differences between Supervised and Unsupervised learning. **2**

15. Explain Train-test split technique with respect to machine learning algorithm. **2**

16. How is Stemming different from Lemmatization ? Explain how the word **"Wolves"** would be processed by stemming and lemmatization. **2**

Answer any **3** out of the given **5** questions in **50-80** words each. **3 × 4 = 12**

17. Differentiate between Deep Learning, Artificial Intelligence and Machine Learning. Also draw a labelled Venn diagram depicting the relationship between AI, ML and DL. **4**

18. Consider the following scenarios and identify which AI domain would be most appropriate for each, with justification : **4**

    (A) An AI based education platform needs to translate to English language and analyze thousands of student essays to provide instant feedback on grammar, content quality and writing style.

    (B) An AI based application installed on a busy crossing in a metropolitan city scans all vehicles driving through that crossing during peak traffic hours and categorizes them into four wheelers and two wheelers.

19. निम्नलिखित पैराग्राफ को पढ़िए और उसके नीचे दिए गए प्रश्नों का उत्तर दीजिए :

PQR Security Solutions ने ई-कॉमर्स वेबसाइटों पर साइबर हमलों का पता लगाने के लिए एक AI मॉडल डिजाइन किया है । इसके लिए एक वेबसाइट पर विभिन्न नेटवर्क गतिविधियों की निगरानी की गई और उनका विश्लेषण किया गया । मॉडल का 1500 नेटवर्क गतिविधियों के एक डेटासेट (data set) पर परीक्षण किया गया । इनमें से, मॉडल ने सही बताया कि 1000 साइबर हमले थे । इसने यह भी सही पहचान की कि 250 साइबर हमले नहीं थे । परंतु मॉडल ने बताया कि 200 साइबर हमले थे लेकिन वास्तव में वे नहीं थे । इसके अतिरिक्त इसने बताया कि 50 साइबर हमले नहीं थे लेकिन वास्तव में वे हमले थे ।

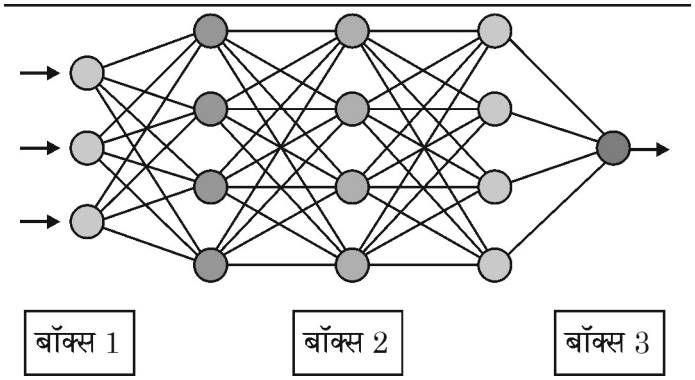
(A) दिए गए परिदृश्य के आधार पर कन्फ्यूज़न मेट्रिक्स (Confusion matrix) चित्रित कीजिए । **2**

(B) उपरोक्त परिदृश्य में कुल कितने मामले सही नकारात्मक (True Negative) हैं ? **1**

(C) प्रिसिज़न (Precision) की गणना कीजिए । **1**

20. (A) CNN और ANN शब्दों को पूर्ण रूप से लिखिए और उनकी परिभाषा दीजिए । **3**

(B) नीचे दिए गए न्यूरल नेटवर्क (Neural network) के रेखा-चित्र में, उस परत (layer) को पहचानिए जिसे बॉक्स 1 और बॉक्स 2 में दर्शाया जाना चाहिए : **1**



21. निम्नलिखित दस्तावेजों पर विचार कीजिए : **4**

Document 1 : Data Science requires information.

Document 2 : Information analysis requires data.

दस्तावेज वेक्टर तालिका (document vector table) बनाने के लिए बैग ऑफ वर्ड्स (Bag of words) मॉडल के सभी चार चरणों को कार्यान्वित कीजिए ।

19. Read the following paragraph and answer the questions that follow :

PQR Security Solutions has designed an AI Model to detect cyber attacks on E-Commerce websites. For this, various network activities were monitored and analyzed on one of the websites. The model was tested on a dataset of 1500 network activities. Out of these, the model correctly predicted that 1000 were cyber attacks. It also correctly identified that 250 were not cyber attacks. However, the model predicted that 200 were cyber attacks but actually they were not. Additionally, it predicted that 50 were not cyber attacks but they actually were.

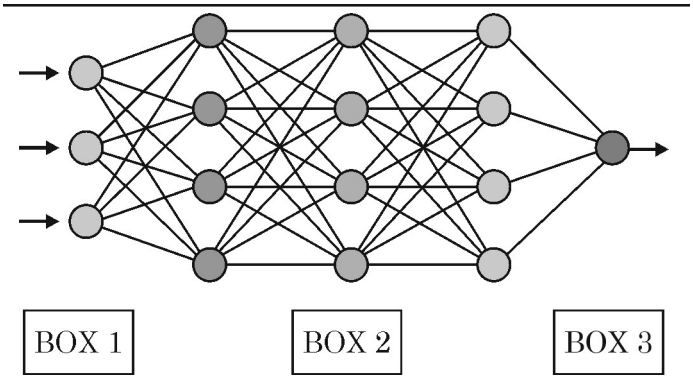
(A) Draw the confusion matrix based on the given scenario. **2**

(B) How many total cases are True Negative in the above scenario ? **1**

(C) Calculate Precision. **1**

20. (A) Expand and define the terms CNN and ANN. **3**

(B) In the diagram of neural network given below, identify the layer that should be depicted in Box 1 and Box 2 : **1**



21. Consider the following documents : **4**

Document 1 : Data Science requires information.

Document 2 : Information analysis requires data.

Implement all the four steps of Bag of Words (BoW) model to create a document vector table.



Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026 (Xth)

SUBJECT NAME : Artificial Intelligence (417) (Q.P. CODE /Set No. 104/4)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. Its leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/Website, etc. may invite action under various rules of the Board and IPC."**
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In Class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X' be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.

8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of **marks 50** has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answers.) ● Half or a part of the answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books, if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for Spot Evaluation**" before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain a photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

General Instructions:

(*i*) Please read the instructions carefully.

(*ii*) This Question Paper consists of **21** questions in **two** sections:**Section-A & Section-B.**

(*iii*) **Section-A** has Objective Type Questions, whereas **Section- B** contains Subjective Type Questions.

(*iv)* Out of the given **(5 + 16) = 21** questions, a candidate has to answer **(5+10) = 15** questions in the allotted (maximum) time of **2** hours.

(*v*) All questions of a particular section must be attempted in the correct order.

(*vi*) SECTION-A: Objective Type Questions (24 Marks):

(a) This section has **5** questions.

(b) There is no negative marking.

(c) Do as per the instructions given.

(d) Marks allotted are mentioned against each question/part.

(*vii*) **SECTION -B: Subjective Type Questions (26 Marks):**

(a) This section has **16** questions.

(b) A candidate has to do **10** questions.

(c) Do as per the instructions given.

(d) Marks allotted are mentioned against each question/part.

		SECTION - A **(Objective Type Questions)**	
1.		**Answer any 4 out of the given 6 questions on Employability skills :**	4 x 1 = 4
	(i)	Identify the imperative sentence: (A) Shut the front door. (B) She is talented artist. (C) Are you feeling better ? (D) You were amazing !	1
	Ans	(A) **OR** Shut the front door.	

		(1 Mark for the correct answer)	
	(ii)	Breaking down big goals into smaller parts will make the goal _____. (A) specific (B) measurable (C) achievable (D) realistic	1
	Ans	(C) **OR** achievable ***(1 Mark for the correct answer)***	
	(iii)	Define the term 'Time Management'.	1
	Ans	Time management is the ability to plan and control how you spend the hours of your day well and do all that you want to do. **OR** Prioritise the things you have to do. **OR** Remove waste and redundancy from work. **OR** Make a time table and follow it diligently. ***(1 Mark for any correct/relevant answer)***	
	(iv)	What should a strong password consist of ? (A) Only letters (B) Numbers and special characters (C) Name of a person (D) Letters, numbers and special characters	1
	Ans	(D) **OR** Letters, numbers and special characters ***(1 Mark for the correct answer)***	
	(v)	A misconception about an entrepreneur is : Entrepreneurs are _____, not _____.	1
	Ans	born , made **OR** rich, poor	

		OR unique, common **OR** big businessmen, small businessmen ***(1 Mark for any correct / relevant answer)***	
	(vi)	Choose the option which is NOT a Sustainable Development Goal according to United Nations. (A) Population (B) No poverty (C) Quality education (D) Reduced Inequalities	1
	Ans	(A) **OR** Population ***(1 Mark for the correct answer)***	
2.		Answer any **5** out of the given **6** questions :	5 X 1 = 5
	(i)	Anita and Surjit are creating an AI application that will classify different types of fruits. The Computer Vision task that will identify the type of fruit and assign a label to it is called _____. (A) Segmentation (B) Classification (C) Classification + Localization (D) Object Detection	1
	Ans	(B) **OR** Classification ***(1 Mark for the correct answer)***	
	(ii)	Consider the following sentence : On seeing her son's result, Pooja's face turned red with anger. The word "red" demonstrates which characteristic of natural language ? (A) Redundancy (B) Context-dependent meaning (C) Grammatical structure (D) Temporal change	1

	Ans	(B) **OR** Context-dependent meaning ***(1 Mark for the correct answer)***	
	(iii)	Ethical frameworks are primarily designed to : (A) Increase the efficiency of AI algorithms. (B) Ensure that choices made do not cause unintended harm. (C) Reduce the cost of AI development. (D) Speed up the AI project cycle.	1
	Ans	(B) **OR** Ensure that choices made do not cause unintended harm. ***(1 Mark for the correct answer)***	
	(iv)	**Statement 1** : Overfitting occurs when a model memorizes the training data rather than learning patterns. **Statement 2** : Using the same data for training and evaluation helps the model give accurate results. (A) Both statements are correct. (B) Both statements are incorrect. (C) Statement 1 is correct but statement 2 is incorrect. (D) Statement 1 is incorrect but statement 2 is correct.	1
	Ans	(C) Statement 1 is correct but Statement 2 is incorrect. **OR** (A) Both statements are correct. (As individual statements, both statement 1 and statement 2 are also correct) ***(1 Mark for the correct answer)***	
	(v)	Which learning approach would be most suitable for training an AI model to park the car correctly ? (A) Supervised Learning (B) Unsupervised Learning (C) Transfer Learning (D) Reinforcement Learning	1

	Ans	(D) **OR** Reinforcement Learning ***(1 Mark for the correct answer)***	
	(vi)	Which stage of the AI Project Cycle involves testing the model on newly fetched data ? (A) Data Exploration (B) Modelling (C) Evaluation (D) Deployment	1
	Ans	(C) **OR** Evaluation ***(1 Mark for the correct answer)***	
3.		Answer any **5** out of the given **6** questions :	5 X 1 = 5
	(i)	In the context of autonomous vehicle safety systems, which type of error would be most critical to minimize ? (A) False Positive (detecting danger when there isn't any) (B) False Negative (failing to detect actual danger) (C) True Positive (detecting danger correctly) (D) True Negative (correctly identifying that there is no danger)	1
	Ans	(B) **OR** False Negative (failing to detect actual danger) ***(1 Mark for the correct answer)***	
	(ii)	What is the range of possible pixel values in a byte image format ? (A) 0 to 100 (B) 0 to 255 (C) 1 to 256 (D) –128 to 127	1
	Ans	(B) **OR** 0 to 255 ***(1 Mark for the correct answer)***	

	(iii)	An e-commerce platform analyzes customer purchase patterns to recommend "Customers who bought product **X** also bought product **Y**." This uses : (A) Classification model (B) Regression model (C) Association model (D) Clustering model	1
	Ans	(C) **OR** Association model ***(1 Mark for the correct answer)***	
	(iv)	As AI is essentially being used as a decision making / influencing tool, we need to ensure that AI makes morally acceptable recommendations. Which of the following is a key factor that can knowingly or unknowingly influences our decision-making while designing an AI model ? (A) Intuition and Values (B) Algorithm efficiency (C) Data storage capacity (D) Processing speed	1
	Ans	(A) **OR** Intuition and Values ***(1 Mark for the correct answer)***	
	(v)	Which NLP application helps in converting natural speech into text in real time ? (A) Keyword Extraction tool (B) Translation of books from English to Hindi language (C) Auto generated captions on YouTube (D) Classifying raw text into pre-defined groups	1
	Ans	(C) **OR** Auto generated captions on YouTube ***(1 Mark for the correct answer)***	

	(vi)	In supervised learning, what is the purpose of the testing dataset ? (A) To train the model. (B) To evaluate the model's accuracy. (C) To create new features. (D) To label the data.	1
	Ans	(B) **OR** To evaluate the model's accuracy. ***(1 Mark for the correct answer)***	
4.		Answer any **5** out of the given **6** questions :	5 x 1 = 5
	(i)	In a fire alarm system, if the model predicts "Fire Present" when there is actually no fire, this is classified as : (A) True Positive (TP) (B) True Negative (TN) (C) False Positive (FP) (D) False Negative (FN)	1
	Ans	(C) **OR** False Positive (FP) ***(1 Mark for the correct answer)***	
	(ii)	**Assertion (A):** Bioethics is an example of a Value-based Framework for AI. **Reason (R) :** Bioethics deals with ethical issues related to health, medicine, and biological sciences. (A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true,but (R) is not the correct explanation of (A). (C) (A) is true, but (R) is false. (D) (A) is false, but (R) is true.	1
	Ans	(D) **OR** (A) is false, but (R) is true. ***(1 Mark for the correct answer)***	
	(iii)	Which scenario best represents a regression problem ? (A) Identifying whether an email is spam.	1

		(B) Grouping customers by behaviour. (C) Predicting tomorrow's temperature. (D) Recognizing faces in photos.	
	Ans	(C) **OR** Predicting tomorrow's temperature. ***(1 Mark for the correct answer)***	
	(iv)	Which of the following best describes the relationship between pixels and image resolution ? (A) More pixels result in lower image quality. (B) Pixels and resolution are unrelated concepts. (C) Resolution depends only on image file size. (D) The number of pixels in an image is known as resolution.	1
	Ans	(D) **OR** The number of pixels in an image is known as resolution. ***(1 Mark for the correct answer)***	
	(v)	Precision is defined as : (A) The ratio of correctly predicted positive observations to total observations. (B) The ratio of correctly predicted positive observations to total predicted positive observations. (C) The ratio of correctly predicted negative observations to total observations. (D) The harmonic mean of true positives and true negatives.	1
	Ans	(B) **OR** The ratio of correctly predicted positive observations to total predicted positive observations. ***(1 Mark for the correct answer)***	
	(vi)	Which type of chat bot requires coding and works on bigger databases directly ?	1

		(A) Script bot (B) Smart bot (C) Traditional bot (D) Rule-based bot	
	Ans	(B) **OR** Smart bot ***(1 Mark for the correct answer)***	
5.		Answer any **5** out of the given **6** questions :	5 x 1=5
	(i)	Which AI domain would be most suitable for developing a price comparison website ? (A) Computer Vision (B) Natural Language Processing (C) Statistical Data (D) Robotics	1
	Ans	(C) **OR** Statistical Data ***(1 Mark for the correct answer)***	
	(ii)	**Assertion (A):** Converting text to lowercase is preferable in text preprocessing. **Reason (R) :** It ensures that “Hello” and “hello” are treated as the same word by the machine. (A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true,but (R) is not the correct explanation of (A). (C) (A) is true, but (R) is false. (D) (A) is false, but (R) is true.	1
	Ans	(A) **OR** Both (A) and (R) are true and (R) is the correct explanation of (A). ***(1 Mark for the correct answer)***	

	(iii)	In the context of Computer Vision vs Image Processing, which statement correctly differentiates them ? (A) Computer Vision and Image Processing are exactly the same. (B) Computer Vision enhances the image while Image Processing does not. (C) Computer Vision is a superset of Image Processing. (D) Image Processing is a superset of Computer Vision.	1
	Ans	(C) **OR** Computer Vision is a superset of Image Processing. ***(1 Mark for the correct answer)***	
	(iv)	State True or False : In machine learning, the error is used to see how accurately the model can predict data.	1
	Ans	True/T ***(1 Mark for the correct answer)***	
	(v)	A company wants to analyze customer reviews to understand satisfaction levels. Which NLP application would be most suitable ? (A) Text classification (B) Sentiment analysis (C) Keyword extraction (D) Language translation	1
	Ans	(B) **OR** Sentiment analysis ***(1 Mark for the correct answer)***	
	(vi)	An AI model was tested with 1000 test samples. If True Positive (TP)= 200, True Negative (TN) = 600, False Positive (FP) = 100, False Negative (FN) = 100, how many total predictions were correct ? (A) 300 (B) 600 (C) 800 (D) 900	1

	Ans	(C) **OR** 800 ***(1 Mark for the correct answer)***	

SECTION - B

(Subjective Type Questions)

Answer any **3** out of the given **5** questions on Employability Skills in **20-30** words each. 3 x 2 = 6

6.	Write the 7 C's of communication.	2
Ans	7 C's of communication: ● Clear ● Concise ● Concrete ● Correct ● Coherent ● Complete ● Courteous ***(2 Marks for all 7 C's)*** ***OR*** ***(1½ Marks for any 5-6 C's)*** ***OR*** ***(1 Mark for any 3-4 C's)*** ***OR*** ***(½ Mark for any 1-2 C's)***	
7 (a)	What is emotional intelligence ?	1
Ans	Emotional intelligence is the ability to identify and manage one's own emotions, as well as the emotions of others. **OR** It involves using emotional data to guide thinking, behavior, and relationships, aiming for improved self-awareness, empathy, and conflict resolution. **OR** It comprises five key components: self-awareness, self-regulation, motivation, empathy, and social skills. ***(1 mark for any correct answer)***	

7 (b)	Name any two skills included in emotional intelligence.	1
Ans	• Emotional awareness • Managing emotions • Harnessing emotions ***(½ mark each for any 2 correct skills)***	
8.	How ICT skills help us in our day-to-day activities ?	2
Ans	• ICT (Information and Communication Technology) skills help us to communicate, run our business and stay connected with our family and friends. • ICT skills (Information and Communication Technology) enhance daily life by enabling instant communication, efficient information access, and streamlined task management. • ICT (Information and Communication Technology) skills facilitate online shopping, digital banking, remote work, and entertainment. • ICT (Information and Communication Technology) skills help in improving education through e-learning and enhancing healthcare via Telemedicine. ***(2 marks for any two correct / relevant activities)*** ***OR*** ***(1 mark for any one correct / relevant activity)***	
9.	State the qualities to become a successful entrepreneur.	2
Ans	• Confident • Keep trying new idea • Patience • Creative • Responsible • Decision making • Hard working • Problem solving • Risk Taking • Do not give up ***(2 marks for any two correct / relevant answer)*** ***OR*** ***(1 mark for any one correct / relevant answer)***	

10.	Define the term 'Sustainable Development'.	2
Ans	Sustainable Development is the development that satisfies the needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, care for the environment and social well-being. **OR** Development that meets current needs without destroying resources for the future. **OR** Sustainable Development protects the environment from degradation like pollution , deforestation and resource depletion. ***(2 marks for any correct / relevant answer)***	

Answer any **4** out of the given **6** questions in **20-30** words each. 4 x2 = 8

11.	Explain the difference between sector-based and value-based ethical frameworks with one example of each.	2
Ans	Sector-based ethical Frameworks **(Any one)**: ● These are frameworks tailored to specific sectors or industries. ● Different sectors face different ethical challenges. ● Sector-based ethical frameworks may also apply to domains such as finance, education, transportation, agriculture, governance, and law enforcement. Example : Bioethics (focuses on ethical considerations in healthcare, patient privacy, data security). Value-based ethical Frameworks **(Any one)**: ● Value-based frameworks focus on fundamental ethical principles and values guiding decision making. ● It reflects the different moral philosophies that inform ethical reasoning. ● Value-based frameworks are concerned with assessing the moral worth of actions and guiding ethical behaviour. Example : Rights-based framework (valuing human life over other considerations), Virtue-Based(Whether developers uphold ethical values), Utility-Based(Maximize overall good). **(1 mark for any one difference and ½ mark for each example)**	
12.	Give any two characteristics of a Classification Model.	2

<table>
<tr><td>Ans</td><td>Characteristics of a Classification Model (any two):
It is a type of Supervised Learning model.
The data is classified according to the labels.
The model works on a discrete data set which means the data need not be continuous.
Example: In the grading system, students are classified on the basis of the grades they obtain with respect to their marks in the examination.

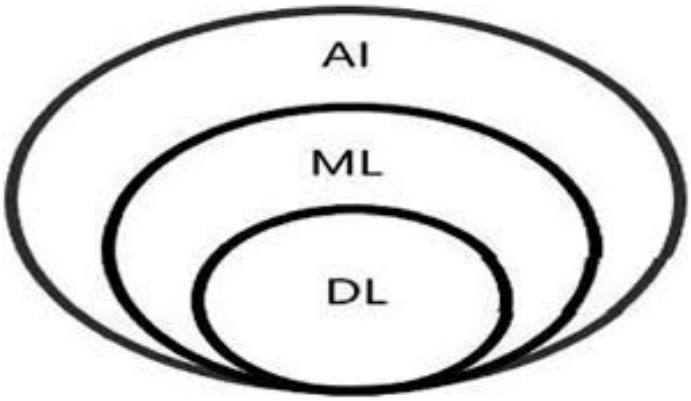
(1 mark each for any correct / relevant Characteristic)</td><td></td></tr>
<tr><td>13.</td><td>How do computers store RGB images ?</td><td>2</td></tr>
<tr><td>Ans</td><td>All the colored images are made up of three primary colors Red, Green, and Blue. These colors can be made by combining different intensities of red, green, and blue.
Every RGB image is stored in the form of three different channels called the R Channel, G Channel, and B Channel.
Each plane separately has many pixels with each value varying from 0-255.
This means that in an RGB image, each pixel has a set of three different values which together give color to that particular pixel.
(2 marks for any correct / relevant answer)</td><td></td></tr>
<tr><td>14.</td><td>Give two differences between Supervised and Unsupervised learning.</td><td>2</td></tr>
<tr><td>Ans</td><td><table><tr><th>Supervised Learning</th><th>Unsupervised Learning</th></tr><tr><td>Uses labelled data.</td><td>Uses un-labelled data.</td></tr><tr><td>Predicts accurate outcomes or classifies data based on known labels.</td><td>Discovers hidden patterns, structures, or groupings on unknown data.</td></tr><tr><td>Less complex, as the model learns from labelled data with clear guidance.</td><td>More complex as unsorted and messy data is used for input.</td></tr><tr><td>User supervision/intervention is required.</td><td>No user supervision/intervention is required.</td></tr><tr><td>Types : Classification or Regression.</td><td>Types : Clustering, Association, Anomaly Detection, Dimensionality Reduction.</td></tr></table></td><td></td></tr>
</table>

	<table><tr><td>Example- Spam Email,Fraud Detection, Predicting house prices.</td><td>Example- Customer Segmentation, Identifying products often brought together, Grouping shopping behaviour.</td></tr></table> ***(1 mark for each correct difference (Any two))*** ***(½ mark each for any correct example, if only example is given)***	
15.	Explain Train-test split technique with respect to machine learning algorithm.	2
Ans	Train-test split : ● The train-test split is a technique for evaluating the performance of a machine learning algorithm. ● It can be used for any supervised learning model. ● The procedure involves taking a dataset and dividing it into two subsets: ○ The training dataset : Used to make the model learn. ○ The testing dataset : Used to evaluate the model's performance on new, unseen data. ● The train-test procedure is appropriate when there is a sufficiently large dataset available. ● The ratio of training and testing dataset should be 80-20% or 70-30 %. ● The objective is to estimate the performance of the machine learning model on new data: data not used to train the model. ***(2 marks for any correct/relevant answer)***	
16.	How is Stemming different from Lemmatization ? Explain how the word **"Wolves"** would be processed by stemming and lemmatization.	2
Ans	<table><tr><th>Stemming</th><th>Lemmatization</th></tr><tr><td>It is the process in which the affixes of words are removed and the words are converted to their base form.The resultant stem word may/may not be meaningful.</td><td>It is the process in which the affixes of words are removed and the words are converted to their base form.The resultant Lemma word is always meaningful.</td></tr><tr><td>Stemming takes less time than lemmatization.</td><td>It takes longer time to execute than stemming</td></tr></table> Input Word : **Wolves**	

	Stemming Output : **Wolv** (may not be meaningful) **Lemmatization** Output : **Wolf** (meaningful word) **(1 mark for correct difference (any one))** **(½ mark for correct Stem word)** **(½ mark for correct Lemma word)**	

Answer any **3** out of the given **5** questions in 50– 80 words each 3 x 4 = 12

17.	Differentiate between Deep Learning, Artificial Intelligence and Machine Learning. Also draw a labelled Venn diagram depicting the relationship between AI, ML and DL.	4
Ans	**Artificial Intelligence or AI** for short, refers to any technique that enables computers to mimic human intelligence. An artificially intelligent machine works on algorithms and data fed to it and gives the desired output. Example of AI: ● A chess-playing system like Deep Blue (IBM's system that defeated Garry Kasparov) ● Virtual assistants like Siri ● Rule-based expert systems in medical diagnosis **Machine Learning, or ML** for short, enables machines to improve at tasks with experience. The machine here learns from the new data fed to it while testing and uses it for the next iteration. It also takes into account the times when it went wrong and considers the exceptions. Example of ML: ● Email spam detection ● Movie recommendations like those used by Netflix ● Fraud detection systems **Deep Learning or DL** for short, enables software to train itself to perform tasks with vast amounts of data. Since the system has got huge set of data, it is able to train itself with the help of multiple machine learning algorithms working together to perform a specific task. Example of DL: ● Image recognition in self-driving cars ● Face recognition systems ● Language models like ChatGPT	

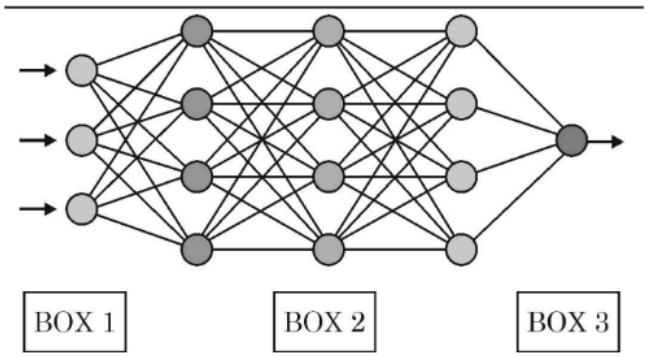
		Artificial Intelligence is the umbrella term which holds both Deep Learning as well as Machine Learning. Deep Learning, on the other hand, is the very specific learning approach which is a subset of Machine Learning as it comprises of multiple Machine Learning algorithms.  ***(1 mark for each correct answer / difference)*** ***(1 mark for correct venn diagram)***	
18.		Consider the following scenarios and identify which AI domain would be most appropriate for each, with justification :	4
Ans	(A)	An AI based education platform needs to translate to English language and analyze thousands of student essays to provide instant feedback on grammar, content quality and writing style.	
		AI Domain : Natural Language Processing (NLP) Justification : Essay translation involves change of language and analysis involves understanding text, grammar checking, and content evaluation, which are core NLP applications. ***(1 mark for correct identification of AI domain)*** ***(1 mark for correct / relevant justification)***	
Ans	(B)	An AI based application installed on a busy crossing in a metropolitan city scans all vehicles driving through that crossing during peak traffic hours and categorizes them into four wheelers and two wheelers.	
		AI Domain : Computer Vision Justification : The system analyzes visual data (images/videos from cameras) to identify and classify vehicles. Since it processes and interprets images, it falls under Computer Vision. ***(1 mark for correct identification of AI domain)*** ***(1 mark for correct / relevant justification)***	

<table>
<tr><td>19.</td><td></td><td>Read the following paragraph and answer the questions that follow :
PQR Security Solutions has designed an AI Model to detect cyber attacks on E-Commerce websites. For this, various network activities were monitored and analyzed on one of the websites. The model was tested on a dataset of 1500 network activities. Out of these, the model correctly predicted that 1000 were cyber attacks. It also correctly identified that 250 were not cyber attacks. However, the model predicted that 200 were cyber attacks but actually they were not. Additionally, it predicted that 50 were not cyber attacks but they actually were.</td><td></td></tr>
<tr><td></td><td>(A)</td><td>Draw the confusion matrix based on the given scenario.</td><td>2</td></tr>
<tr><td>Ans</td><td>(A)</td><td>
<table>
<tr><td colspan="2" rowspan="2">CONFUSION MATRIX</td><td colspan="2">REALITY</td></tr>
<tr><td>YES</td><td>NO</td></tr>
<tr><td rowspan="2">PREDICTION</td><td>YES</td><td>1000(TP)</td><td>200 (FP)</td></tr>
<tr><td>NO</td><td>50 (FN)</td><td>250(TN)</td></tr>
</table>
OR
<table>
<tr><td colspan="2" rowspan="2">CONFUSION MATRIX</td><td colspan="2">PREDICTION</td></tr>
<tr><td>YES</td><td>NO</td></tr>
<tr><td rowspan="2">REALITY</td><td>YES</td><td>1000(TP)</td><td>50 (FN)</td></tr>
<tr><td>NO</td><td>200 (FP)</td><td>250(TN)</td></tr>
</table>
(2 marks for drawing confusion matrix with all correct values at correct positions)

OR
(1 ½ mark for drawing confusion matrix with any 2 correct values at correct positions)

OR
(½ mark for drawing confusion matrix without/incorrect values)
</td><td></td></tr>
<tr><td>Ans</td><td>(B)</td><td>How many total cases are True Negative in the above scenario ?</td><td>1</td></tr>
<tr><td></td><td></td><td>True Negative (TN) : 250

(1 mark for the correct answer)</td><td></td></tr>
<tr><td>Ans</td><td>(C)</td><td>Calculate Precision.</td><td>1</td></tr>
</table>

		TP = 1000, TN = 250, FP = 200, FN = 50 Precision = TP/(TP + FP) = 1000/1200 = 0.833 = 83.3 % ***(1 mark for the correct answer)*** ***OR*** ***(½ mark for writing correct formula but incorrect posting of values)*** ***OR*** ***(½ mark for writing formula only)*** ***NOTE- Mathematical calculations can be ignored***	
20.	(A)	Expand and define the terms CNN and ANN.	3
Ans	(A)	**Convolutional Neural Network (CNN)** – Convolutional Neural Network is a Deep learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. CNN is specially designed to process images by automatically extracting visual features. **Artificial Neural Network (ANN)** – Artificial Neural networks are modelled on the human brain and nervous system. They are able to automatically extract features without input from the programmer. Every neural network node is essentially a machine learning algorithm. It is useful when solving problems for which the data set is very large. ***(½ mark each for the correct full form)*** ***(1 mark each for the correct definition / explanation / relevant answer)***	
	(B)	In the diagram of neural network given below, identify the layer that should be depicted in Box 1 and Box 2 :  	1

<table>
<tr><td>Ans</td><td>(b)</td><td>Box 1 : Input Layer
Box 2 : Hidden Layer

(½ mark each for the correct answer. No marks to be awarded for naming Box 3)</td><td></td></tr>
<tr><td>21.</td><td></td><td>Consider the following documents :

Document 1 : Data Science requires information.
Document 2 : Information analysis requires data.

Implement all the four steps of Bag of Words (BoW) model to create a document vector table.</td><td>4</td></tr>
<tr><td>Ans</td><td></td><td>Step 1 : Text Processing (Preprocessing), after normalization :
Document 1 : [data, science, requires, information]
Document 2 : [information, analysis, requires, data]

Step 2 : Create Dictionary (Vocabulary)
Unique words :data, science, information, analysis, requires

Step 3 : Create Document Vector
Count frequency of each vocabulary word in Document 1

<table>
<tr><td></td><td>data</td><td>science</td><td>requires</td><td>information</td><td>analysis</td></tr>
<tr><td>Doc 1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
</table>

Step 4 : Create Document Vector table for all documents

<table>
<tr><td></td><td>data</td><td>science</td><td>requires</td><td>information</td><td>analysis</td></tr>
<tr><td>Doc 1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>Doc 2</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
</table>

(1 mark for each correct step)
(No mark to be deducted for combining Step 3 and Step 4)</td><td></td></tr>
</table>

Series : GE1FH

SET ~ 4

प्रश्न–पत्र कोड
Q.P. Code 104

रोल नं.
Roll No.

परीक्षार्थी प्रश्न–पत्र कोड को उत्तर–पुस्तिका के मुख–पृष्ठ पर अवश्य लिखें ।
Candidates must write the Q.P. Code on the title page of the answer-book.

• • •

नोट

(I) कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ **23** हैं ।

(II) कृपया जाँच कर लें कि इस प्रश्न–पत्र में **21** प्रश्न हैं ।

(III) प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए प्रश्न–पत्र कोड को परीक्षार्थी उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें ।

(IV) **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें ।**

(V) इस प्रश्न–पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न–पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न–पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर–पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।

• ~ •

NOTE

(I) Please check that this question paper contains **23** printed pages.

(II) Please check that this question paper contains **21** questions.

(III) Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

(IV) **Please write down the serial number of the question in the answer-book at the given place before attempting it.**

(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

कृत्रिम बुद्धिमत्ता

ARTIFICIAL INTELLIGENCE

*निर्धारित समय : **2** घण्टे* | *अधिकतम अंक : **50***

*Time allowed : **2** hours* | *Maximum Marks : **50***

• • •

सामान्य निर्देश :

(i) कृपया निर्देशों को ध्यान से पढ़ें ।

*(ii) इस प्रश्न-पत्र में **दो** खण्डों में **21** प्रश्न हैं : **खण्ड-क** और **खण्ड-ख** ।*

*(iii) **खण्ड-क** में वस्तुपरक प्रकार के प्रश्न हैं, जबकि **खण्ड-ख** में विषयपरक प्रकार के प्रश्न हैं ।*

*(iv) दिये गए **(5 + 16) = 21** प्रश्नों में से, उम्मीदवार को **2** घंटे के आबंटित (अधिकतम) समय में **(5 + 10) = 15** प्रश्नों के उत्तर देने हैं ।*

(v) किसी विशेष खण्ड के सभी प्रश्नों को सही क्रम में करने का प्रयास किया जाना चाहिए ।

*(vi) **खण्ड-क : वस्तुपरक प्रकार के प्रश्न (24 अंक)***

*(a) इस खण्ड में **5** प्रश्न हैं ।*

(b) कोई नकारात्मक अंकन नहीं है ।

(c) दिए गए निर्देशों के अनुसार कीजिए ।

(d) प्रत्येक प्रश्न/भाग के सामने आबंटित अंकों का उल्लेख किया गया है ।

*(vii) **खण्ड-ख : विषयपरक प्रकार के प्रश्न (26 अंक)***

*(a) इस खण्ड में **16** प्रश्न हैं ।*

*(b) उम्मीदवार को **10** प्रश्न करने हैं ।*

(c) दिए गए निर्देशों के अनुसार कीजिए ।

(d) प्रत्येक प्रश्न/भाग के सामने आबंटित अंकों का उल्लेख किया गया है ।

खण्ड – क

(वस्तुपरक प्रकार के प्रश्न)

1. रोज़गार कौशल पर दिये गये **6** प्रश्नों में से किन्हीं **4** प्रश्नों के उत्तर दीजिए : **4 × 1 = 4**

(i) निम्नलिखित में से कौन तनाव प्रबंधन में सहायक नहीं है ?

(A) स्वास्थ्यवर्धक भोजन (B) गहरी नींद

(C) योगासन (D) नकारात्मक विचार

(ii) स्पैम (Spam) का अर्थ है–

(A) अनावश्यक चित्र (Unnecessary images)

(B) अस्थाई फाइल्स (Temporary files)

(C) जंक मेल (Junk mails)

(D) म्यूजिक फाइल्स (Music files)

(iii) **अभिकथन (A)** : स्थाई कृषि पर्यावरण के अनुकूल है ।

कारण (R) : मृदा संरक्षण के लिये यह रासायनिक उर्वरकों के उपयोग को रोकता है ।

(A) (A) और (R) दोनों सही हैं और (A) का सही स्पष्टीकरण (R) है ।

(B) (A) और (R) दोनों सही हैं परंतु (A) का सही स्पष्टीकरण (R) नहीं है ।

(C) (A) सही है परंतु (R) सही नहीं है ।

(D) (A) सही नहीं है परंतु (R) सही है ।

• • •

General Instructions :

(i) *Please read the instructions carefully.*

(ii) *This question paper consists of **21** questions in **two** sections : **Section-A** & **Section-B**.*

(iii) ***Section-A** has objective type questions whereas **Section-B** contains subjective type questions.*

(iv) *Out of the given **(5 + 16) = 21** questions, a candidate has to answer **(5 + 10) = 15** questions in the allotted (maximum) time of **2** hours.*

(v) *All questions of a particular section must be attempted in the correct order.*

(vi) ***Section-A : Objective type questions (24 marks)***

(a) *This section has **5** questions.*

(b) *There is no negative marking.*

(c) *Do as per the instructions given.*

(d) *Marks allotted are mentioned against each question/part.*

(vii) ***Section-B : Subjective type questions (26 marks)***

(a) *This section has **16** questions.*

(b) *A candidate has to do **10** questions.*

(c) *Do as per the instructions given.*

(d) *Marks allotted are mentioned against each question/part.*

Section – A
(Objective Type Questions)

1. Answer any **4** out of the given **6** questions on employability skills : **4 × 1 = 4**

(i) Which of the following does not help in stress management ?

(A) Healthy food (B) Sound sleep
(C) Yoga asanas (D) Negative thoughts

(ii) Spam refers to

(A) Unnecessary images (B) Temporary files
(C) Junk mails (D) Music files

(iii) **Assertion (A) :** Sustainable agriculture is environment friendly.
Reason (R) : It prevents use of chemical fertilizers to protect soil.

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).

(B) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

(C) (A) is correct but (R) is not correct.

(D) (A) is not correct but (R) is correct.

• • •

(iv) निम्नलिखित में से कौन सा कदम आत्म प्रेरण (Self motivation) नहीं करता ?

(A) अपने लक्ष्य पर ध्यान केन्द्रित करना ।

(B) अपना लक्ष्य प्राप्त करने की योजना बनाना ।

(C) अनुशासन में न रहना ।

(D) अपनी शक्ति का पता करना ।

(v) एक दूसरे से प्रभावकारी रूप से संवाद करने के लिये जब व्यक्तियों की संख्या काफ़ी कम हो तो निम्नलिखित में से किस प्रकार का संवाद किया जाता है ?

(A) अंतर वैयक्तिक (Interpersonal) संवाद

(B) जन संवाद / संचार (Public communication)

(C) अंतःवैयक्तिक (Intrapersonal) संवाद

(D) लघु समूह संवाद (Small group communication)

(vi) रीमा ने अपना रेस्तरां (restaurant) शुरू किया है । वह अपने ग्राहकों के लिये विभिन्न व्यंजन तैयार करने के नये–नये विचार लाती रहती है । एक उद्यमी के रूप में रीमा है :

(A) उत्सुक (Impatient)

(B) सृजनशील (Creative)

(C) कम आत्मविश्वासी (Under Confident)

(D) आलसी (Lazy)

2. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) **अभिकथन (A)** : जब कोई मशीन मनुष्य की तरह कार्य कर सकती है तो इसे कृत्रिम बुद्धिमत्ता कहा जाता है ।

कारण (R) : एक पूर्णतः स्वचालित वॉशिंग मशीन (Washing Machine) कृत्रिम रूप से बुद्धिमान होती है ।

(A) (A) और (R) दोनों सही हैं और (A) का सही स्पष्टीकरण (R) है ।

(B) (A) और (R) दोनों सही हैं परंतु (A) का सही स्पष्टीकरण (R) नहीं है ।

(C) (A) सही है परंतु (R) सही नहीं है ।

(D) (A) सही नहीं है परंतु (R) सही है ।

• • •

(iv) Which of the following is not a step to build self-motivation ?

(A) Focusing on your goal.

(B) Planning to achieve your goal.

(C) Being indisciplined.

(D) Finding out your strength.

(v) Which of the following types of communication takes place when the number of people is small enough to communicate with each other effectively ?

(A) Interpersonal communication

(B) Public communication

(C) Intrapersonal communication

(D) Small group communication

(vi) Reema has started her own restaurant. She keeps on trying new ideas to make different dishes for her customers. As an entrepreneur, Reema is :

(A) Impatient (B) Creative

(C) Under-confident (D) Lazy

2. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) **Assertion (A) :** When a machine is able to mimic human traits, it is said to be artificially intelligent.

Reason (R) : A fully automatic washing machine is artificially intelligent.

(A) Both (A) and (R) are correct and (R) is the correct explanation of (A).

(B) Both (A) and (R) are correct and (R) is not the correct explanation of (A).

(C) (A) is correct but (R) is not correct.

(D) (A) is not correct but (R) is correct.

• • •

(ii) स्पोटिफाइ (Spotify), फेसबुक (Facebook), इंस्टाग्राम (Instagram), अमेजन (Amazon), नेटफ्लिक्स (Netflix) आदि जैसे प्लेटफॉर्म आपकी पसंद के आधार पर संदेश प्रदर्शित करते हैं । इसके पीछे कौन सी प्रौद्योगिकी है ?

(A) मानव बुद्धिमत्ता (Human intelligence)

(B) प्लेटफॉर्म बुद्धिमत्ता (Platform intelligence)

(C) कृत्रिम बुद्धिमत्ता (Artificial intelligence)

(D) अनुप्रयोग बुद्धिमत्ता (Application intelligence)

(iii) **कथन 1** : 4Ws कैनवास के "When" ब्लॉक में हम हितधारक (Stakeholders) देखते हैं ।

कथन 2 : हितधारक (Stakeholders) वे लोग हैं जो विशिष्ट समस्या का सामना करते हैं और समाधान (solution) से उनको लाभ होगा ।

(A) कथन 1 और कथन 2 दोनों सही हैं ।

(B) कथन 1 और कथन 2 दोनों गलत हैं ।

(C) कथन 1 सही है परंतु कथन 2 गलत है ।

(D) कथन 2 सही है परंतु कथन 1 गलत है ।

(iv) जब कभी हम यह चाहते हैं कि AI (कृत्रिम बुद्धिमत्ता) प्रोजेक्ट कोई आउटपुट बताने में समर्थ हो, तो हमें _____ की आवश्यकता होती है ।

(A) डेटा का उपयोग करते हुए पहले इसका परीक्षण करने

(B) डेटा का उपयोग करते हुए पहले इसे प्रशिक्षित करने

(C) (A) और (B) दोनों

(D) (A) और (B) कोई भी नहीं

(v) कम्प्यूटर विज़न (Computer Vision) में "इमेज प्रोसेसिंग" (Image Processing) का क्या अर्थ है ?

(A) विडियोज की एडिटिंग (Editing) करना

(B) इमेजों से सार्थक सूचना प्राप्त करना

(C) ऑडियो फाइल्स चलाना (Playing audio files)

(D) कोड्स कंपाइल करना (Codes Compilation)

• • •

(ii) Platforms such as Spotify, Facebook, Instagram, Amazon, Netflix etc. shows recommendation on the basis of what you like. Which is the technology behind this ?

(A) Human Intelligence (B) Platform Intelligence

(C) Artificial Intelligence (D) Application Intelligence

(iii) **Statement 1** : In "When" block of 4Ws canvas we find the stakeholders.

Statement 2 : Stakeholders are the people who face a particular problem and would be benefitted with the solution.

(A) Both Statement 1 and Statement 2 are correct.

(B) Both Statement 1 and Statement 2 are incorrect.

(C) Statement 1 is correct but Statement 2 is incorrect.

(D) Statement 2 is correct but Statement 1 is incorrect.

(iv) Whenever we want an AI project to be able to predict an output, we need to _____.

(A) first test it using the data.

(B) first train it using the data.

(C) Both (A) and (B)

(D) Neither (A) nor (B)

(v) What does the term "image processing" refer to in Computer Vision ?

(A) Editing videos

(B) Extracting meaningful information from images

(C) Playing audio files

(D) Compiling codes

• • •

(vi) एक कार्पस में 4 दस्तावेज़ (Documents) हैं जिसमें an, is, the जैसे शब्द बार-बार दिखाई दे रहे हैं । उस शब्द (Term) को बताइये जिसका प्रयोग ऐसे शब्दों के लिये किया जाता है ।

(A) स्टाप शब्द (Stop Word) (B) दुर्लभ शब्द (Rare Word)

(C) लुप्त शब्द (Missing Word) (D) हटाने योग्य शब्द (Removable Word)

3. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) नीचे दिये गये AI एप्लीकेशन के लोगो (logo) का नाम बताइये । यह हमें कहीं जाने पर मार्ग निर्देशन में मदद करता है ।



(ii) डेटा विज्ञान (Data Science) का निम्नलिखित में से कौन सा अनुप्रयोग (application) आनुवंशिकी (genetics) और आनुवंशिक तत्व विज्ञान (genomics) से संबंधित नहीं है ?

(A) स्वास्थ्य पर डीऑक्सीराइबोन्यूक्लिक एसिड (DNA) के प्रभाव को समझना ।

(B) दवाओं और बीमारी के संबंध में प्रतिक्रिया का विश्लेषण करना ।

(C) व्यक्तिगत जीव वैज्ञानिक संबंध का पता करना ।

(D) इंटरनेट पर किसी रिश्तेदार के घर के पते की खोज करना ।

(iii) कम्प्यूटर विज़न (Computer Vision) में निम्नलिखित में से किस कार्य (task) का प्रयोग एकल उद्देश्य (single object) के लिये किया जाता है ?

(A) वस्तु का पता लगाना (Object Detection)

(B) वर्गीकरण + स्थानीयकरण (Classification + Localization)

(C) उदाहरण विभाजन (Instance Segmentation)

(D) गैर-स्थानीयकरण (Non-Localization)

(iv) यह एक कार्यक्षेत्र विशिष्ट भाषा (Domain Specific Language) है जिसे विभिन्न प्रकार के डेटाबेस प्रबंधन प्रणाली (Database Management System) में रखे गये डेटा के प्रबंधन के लिये तैयार किया गया है । संरचनात्मक आँकड़ा (Structured data) संचालन में यह विशेष रूप से लाभदायक है । यह कौन सी कम्प्यूटर भाषा (language) है ?

(A) एस क्यू एल (SQL) (B) सी एस वी (CSV)

(C) स्प्रेड शीट (Spreadsheet) (D) टैक्स्ट (TXT)

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(vi) A corpus contains 4 documents in which the words such as 'an, is, the' were appearing frequently. Identify the term that is used for such words.

(A) Stop word (B) Rare word

(C) Missing word (D) Removable word

3. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) Identify the logo of an application of AI given below. It helps us to navigate to places.



(ii) Which of the following data science application is not associated with genetics and genomics ?

(A) To understand the impact of DNA on health.

(B) To analyze reactions to drugs and disease.

(C) To find individual biological connection.

(D) To search the house address of a relative on the Internet.

(iii) In Computer Vision, which of the following tasks is used for single object ?

(A) Object Detection (B) Classification + Localization

(C) Instance Segmentation (D) Non-Localization

(iv) It is a domain-specific language that is designed for managing data held in different kinds of DBMS (Database Management System). It is particularly useful in handling structured data. Which computer language is this ?

(A) SQL (B) CSV

(C) Spreadsheet (D) TXT

• • •

(v) NLP का कौन सा अनुप्रयोग (application) News item या Blog post का अवलोकन करता है ? यह अतिरिक्तता (redundancy) को दूर करता है और प्राप्त विषय (Content) की विविधता को अधिकतम करता है ।

(A) वर्चुअल असिसटेंट्स (Virtual Assistants)

(B) सेंटीमेंट एनालिसिस (Sentiment Analysis)

(C) टेक्स्ट क्लासीफिकेशन (Text Classification)

(D) ऑटोमेटिक समराइजेशन (Automatic Summarization)

(vi) निम्न चित्र, मूल्यांकन की किस दशा को प्रदर्शित करता है?

Prediction : No	Reality : Yes

(A) गलत सकारात्मक (False Positive)

(B) गलत नकारात्मक (False Negative)

(C) सही सकारात्मक (True Positive)

(D) सही नकारात्मक (True Negative)

4. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) निम्नलिखित में से कौन CSV का सही विस्तार (पूर्ण रूप) है ?

(A) Comma and Space Value

(B) Comma Separated Values

(C) Control Separated Values

(D) Character Separated Values

(ii) **कथन 1** : मॉडल के मूल्यांकन के लिये अति-सज्जा (overfitting) की संस्तुति नहीं की जाती ।

कथन 2 : इसका कारण यह है कि मॉडल सरलता से संपूर्ण प्रशिक्षण सेट को याद करेगा, अतः प्रशिक्षण सेट में किसी भी प्वाइंट के लिये हमेशा सही लेबल (label) बतायेगा ।

(A) कथन 1 और कथन 2 दोनों सही हैं ।

(B) कथन 1 और कथन 2 दोनों गलत हैं ।

(C) कथन 1 सही है परंतु कथन 2 गलत है ।

(D) कथन 2 सही है परंतु कथन 1 गलत है ।

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(v) Which application of NLP helps to provide an overview of a news item or blog post ? It also avoids redundancy from multiple sources and maximises the diversity of content obtained.

(A) Virtual Assistants (B) Sentiment Analysis

(C) Text Classification (D) Automatic Summarization

(vi) Which condition of evaluation does the following diagram indicate ?



(A) False Positive (B) False Negative

(C) True Positive (D) True Negative

4. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) Which of the following is the correct expansion of CSV ?

(A) Comma and Space Value

(B) Comma Separated Values

(C) Control Separated Values

(D) Character Separated Values

(ii) **Statement 1** : Overfitting is not recommended for evaluation of a model.

Statement 2 : This is because the model will simply remember the whole training set, and will therefore always predict the correct label for any point in the training set.

(A) Both Statement 1 and Statement 2 are correct.

(B) Both Statement 1 and Statement 2 are incorrect.

(C) Statement 1 is correct but Statement 2 is incorrect.

(D) Statement 2 is correct but Statement 1 is incorrect.

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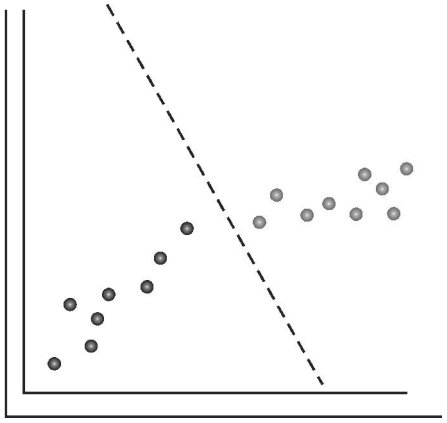
(iii) मॉडल के कार्य निष्पादन के मूल्यांकन के लिये यह एक पैरामीटर है और सही पूर्वानुमान (Prediction) वाले सभी मामलों की तुलना में सही सकारात्मक मामलों (true positive cases) के प्रतिशत के रूप में इसे परिभाषित किया गया है ।

निम्नलिखित मूल्यांकन पैरामीटरों में से यह कौन सा पैरामीटर है ?

(A) प्रिसिज़न (Precision)
(B) रिकॉल (Recall)
(C) F1 स्कोर (F1 Score)
(D) एक्यूरेसी (Accuracy)

(iv) निम्न चित्र शिक्षण आधारित तरीके (learning based approach) के किस रूप को प्रदर्शित करता है ?



(A) समूहन (Clustering)
(B) वर्गीकरण (Classification)
(C) प्रतिगमन (Regression)
(D) आयामी न्यूनीकरण (Dimensionally Reduction)

(v) NLP (Natural Language Processing) की निम्नलिखित में से कौन सी application ई-मेल्स में स्पैम फिल्टरिंग (Spam filtering) से संबंधित है ?

(A) वर्चुअल असिसटेंट्स (Virtual Assistants)
(B) सेन्टीमेंट एनालिसिस (Sentiment Analysis)
(C) टेक्स्ट क्लासीफिकेशन (Text Classification)
(D) ऑटोमेटिक समराइजेशन (Automatic Summarization)

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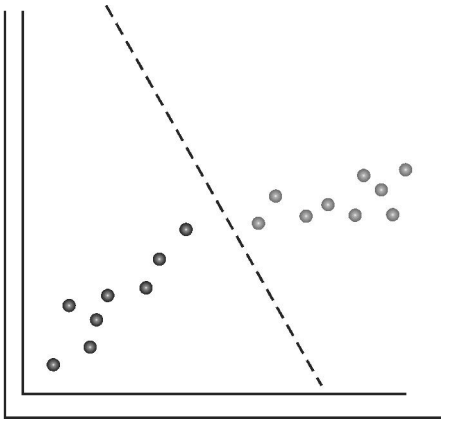
(iii) It is one of the parameters for evaluating a model's performance and is defined as the percentage of true positive cases versus all the cases where the prediction is true.

Which of the following evaluation parameter is this ?

(A) Precision (B) Recall

(C) F1 score (D) Accuracy

(iv) Which form of learning-based approach does the following diagram indicate ?



(A) Clustering

(B) Classification

(C) Regression

(D) Dimensionally Reduction

(v) Which of the following applications of NLP (Natural Language Processing) is associated with spam filtering in e-mails ?

(A) Virtual Assistants

(B) Sentiment Analysis

(C) Text Classification

(D) Automatic Summarization

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(vi) इंटरनेट सक्षम उपकरण (Internet Enabled Device) का उपयोग करते हुए राघव दूर से किसी भी उपकरण को चालू या बंद कर सकता है। यह _____ का एक उदाहरण है।

(A) कृत्रिम बुद्धिमत्ता (Artificial Intelligence)

(B) इंटरनेट ऑफ थिंग्स (Internet of Things)

(C) कंप्यूटर विज़न (Computer Vision)

(D) डीप लर्निंग (Deep Learning)

5. दिए गए **6** प्रश्नों में से किन्हीं **5** प्रश्नों के उत्तर दीजिए : **5 × 1 = 5**

(i) संगीत बुद्धिमत्ता (musical intelligence) एक अवधारणा है जो –

(A) विनियमन, मापन और अंकीय संकेतों, पृथक्करण (abstraction) और तर्क समझने की किसी की योग्यता का आकलन करता है।

(B) समझने या लिखने या बोलने को कार्यान्वित करने, दोनों के संदर्भ में भाषा प्रसंस्करण (Language Processing) कौशल का मापन करता है।

(C) हमारे आस-पास के पर्यावरण पर जानकारी तैयार करने की योग्यता का मूल्यांकन करता है।

(D) ध्वनि, लय और ध्वनि प्रतिरूपों (Patterns) को पहचानने और तैयार करने की व्यक्ति की योग्यता का उल्लेख करता है।

(ii) मूल्यांकन के संदर्भ में निम्नलिखित में से किन में पूर्वानुमान (Prediction) और वास्तविकता (Reality) एक समान हैं ?

(A) सही सकारात्मक और गलत सकारात्मक (True positive और False positive)

(B) सही सकारात्मक और सही नकारात्मक (True positive और True negative)

(C) गलत सकारात्मक और गलत नकारात्मक (False positive और False negative)

(D) सही सकारात्मक और गलत नकारात्मक (True positive और False negative)

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(vi) Raghav can turn on and off any appliance remotely using an internet enabled device. This is an example of _____.

(A) Artificial Intelligence (AI)

(B) Internet of Things (IoT)

(C) Computer Vision (CV)

(D) Deep Learning (DL)

5. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) Musical intelligence is a concept that

(A) assesses one's ability to regulate, measure and understand numerical symbols, abstraction and logic.

(B) measures the language processing skills both in terms of understanding or implementation in writing or verbally.

(C) evaluates the ability to process information on the environment around us.

(D) describes a person's ability to recognize and create sounds, rhythms and sound patterns.

(ii) With respect to evaluation, for which of the following does the prediction and reality match ?

(A) True positive and False positive

(B) True positive and True negative

(C) False positive and False negative

(D) True positive and False negative

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(iii) **कथन 1** : विभिन्न सर्च इंजनों और ई-कॉमर्स पोर्टल्स में अब एक नई विशेषता है जिसे कम्प्यूटर विज़न का उपयोग करने वाला इमेज आधारित सर्च (Image Based Search) कहा जाता है ।

कथन 2 : इमेज आधारित सर्च (Image Based Search) उत्पादों, लोगों और स्थानों को उनकी ध्वनि द्वारा खोजने में मदद करता है ।

(A) कथन 1 और कथन 2 दोनों सही हैं ।

(B) कथन 1 और कथन 2 दोनों गलत हैं ।

(C) कथन 1 सही है परंतु कथन 2 गलत है ।

(D) कथन 2 सही है परंतु कथन 1 गलत है ।

(iv) प्राकृतिक भाषा प्रसंस्करण (Natural Language Processing) के संदर्भ में "Studies" के लिये Stemming से निकले Stem को निम्नलिखित में से कौन सा शब्द निरूपित करता है ?

(A) Study (B) Stud

(C) Studi (D) Studied

(v) निम्नलिखित में से किस परिदृश्य (Scenario) की high False Negative (FN) लागत (cost) हो सकती है ?

(A) वायरल बीमारी का प्रकोप (Viral Disease Outbreak)

(B) अवांछित ई-मेल (Spam)

(C) खनन (Mining)

(D) चित्र खोज (Image Search)

(vi) किस प्रकार के चैट बॉट (Chat-bot) की व्यापक कार्यशीलता है, वह नम्य (flexible) और शक्तिशाली है और बड़े डेटा बेसेज (databases) पर सीधे ही कार्य करता है ?

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(iii) **Statement 1** : Various search engines and e-commerce portals now have a new feature called image-based search using computer vision.

Statement 2 : Image-based search helps in finding items, people and places by giving their sounds to the system.

(A) Both Statement 1 and Statement 2 are correct.

(B) Both Statement 1 and Statement 2 are incorrect.

(C) Statement 1 is correct but Statement 2 is incorrect.

(D) Statement 2 is correct but Statement 1 is incorrect.

(iv) In the context of NLP, which of the following words represents a stem resulting from stemming for "Studies" ?

(A) Study (B) Stud

(C) Studi (D) Studied

(v) Which of the following scenarios might have a high False Negative (FN) cost ?

(A) Viral Disease Outbreak

(B) Spam

(C) Mining

(D) Image Search

(vi) Which type of chat-bot has a wide functionality, is flexible and powerful, and works on bigger databases directly ?

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खण्ड–ख

(विषयपरक प्रकार के प्रश्न)

रोज़गार कौशल पर दिए गए **5** प्रश्नों में से किन्हीं **3** प्रश्नों के उत्तर दीजिए । प्रत्येक प्रश्न का उत्तर **20-30** शब्दों में दीजिए । **3 × 2 = 6**

6. तनाव (Stress) से कारगर रूप में निपटने के लिये स्वस्थ जीवनचर्या अपनाने के महत्व को स्पष्ट कीजिये । आजकल बच्चों में तनाव उत्पन्न करने वाले किसी एक आम कारण को बताइये ।

7. यदि किसी संगठन में आप 20 लोगों की एक टीम के टीम लीडर हैं तो ऐसे किन्हीं दो तरीकों का उल्लेख कीजिये जिनका टीम के सदस्यों के साथ प्रभावकारी संवाद के लिये आप उपयोग करेंगे ।

8. कोई दो ऐसे कार्य बताएँ जो उद्यमी अपना कारोबार चलाने के लिये करते हैं ।

9. ऐसे कोई दो उपाय बताइये जिन्हें किसी व्यक्ति द्वारा अपने डिजिटल उपकरणों (digital devices) की सुरक्षा के लिये अपनाया जाना चाहिए ।

10. सतत् विकास (Sustainable Development) से संबंधित निम्नलिखित समस्याओं पर चर्चा कीजिए :

    (i) जल (Water) (ii) ईंधन (Fuel)

दिए गए **6** प्रश्नों में से किन्हीं **4** प्रश्नों के उत्तर **20-30** शब्दों में दीजिए : **4 × 2 = 8**

11. कम्प्यूटर विज़न (Computer Vision) और नेचुरल लैंगवेज प्रोसेसिंग (Natural Language Processing) के बीच अंतर बताइये ।

12. AI परियोजना चक्र (Project Cycle) के संबंध में निम्नलिखित को परिभाषित कीजिये :

    (i) डेटा अन्वेषण (Data Exploration)

    (ii) डेटा सुविधाएँ (Data Features)



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Section – B

(Subjective Type Questions)

Answer any **3** out of the given **5** questions on Employability Skills. Answer each question in **20-30** words. **3 × 2 = 6**

6. Explain the importance of following a healthy lifestyle in effectively dealing with stress. Write any one common factor that causes stress among the children nowadays.

7. If you are a team leader of a team of 20 people in an organization, mention any two methods that you will use for effective communication with your team members.

8. Write any two tasks that entrepreneurs do when they run their business.

9. Enlist any two measures that an individual should follow to take care of his/her digital devices.

10. Discuss the following problems related to sustainable development :
    (i) Water
    (ii) Fuel

Answer any **4** out of the given **6** questions in **20-30** words each. **4 × 2 = 8**

11. Differentiate between Computer Vision (CV) and Natural Language Processing (NLP).

12. Define the following with respect to AI project cycle :
    (i) Data Exploration
    (ii) Data Features

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13. डेटा विज्ञान (Data Science) का एक अनुप्रयोग "एयरलाईन मार्ग योजना" (Airline Route Planning) है । ऐसे दो कार्य बताइये जिन्हें एयर–लाइन कंपनियाँ डेटा साइंस के उपयोग से कर सकती हैं ।

14. मेडिकल इमेजिंग (Medical Imaging) पर कम्प्यूटर विज़न के किन्हीं दो मुख्य प्रभावों को बताइये ।

15. मानव भाषा (Human Language) और कम्प्यूटर भाषा (Computer Language) के बीच क्या प्राथमिक अंतर है ?

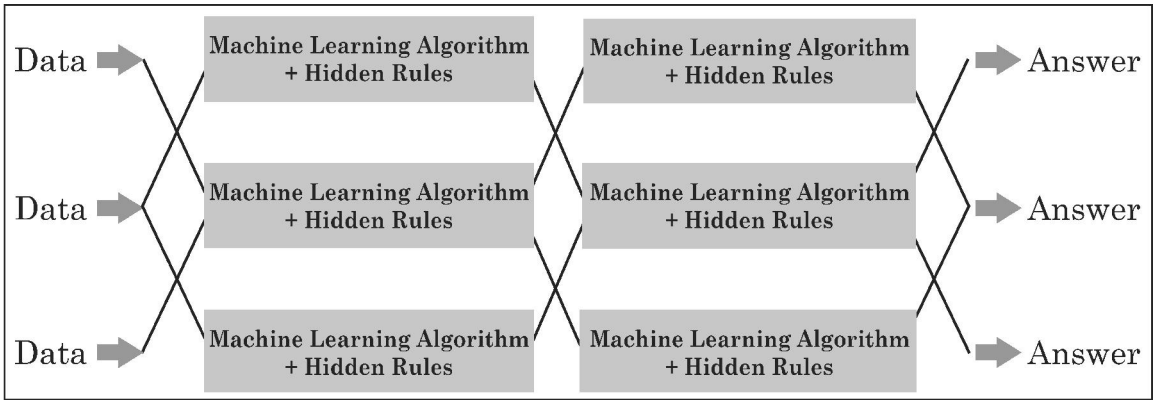
16. मान लीजिए की धोखाधड़ी वाले वित्तीय लेनदेन के जोखिम का पता लगाने के लिये आप एक AI मॉडल तैयार कर रहे हैं । इस संदर्भ में गलत सकारात्मक (False Positives) और गलत नकारात्मक (False Negatives) का उल्लेख कीजिये ।

दिए गए **5** प्रश्नों में से किन्हीं **3** प्रश्नों के उत्तर **50-80** शब्दों में दीजिए : **3 × 4 = 12**

17. आप AI बाएस (AI Bias) और AI एक्सेस (AI Access) से क्या समझते हैं ? अपने उत्तर के समर्थन में एक–एक उदाहरण दीजिए ।

18. प्रॉब्लम स्कोपिंग (Problem Scoping) के 4Ws के संदर्भ में समस्या कथन टेम्पलेट (Problem Statement Template) का क्या उपयोग है ? सभी मुख्य तत्वों (Key elements) को दर्शाते हुए एक समस्या कथन टेम्पलेट (Problem Statement Template) तैयार कीजिए ।

19. निम्न चित्र पर विचार कीजिए । यह बताता है कि संगठित मशीन लर्निंग एलगोरिद्म (organized machine learning algorithm) कैसे काम करती है । अवधारणा (Concept) का पता लगाइये और इसकी कार्यप्रणाली (working) समझाइए ।



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13. One of the applications of Data Science is Airline Route Planning. List any two tasks that airline companies can do using Data Science.

14. Give any two key impacts of Computer Vision on medical imaging.

15. What is the primary difference between Human Language and Computer Language ?

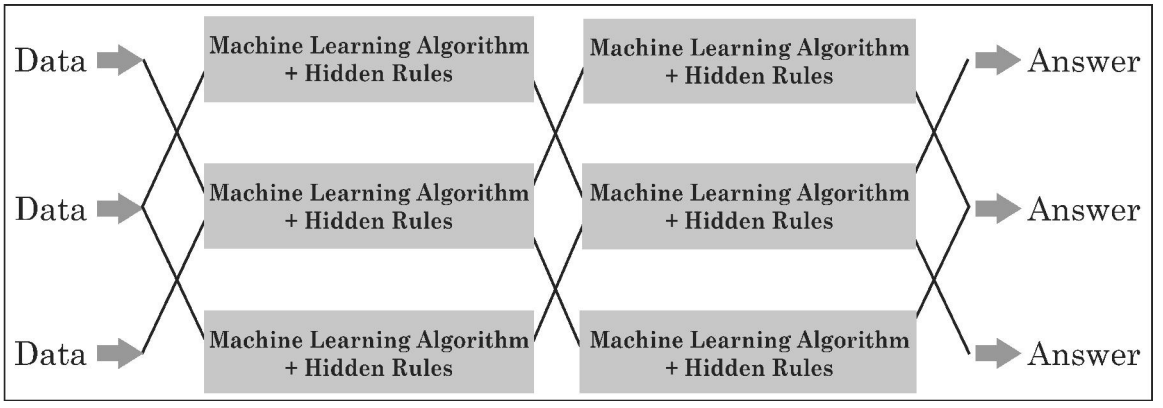
16. Suppose you are developing an AI model to detect fraudulent financial transaction risk. Describe False Positives and False Negatives in this context.

Answer any **3** out of the given **5** questions in **50-80** words each. **3 × 4 = 12**

17. What do you understand by AI Bias and AI Access ? Give one example of each to support your answer.

18. What is the use of problem statement template with respect to 4Ws of problem scoping ? Draw a problem statement template depicting all key elements.

19. Consider the following diagram. It explains how a system of organized machine learning algorithms perform certain tasks. Identify the concept and explain its working.



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20. निम्नलिखित documents पर विचार कीजिये :

Document 1 : NLP is a domain of AI.

Document 2 : NLP stands for Natural Language Processing.

एक डॉक्यूमेंट वेक्टर टेबल (document vector table) बनाने के लिये Bag of Words (BoW) के सभी चार चरणों को कार्यान्वित कीजिए ।

21. बीमारी (डायबिटीज, लीवर संक्रमण आदि) के निदान के लिये एकत्रित नमूनों (रक्त / पेशाब / बलगम आदि) की जाँच करने के लिये एक AI मॉडल तैयार किया गया है । इस मॉडल का परीक्षण लगभग 630 परीक्षणों वाले डेटा सेट पर किया गया और परिणामी Confusion Matrix इस प्रकार है :

Confusion Matrix		**Reality**	
		Yes	No
Prediction	Yes	110	60
	No	50	410

(A) उक्त सूचना में कुल कितने मामले True Negative हैं ?

(B) प्रिसिज़न (Precision), रिकॉल (Recall) और F1 स्कोर (F1 Score) की गणना करें ।

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20. Consider the following documents :

Document 1 : NLP is a domain of AI.

Document 2 : NLP stands for Natural Language Processing.

Implement all the four steps of Bag of Words (BoW) model to create a document vector table.

21. An AI model has been developed to test specimens of blood/urine/cough etc. to diagnose ailments (diabetes/liver infection etc.). The model was tested on a data-set of about 630 tests and the resulting confusion matrix is as follows :

Confusion Matrix		**Reality**	
		Yes	No
Prediction	Yes	110	60
	No	50	410

(A) How many total cases are True Negative in the above scenario ?

(B) Calculate Precision, Recall and F1 Score.

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Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2025
SUBJECT NAME ARTIFICIAL INTELLIGENCE
Subject Code (417) (Q.P. CODE 104 Set 4)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc. may invite action under various rules of the Board and IPC."**
3	**Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
4	The Marking Scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	**Evaluators will mark(✓) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓)while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.**
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of **marks 50** has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answers.) ● Half or a part of the answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books, if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the **"Guidelines for Spot Evaluation"** before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain a photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **21** questions in **two** sections: **Section A & Section B.**
3. **Section A** has Objective type questions whereas **Section B** contains Subjective type questions.
4. Out of the given **(5 + 16 =) 21** questions, a candidate has to answer **(5 + 10 =) 15** questions in the allotted (maximum) time of **2** hours.
5. All questions of a particular section must be attempted in the correct order.
6. **SECTION A - OBJECTIVE TYPE QUESTIONS (24 MARKS):**
    i. This section has **05** questions.
    ii. Marks allotted are mentioned against each question/part.
    iii. There is no negative marking.
    iv. Do as per the instructions given.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**
    i. This section has **16** questions.
    ii. A candidate has to do **10** questions.
    iii. Do as per the instructions given.
    iv. Marks allotted are mentioned against each question/part.

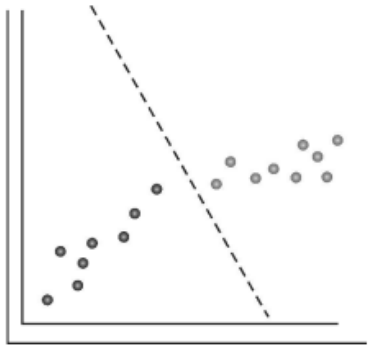
		SECTION A **(Objective Type Questions)**	
1.		**Answer any 4 out of the given 6 questions on employability skills :**	4 x 1 = 4
	(i)	Which of the following does not help in stress management ? (A) Healthy food (B) Sound sleep (C) Yoga asanas (D) Negative thoughts	1
	Ans	(D) Negative thoughts ***(1 Mark for the correct answer)***	
	(ii)	Spam refers to (A) Unnecessary images (B) Temporary files (C) Junk mails (D) Music files	1
	Ans	(C) Junk mails ***(1 Mark for the correct answer)***	

	(iii)	**Assertion (A)** : Sustainable agriculture is environment friendly. **Reason (R)** : It prevents use of chemical fertilizers to protect soil. (A) Both (A) and (R) are correct and (R) is the correct explanation of (A). (B) Both (A) and (R) are correct but (R) is not the correct explanation of (A). (C) (A) is correct but (R) is not correct. (D) (A) is not correct but (R) is correct.	1
	Ans	(A) Both (A) and (R) are correct and (R) is the correct explanation of (A) ***(1 Mark for the correct answer)***	
	(iv)	Which of the following is not a step to build self-motivation ? (A) Focusing on your goal. (B) Planning to achieve your goal. (C) Being indisciplined. (D) Finding out your strength.	1
	Ans	(C) Being indisciplined. ***(1 Mark for the correct answer)***	
	(v)	Which of the following types of communication takes place when the number of people is small enough to communicate with each other effectively ? (A) Interpersonal communication (B) Public communication (C) Intrapersonal communication (D) Small group communication	1
	Ans	(D) Small group communication ***(1 Mark for the correct answer)***	
	(vi)	Reema has started her own restaurant. She keeps on trying new ideas to make different dishes for her customers. As an entrepreneur, Reema is : (A) Impatient (B) Creative (C) Under-confident (D) Lazy	1
	Ans	(B) Creative ***(1 Mark for the correct answer)***	
2.		Answer any **5** out of the given **6** questions :	5 X 1 = 5
	(i)	**Assertion (A) :** When a machine is able to mimic human traits, it is said to be artificially intelligent. **Reason (R) :** A fully automatic washing machine is artificially intelligent. (A) Both (A) and (R) are correct and (R) is the correct explanation of (A) (B) Both (A) and (R) are correct and (R) is not the correct explanation of (A). (C) (A) is correct but (R) is not correct. (D) (A) is not correct but (R) is correct.	1

	Ans	(C) (A) is correct but (R) is not correct. ***(1 Mark for the correct answer)***	
	(ii)	Platforms such as Spotify, Facebook, Instagram, Amazon, Netflix etc. shows recommendation on the basis of what you like. Which is the technology behind this ? (A) Human Intelligence (B) Platform Intelligence (C) Artificial Intelligence (D) Application Intelligence	1
	Ans	(C) Artificial Intelligence ***(1 Mark for the correct answer)***	
	(iii)	**Statement 1** : In "When" block of 4Ws canvas we find the stakeholders. **Statement 2** : Stakeholders are the people who face a particular problem and would be benefited with the solution. (A) Both Statement 1 and Statement 2 are correct. (B) Both Statement 1 and Statement 2 are incorrect. (C) Statement 1 is correct but Statement 2 is incorrect. (D) Statement 2 is correct but Statement 1 is incorrect.	1
	Ans	(D) Statement 2 is correct but Statement 1 is incorrect. ***(1 Mark for the correct answer)***	
	(iv)	Whenever we want an AI project to be able to predict an output, we need to _____. (A) first test it using the data. (B) first train it using the data. (C) Both (A) and (B) (D) Neither (A) nor (B)	1
	Ans	(B) first train it using the data. ***(1 Mark for the correct answer)***	
	(v)	What does the term "image processing" refer to in Computer Vision ? (A) Editing videos (B) Extracting meaningful information from images (C) Playing audio files (D) Compiling codes	1
	Ans	(B) Extracting meaningful information from images ***(1 Mark for the correct answer)***	
	(vi)	A corpus contains 4 documents in which the words such as 'an, is, the' were appearing frequently. Identify the term that is used for such words. (A) Stop word (B) Rare word (C) Missing word (D) Removable word	1
	Ans	(A) Stop word ***(1 Mark for the correct answer)***	

3.		Answer any **5** out of the given **6** questions :	5 X 1 = 5
	(i)	Identify the logo of an application of AI given below. It helps us to navigate to places. 	1
	Ans	Google Maps OR Maps ***(1 Mark for the correct answer)***	
	(ii)	Which of the following data science application is not associated with genetics and genomics ? (A) To understand the impact of DNA on health. (B) To analyze reactions to drugs and disease. (C) To find individual biological connection. (D) To search the house address of a relative on the Internet.	1
	Ans	(D) To search the house address of a relative on the Internet. ***(1 Mark for the correct answer)***	
	(iii)	In Computer Vision, which of the following tasks is used for single object ? (A) Object Detection (B) Classification + Localization (C) Instance Segmentation (D) Non-Localization	1
	Ans	(B) Classification + Localization ***(1 Mark for the correct answer)***	
	(iv)	It is a domain-specific language that is designed for managing data held in different kinds of DBMS (Database Management System). It is particularly useful in handling structured data. Which computer language is this ? (A) SQL (B) CSV (C) Spreadsheet (D) TXT	1
	Ans	(A) SQL ***(1 Mark for the correct answer)***	
	(v)	Which application of NLP helps to provide an overview of a news item or blog post ? It also avoids redundancy from multiple sources and maximises the diversity of content obtained. (A) Virtual Assistants (B) Sentiment Analysis (C) Text Classification (D) Automatic Summarization	1
	Ans	(D) Automatic Summarization ***(1 Mark for the correct answer)***	

	(vi)	Which condition of evaluation does the following diagram indicate ?  (A) False Positive (B) False Negative (C) True Positive (D) True Negative	1
	Ans	(B) False Negative ***(1 Mark for the correct answer)***	
4.		Answer any **5** out of the given **6** questions :	5 x 1 = 5
	(i)	Which of the following is the correct expansion of CSV ? (A) Comma and Space Value (B) Comma Separated Values (C) Control Separated Values (D) Character Separated Values	1
	Ans	(B) Comma Separated Values ***(1 Mark for the correct answer)***	
	(ii)	**Statement 1** : Overfitting is not recommended for evaluation of a model. **Statement 2** : This is because the model will simply remember the whole training set, and will therefore always predict the correct label for any point in the training set. (A) Both Statement 1 and Statement 2 are correct. (B) Both Statement 1 and Statement 2 are incorrect. (C) Statement 1 is correct but Statement 2 is incorrect. (D) Statement 2 is correct but Statement 1 is incorrect.	1
	Ans	(A) Both Statement 1 and Statement 2 are correct. ***(1 Mark for the correct answer)***	
	(iii)	It is one of the parameters for evaluating a model's performance and is defined as the percentage of true positive cases versus all the cases where the prediction is true. Which of the following evaluation parameter is this ? (A) Precision (B) Recall (C) F1 score (D) Accuracy	1
	Ans	(A) Precision ***(1 Mark for the correct answer)***	

	(iv)	Which form of learning-based approach does the following diagram indicate ?  (A) Clustering (B) Classification (C) Regression (D) Dimensionally Reduction	1
	Ans	(B) Classification ***(1 Mark for the correct answer)***	
	(v)	Which application of NLP helps to provide an overview of a news item or blog post ? It also avoids redundancy from multiple sources and maximises the diversity of content obtained. (A) Virtual Assistants (B) Sentiment Analysis (C) Text Classification (D) Automatic Summarization	1
	Ans	(C) Text Classification ***(1 Mark for the correct answer)***	
	(vi)	Raghav can turn on and off any appliance remotely using an internet enabled device. This is an example of _____. (A) Artificial Intelligence (AI) (B) Internet of Things (IoT) (C) Computer Vision (CV) (D) Deep Learning (DL)	1
	Ans	(B) Internet of Things (IoT) ***(1 Mark for the correct answer)***	
5.		Answer any **5** out of the given **6** questions :	5 x 1=5
	(i)	Musical intelligence is a concept that (A) assesses one's ability to regulate, measure and understand numerical symbols, abstraction and logic. (B) measures the language processing skills both in terms of understanding or implementation in writing or verbally. (C) evaluates the ability to process information on the environment around us. (D) describes a person's ability to recognize and create sounds, rhythms and sound patterns.	1

	Ans	(D) describes a person's ability to recognize and create sounds, rhythms and sound patterns. ***(1 Mark for the correct answer)***	
	(ii)	With respect to evaluation, for which of the following does the prediction and reality match ? (A) True positive and False positive (B) True positive and True negative (C) False positive and False negative (D) True positive and False negative	1
	Ans	(B) True positive and True negative ***(1 Mark for the correct answer)***	
	(iii)	**Statement 1** : Various search engines and e-commerce portals now have a new feature called image-based search using computer vision. **Statement 2** : Image-based search helps in finding items, people and places by giving their sounds to the system. (A) Both Statement 1 and Statement 2 are correct. (B) Both Statement 1 and Statement 2 are incorrect. (C) Statement 1 is correct but Statement 2 is incorrect. (D) Statement 2 is correct but Statement 1 is incorrect.	1
	Ans	(C) Statement 1 is correct but Statement 2 is incorrect. ***(1 Mark for the correct answer)***	
	(iv)	In the context of NLP, which of the following words represents a stem resulting from stemming for "Studies" ? (A) Study (B) Stud (C) Studi (D) Studied	1
	Ans	(C) Studi ***(1 Mark for the correct answer)***	
	(v)	Which of the following scenarios might have a high False Negative (FN) cost ? (A) Viral Disease Outbreak (B) Spam (C) Mining (D) Image Search	1
	Ans	(A) Viral Disease Outbreak ***(1 Mark for the correct answer)***	
	(vi)	Which type of chat-bot has a wide functionality, is flexible and powerful, and works on bigger databases directly ?	1
	Ans	Smart Bot **OR** Artificial Intelligent chat-bot **OR** AI-powered chat-bot **OR**	

		Learning based chat-bot ***(1 Mark for the correct answer)*** **OR** ***(1/2 Mark for*** **any AI based smart bot name example like Gemini, ChatGPT)**	

SECTION - B

(SUBJECTIVE TYPE QUESTIONS)

Answer any **3** out of the given **5** questions on Employability Skills (2 x 3 = 6 marks)
Answer each question in **20 – 30** words.

6.	Explain the importance of following a healthy lifestyle in effectively dealing with stress. Write any one common factor that causes stress among the children nowadays.	2
Ans	Maintaining a healthy lifestyle will help you manage stress. Eat a healthy diet, exercise regularly and get enough sleep. Make a conscious effort to spend less time in front of a screen – television, tablet, computer and phone – and more time relaxing. Avoid using alcohol or drugs to manage stress. Stress won't disappear from your life. And stress management needs to be ongoing. Factors that causes stress among the children are ● Peer pressure ● Lack of knowledge ● Comparison ● Competition ● Academic Pressure ● Social Media and Cyberbullying ● Family Issues ● Peer Pressure ● Lack of Sleep ● Uncertainty and lack of resources/guidance about the Future ● Teenage issues like more independent, looks and hormonal changes ● Lack of healthy diet/nutrition ● Lack of outdoor activities/ physical exercise ● Health Problems ***(1 Mark each for the correct answer or any other relevant answer)***	
7.	If you are a team leader of a team of 20 people in an organization, mention any two methods that you will use for effective communication with your team members.	2

Ans	There are different methods of communication: non-verbal, verbal and visual. However, all these methods can only be effective if we follow the basic principles of professional communication skills. These can be abbreviated as 7 Cs i.e., Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous. The **examples** of various methods of communication are: 1. Face-to-face informal communication 2. Notices/Posters 3. E-mail 4. Business Meetings 5. Social networks 6. Message 7. Phone call for communication 8. Newsletter 9. Blog ***(1 mark each for any correct method)*** **OR** ***(1/2 mark for each correct/relevant example)***	
8.	Write any two tasks that entrepreneurs do when they run their business.	2
Ans	The two tasks that entrepreneurs do when they run their business are : 1. Decision Making 2. Managing the business 3. Divide Income 4. Taking risk 5. Create a new method or idea or product 6. Developing a Business Plan 7. Fund management 8. Product/Service Development 9. Managing Finances 10. Hiring and Managing Employees ***(1 mark for each correct/relevant task)***	
9.	Enlist any two measures that an individual should follow to take care of his/her digital devices.	2

Ans	The measures that an individual should follow to take care of his/her digital devices are : 1. Use of updated Antivirus/Firewall 2. Removal of unnecessary files/Spam 3. Use Defragmenter/Disk cleaner (Utility software) 4. Keep the devices cool 5. Regular software updates and security maintenance 6. Proper cleaning and physical care 7. Avoid overcharging and exposure to extreme temperatures 8. Do not run too many programs at a time 9. Always plug in devices carefully 10. Use strong passwords and keep changing 11. Always logout from your device after finishing your work 12. Shutdown the devices properly 13. Get your devices insured ***(1 mark for each correct/relevant answer)***	
10.	Discuss the following problems related to sustainable development : (i) Water (ii) Fuel	2
	Water - ● Water scarcity due to wastage and overuse of water. ● Water Pollution as people are dumping garbage in the water bodies. ● Inefficient water management, due to lack of awareness regarding water harvesting / saving ● Climate Change as extreme weather such as cold or heat are seen in many places, which affect the people living there. ● Wastage of water like car cleaning with a pipe/ keeping the tap open while brushing ● Unplanned city and sewage system ● Lack of awareness/ resources for water recycling **Fuel:** ● We are using a lot of wood from trees as fuels and for construction of homes and furniture. ● As more and more trees are being cut, it is affecting the climate of the place. ● Extreme weather conditions, such as floods, extreme cold or heat, are seen in many places, which affect the people living there. ● Dependency on Fossil Fuels, Climate Change and Greenhouse Gas Emissions ● Limited Access to Clean Energy ● Over use of fuel resources ● Lack of awareness of other methods like solar energy, etc ***(1 mark for each correct/relevant problem)***	

Answer any **4** out of the given **6** questions in **20-30** words each. (4 x2 = 8 marks)

<table>
<tr><td>11.</td><td>Differentiate between Computer Vision (CV) and Natural Language Processing (NLP).</td><td>2</td></tr>
<tr><td>Ans</td><td>
<table>
<tr><th></th><th>Computer Vision</th><th>Natural Language Processing</th></tr>
<tr><td>1</td><td>Abbreviated as CV, is a domain of AI that depicts the capability of a machine to get and analyse visual information and afterwards predict some decisions about it.</td><td>Abbreviated as NLP, is a branch of artificial intelligence that deals with the spoken and written interaction between computers and humans using the natural language.</td></tr>
<tr><td>2</td><td>The entire process involves images/videos acquiring, screening, analysing, identifying and extracting information using algorithms.</td><td>Natural language refers to language that is spoken and written by people, and it attempts to extract information from the spoken and written word using algorithms.</td></tr>
<tr><td>3</td><td>This extensive processing helps computers to understand any visual content and act on it accordingly.</td><td>The ultimate objective of NLP is to read, decipher, understand, and make sense of the human languages in a mainly that is valuable.</td></tr>
<tr><td>4</td><td>In computer vision, Input to machines can be photographs, videos and pictures from thermal or infrared sensors, indicators and different sources.</td><td>In NLP, Input to machines can be in the form of spoken and written text using chatbot, mics, social media or phone messages etc.</td></tr>
<tr><td>5</td><td>It reads pixels from 0-255 in RGB format.</td><td>It understands the human language, its context and semantics.</td></tr>
<tr><td>6</td><td>Examples – Self driving cars and face recognition.</td><td>Examples – Voice assistants, Chatbot</td></tr>
</table>
(1 mark each for any correct/relevant comparison, maximum up to 2 marks)
</td><td></td></tr>
</table>

12.	Define the following with respect to AI project cycle : (i) Data Exploration (ii) Data Features	2
Ans	(i) Data Exploration: It is the 3rd step of the AI Project Cycle to analyse the data. It is a way to discover hidden patterns, interesting insights and useful information from the collected data. You need to visualise it in some user-friendly format so that you can: • Quickly get a sense of the trends, relationships and patterns contained within the data. • Define strategy for which model to use at a later stage. • Communicate the same to others effectively. • To visualise data, we can use various types of visual representations. • Validating or verification of the collected data to analyze that the data is according to the specifications decided, free from errors and data is meeting our needs. (ii) Data Feature Data features refer to the type of data you want to collect. It should be relevant and correct. Data features are individual measurable properties or characteristics of a dataset that are used to analyze and build models. These features, also called variables or attributes, provide context and information about the data For example, data features would be salary amount, increment percentage, increment period, bonus, etc. ***(1 mark each for any correct/relevant answer)*** ***OR*** ***(1/2 mark each for any correct example, if only example is given)***	
13.	One of the applications of Data Science is Airline Route Planning. List any two tasks that airline companies can do using Data Science.	2
Ans	Using Data Science, the airline companies can: • Predict flight delay • Decide which class of airplanes to buy • Whether to directly land at the destination or take a halt in between (For example, A flight can have a direct route from New Delhi to New York. Alternatively, it can also choose to halt in any country.) • Effectively drive customer loyalty programs ***(1 mark each for any correct/relevant answer)***	

14.	Give any two key impacts of Computer Vision on medical imaging.	2
Ans	Application of computer vision. Computer supported medical imaging applications have been a trustworthy help for physicians. It doesn't only create and analyse images but also becomes an assistant and helps doctors with their interpretation. The application is used to read and convert 2D scan images into interactive 3D models that enable medical professionals to gain a detailed understanding of a patient's health condition. Computer Vision has significantly transformed the field of medical imaging, leading to substantial advancements in diagnosis, treatment, planning and patient care. Here are the key impacts : 1. Improved diagnostic accuracy 2. Enhanced image analysis 3. Workflow efficiency 4. Personalized treatment plans 5. Advanced research and development ***(1 mark each for any correct/relevant answer)***	
15.	What is the primary difference between Human Language and Computer Language ?	2

Ans

	HUMAN LANGUAGE	COMPUTER LANGUAGE
1.	It is communication between humans.	It is instructions to the computer.
2.	Humans understand and communicate in many languages.	The computer understands only Binary Language, that is the language of 1s and 0s. Everything that is sent to the machine has to be converted to numbers.
3.	It is flexible, allows variations and can reflect emotions	It is strict, must be followed exactly and lacks emotional touch.
4.	Communication mode is Speech, writing, gestures, images, videos and using sensory organs.	Communication mode is Text-based (code)
5.	Human language is also cultural specific, with different tone, languages and dialects used in different regions and communities	It is a set of instructions that are used to communicate with computers and other digital devices. Computer language is designed to be clear and precise, allowing computers to understand and carry out specific tasks.
6.	Example English, Hindi, Punjabi, French etc.	Python, C++, Basic etc.

(1 mark each for any correct/relevant comparison, maximum upto 2 marks)
OR
(1/2 mark each if only an example is given.)

16. Suppose you are developing an AI model to detect fraudulent financial transaction risk. Describe False Positives and False Negatives in this Context. — 2

Ans

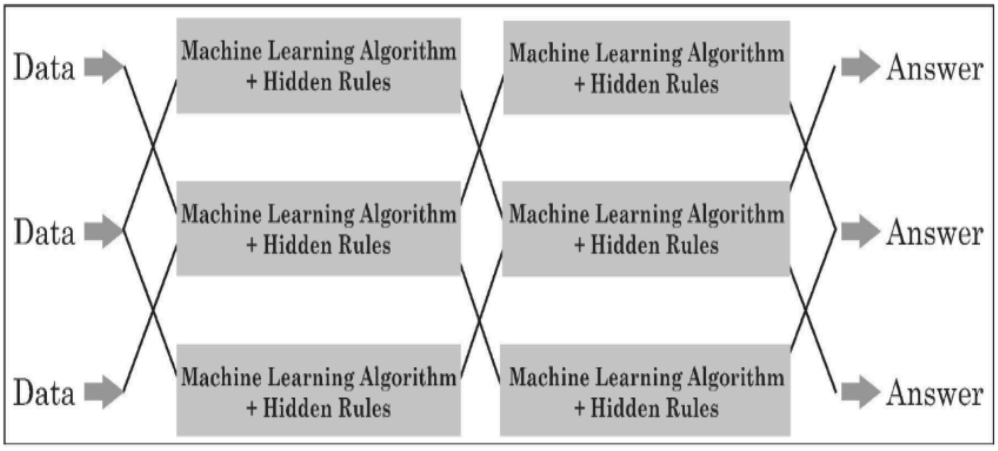
In AI fraud detection model -

1. **False Positives** are legitimate transactions that are incorrectly classified as fraudulent. This can lead to customer dissatisfaction and loss of trust/business/customers/reputation, if legitimate transactions are frequently blocked or flagged for review. A False Positive where Reality is NO but Prediction is YES, like if there is not a fraud done by a customer but the machine has predicted it wrongly as fraud.

	2. **False Negatives** are fraudulent transactions that are not detected by the model and are allowed to proceed. This can result in financial loss and damage to the institution's reputation. A False Negative where Reality is YES but Prediction is NO ***(1 mark for each correct answer)***	

Answer any 3 out of the given 5 questions in 50- 80 words each (4 x 3 = 12 marks)

17.	What do you understand by AI Bias and AI Access ? Give one example of each to support your answer.	4
Ans	**AI Bias** refers to the presence of discrimination in AI systems that leads to favor certain groups over others, due to the data used to train the model. It occurs when an AI system exhibits prejudiced behavior or produces inaccurate predictions due to flawed training data, biased algorithms, or incomplete representations of reality. Sometimes, it is required to have a bias to control a situation and keep things working. We cannot expect a machine to have any biases of its own. Any bias can transfer from the developer to the machine while the algorithm is being developed. Examples: 1. Majorly, all the virtual assistants have a female voice. It is only now that some companies have understood this bias and have started giving options for male voices but since the virtual assistants came into practice, female voices are always preferred for them over any other voice. 2. If you search on any search engines for salons, the first few searches are mostly for female salons. This is based on the assumption that if a person is searching for a salon, in all probability it would be a female. **AI Access** refers to the availability to use AI technologies, tools, and resources. It ensures that AI systems are accessible to different communities and organizations, particularly marginalized or underserved groups, to avoid widening the digital divide. AI access can be both **technical access** (access to AI tools, platforms, and infrastructure) and **social access** (ensuring that AI is used equitably and benefits all sectors of society). The people who can afford AI enabled devices make the most of it while others who cannot are left behind. Because of this, a gap has emerged between these two classes of people and it gets widened with the rapid advancement of technology. Examples: **Duolingo**: An AI-driven language-learning app that uses machine learning algorithms to adapt lessons based on the user's skill level. This makes learning a new language more accessible to people worldwide, regardless of location or socioeconomic status. **AI-powered mobile health apps**: apps like **Babylon Health** and **Ada**	

	Health use AI to provide diagnostic advice based on symptoms. These apps allow people in low-resource areas to access healthcare consultations and diagnostics remotely, reducing the need to travel long distances to see a doctor. ***(1 ½ mark for each correct answer and ½ marks for example)*** ***OR*** ***(½ mark each if only example is written)*** ***OR*** ***(2 marks each for correct explanation with an example)***	
18.	What is the use of a problem statement template with respect to 4Ws of problem scoping ? Draw a problem statement template depicting all key elements.	4
Ans	The Problem Statement Template helps us to summarise all the key points with respect to 4Ws (Who, What, Where, Why) into one single Template so that in future, whenever there is need to look back at the basis of the problem, we can take a look at the Problem Statement Template and understand the key elements of it. ***(1 mark for correct use of problem statement template)*** ***(3 marks for correct problem statement template/ 1 mark for each column)***	
19.	Consider the following diagram. It explains how a system of organized machine learning algorithms perform certain tasks. Identify the concept and explain its working.  	4

Our	Stakeholders	Who
Has/have a problem	[issue, problem, need]	What
When/ While	[context, situation]	Where
An ideal solution would	[benefit solution for them]	Why

Ans	Neural networks are modelled after how neurons in the human brain behave. The key advantage of neural networks is that they are able to extract data features automatically without needing the input of the programmer. A neural network is essentially a system of organizing machine learning algorithms to perform certain tasks. This is a representation of the working of neural networks. A Neural Network is divided into 3 layers and each layer is further divided into several blocks called nodes. Each node has its own machine learning algorithm to accomplish, which is then passed to the next layer. ● The first layer of a Neural Network is known as the input layer. The job of an input layer is to acquire data and feed it to the Neural Network. No processing occurs at the input layer. ● Next to it, are the hidden layers. Hidden layers are the layers in which the whole processing occurs. Their name essentially means that these layers are hidden and are not visible to the user. Each node of these hidden layers has its own machine learning algorithm which it executes on the data received from the input layer. The processed output is then fed to the subsequent hidden layer of the network. There can be multiple hidden layers in a neural network system and their number depends upon the complexity of the function for which the network has been configured. Also, the number of nodes in each layer can vary accordingly. The last hidden layer passes the final processed data to the output layer which then gives it to the user as the final output. ● Similar to the input layer, the output layer too does not process the data which it acquires. It is meant for user-interface ***(1/2 mark for the correct identification , 1/2 mark for the definition)*** ***(3 marks for all the layers/ 1 mark for each layer)***	
20.	Consider the following documents : Document 1 : NLP is a domain of AI. Document 2 : NLP stands for Natural Language Processing. Implement all the four steps of Bag of Words (BoW) model to create a document vector table.	4
Ans	**Step 1 – Text Normalisation** Document 1: [nlp is a domain of AI] Document 2: [nlp stands for natural language processing] **Step 2 : Creating Dictionary** nlp, is, a, domain, of, ai, stands, for, natural, language, processing **Step 3 : Create Document vectors** nlp is a domain of ai stands for natural language processing	

	nlp	is	a	domain	of	AI	stands	for	natural	language	processing
Document 1	1	1	1	1	1	1	0	0	0	0	0
Document 2	1	0	0	0	0	0	1	1	1	1	1

Step 4 : Create Document vectors for all the documents/Term Frequency

	nlp	is	a	domain	of	AI	stands	for	natural	language	processing
Document 1	1	1	1	1	1	1	0	0	0	0	0
Document 2	1	0	0	0	0	0	1	1	1	1	1
	2	1	1	1	1	1	1	1	1	1	1

(½ mark each for naming the step and ½ mark each for making correct table)

21. An AI model has been developed to test specimens of blood/urine/cough etc. to diagnose ailments (diabetes/liver infection etc.). The model was tested on a data-set of about 630 tests and the resulting confusion matrix is as follows : — 4

Confusion Matrix		**Reality**	
		Yes	No
Prediction	Yes	110	60
	No	50	410

(A) How many total cases are True Negative in the above scenario ?
(B) Calculate Precision, Recall and F1 Score.

Ans

CONFUSION MATRIX		**REALITY**	
		YES	**NO**
PREDICTION	**YES**	**110 (TP)**	**60 (FP)**
	NO	**50 (FN)**	**410(TN)**

True Negative cases - 410

Confusion Matrix:

Precision= $\frac{TP}{TP + FP}$

= $\frac{110}{110+60}$ = $\frac{110}{170}$ = 0.647

Recall= $\frac{TP}{TP + FN}$

= $\frac{110}{110+50}$ = $\frac{110}{160}$ = 0.688

F1 Score = $\frac{2* (Precision * Recall)}{(Precision + Recall)}$

= $\frac{2 * 0.647 * 0.688}{0.647+.688}$ = $\frac{0.890}{1.335}$ = 0.667

(1 mark for correct total number of true Negative value)

(½ mark for each correct formula)

(½ mark each for value substitution)

NOTE- Mathematical calculations can be ignored

Set-4

Series #CDBA

प्रश्न–पत्र कोड
Q.P. Code **104**

रोल नं.
Roll No.

परीक्षार्थी प्रश्न–पत्र कोड को उत्तर–पुस्तिका के मुख–पृष्ठ पर अवश्य लिखें ।
Candidates must write the Q.P. Code on the title page of the answer-book.

ARTIFICIAL INTELLIGENCE

*निर्धारित समय : **2** घण्टे* | *अधिकतम अंक : **50***

*Time allowed : **2** hours* | *Maximum Marks : **50***

नोट	NOTE
(I) कृपया जाँच कर लें कि इस प्रश्न–पत्र में मुद्रित पृष्ठ **11** हैं ।	(I) Please check that this question paper contains **11** printed pages.
(II) कृपया जाँच कर लें कि इस प्रश्न–पत्र में **21** प्रश्न हैं ।	(II) Please check that this question paper contains **21** questions.
(III) प्रश्न–पत्र में दाहिने हाथ की ओर दिए गए प्रश्न–पत्र कोड को परीक्षार्थी उत्तर–पुस्तिका के मुख–पृष्ठ पर लिखें ।	(III) Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
(IV) **कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर–पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।**	(IV) **Please write down the serial number of the question in the answer-book before attempting it.**
(V) इस प्रश्न–पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न–पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न–पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर–पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।	(V) 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

General Instructions :

(i) *Please read the instructions carefully.*

(ii) *This question paper consists of **21** questions in two sections : Section **A** & Section **B**.*

(iii) *Section **A** has objective type questions whereas Section **B** contains subjective type questions.*

(iv) *Out of the given **(5 + 16 =) 21** questions, a candidate has to answer **(5 + 10 =) 15** questions in the allotted (maximum) time of **2** hours.*

(v) *All questions of a particular section must be attempted in the correct order.*

(vi) ***Section A – Objective type questions (24 marks) :***

(a) *This section has **05** questions.*

(b) *Marks allotted are mentioned against each question/part.*

(c) *There is no negative marking.*

(d) *Do as per the instructions given.*

(vii) ***Section B – Subjective type questions (26 marks) :***

(a) *This section has **16** questions.*

(b) *A candidate has to do **10** questions.*

(c) *Do as per the instructions given.*

(d) *Marks allotted are mentioned against each question/part.*

Section – A
(Objective Type Questions)

1. Answer any **4** out of the given **6** questions : **4 × 1 = 4**

(i) SMART method can be used to set goals to make you successful in your career and personal life. What does 'A' in SMART stand for ?

(a) Abrupt (b) Accountable

(c) Achievable (d) Admirable

(ii) Which of the following is not a key element of self-management skills ?

(a) Prioritising your work

(b) Not taking feedback

(c) Goal setting

(d) Staying updated about new practices

(iii) Which of the following is a quality of successful entrepreneurs ?

(a) Hard working

(b) Resistance to change

(c) Lazy

(d) Less-confident

(iv) The most important software in any computer is the _____. This is the software that starts working as soon as we switch on a computer.

(a) Web Browsers (b) Operating System

(c) Office Software (d) Designing Software

(v) Which of the following types of communication takes place when one individual addresses a large gathering ?

(a) Written communication

(b) Public communication

(c) Small group communication

(d) Interpersonal communication

(vi) **Assertion (A) :** Organic farming technique is an example of a green skill that is essential for sustainable agriculture.

Reason (R) : Organic farming technique prioritise environment friendly and sustainable practices such as using natural fertilisers, avoiding synthetic pesticides and promoting soil health.

(a) Both (A) and (R) are true and (R) is the correct explanation for (A).

(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).

(c) (A) is true, but (R) is false.

(d) (A) is false, but (R) is true.

2. Answer any **5** out of given **6** questions : **5 × 1 = 5**

(i) Which of the following contributes to the efficiency of an AI project ?

(a) High Model Complexity

(b) Relevant and Authentic Training Data

(c) Minimal Preprocessing

(d) Limited Hardware Resources

(ii) This real life application of NLP is used to provide an overview of a news item or blog post, while avoiding redundancy from multiple sources and maximising the diversity of content obtained. Which is this application ?

(a) Chatbot (b) Virtual Assistant

(c) Sentiment Analysis (d) Automatic Summarisation

(iii) Which of the following represent a machine that is smart but not considered Artificial Intelligence (AI) enabled ?

(a) A robotic vacuum cleaner that can navigate and clean floors autonomously.

(b) A chatbot that engages in natural language conversations and answers questions.

(c) A smartphone with facial recognition for unlocking the device.

(d) A digital alarm clock that rings at a set time every morning.

(iv) Which of the following words represent an example of a lemma resulting from lemmatisation for "caring" in context to Natural Language Processing (NLP) ?

(a) Care (b) Cared

(c) Cares (d) Car

(v) Intrapersonal Intelligence is a concept that :

(a) Measures an individual's ability to understand others' emotions and feelings.

(b) Assesses one's proficiency in mathematics and logical reasoning.

(c) Describes the level of self-awareness someone has, starting from realizing weaknesses, strengths, to recognizing their own feelings.

(d) Evaluates an individual's spatial navigation and visualisation skills.

(vi) For Data Science, usually the data is collected in the form of tables. These tabular datasets can be stored in different formats. Which of the following formats is not used for storing data in a tabular format ?

(a) CSV (b) Website

(c) SQL (d) Spreadsheet

3. Answer any **5** out of given **6** questions : **5 × 1 = 5**

(i) _____ is one of the parameter for evaluating a model's performance and is defined as the fraction of positive cases that are correctly identified.

(a) Precision (b) Accuracy

(c) Recall (d) F1

(ii) In the AI project cycle, which of the following represents the correct order of steps ?

(a) Data Exploration, Problem Scoping, Modelling, Evaluation, Data Acquisition.

(b) Problem Scoping, Data Acquisition, Data Exploration, Modelling, Evaluation.

(c) Modelling, Data Acquisition, Evaluation, Problem Scoping, Data Exploration.

(d) Data Acquisition, Data Exploration, Problem Scoping, Modelling, Evaluation.

(iii) _____ is a concept to unify statistics, data analysis, machine learning and their related methods in order to understand and analyse actual phenomena with data.

(a) Computer Vision (b) Natural Language Processing

(c) Data Science (d) Computer Science

(iv) In computer vision which of the following tasks is used for multiple objects ?

(a) Classification (b) Classification + Localisation

(c) Instance Segmentation (d) Localisation

(v) In spam email detection, which of the following will be considered as "False Negative" ?

(a) When a legitimate email is accurately identified as not spam.

(b) When a spam email is mistakenly identified as legitimate.

(c) When an email is accurately recognised as spam.

(d) When an email is inaccurately labelled as important.

(vi) Which of the following applications is not associated with Natural Language Processing (NLP) ?

(a) Sentiment Analysis (b) Speech Recognition

(c) Spam Filtering in emails (d) Stock Market Analysis

4. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) **Statement 1 :** Confusion matrix is an evaluation metric.

Statement 2 : Confusion Matrix is a record which helps in evaluation.

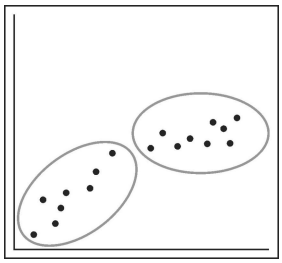
(a) Both Statement 1 and Statement 2 are correct.

(b) Both Statement 1 and Statement 2 are incorrect.

(c) Statement 1 is correct and Statement 2 is incorrect.

(d) Statement 2 is correct and Statement 1 is incorrect.

(ii) Which form of unsupervised learning does the following diagram indicate ?



(a) Clustering (b) Regression

(c) Reinforcement learning (d) Classification

(iii) Bag of Words is a _____ model which helps in extracting features out of the text which can be helpful in machine learning algorithms.

(a) Data Science (DS)

(b) Virtual Reality (VR)

(c) Natural Language Processing (NLP)

(d) Computer Vision (CV)

(iv) Which of the following represents an example of a recommendation system ?

(a) An online clothing store that offers a wide variety of clothing options.

(b) A search engine that retrieves relevant web pages based on user queries.

(c) An e-commerce website that displays customer reviews and ratings for products.

(d) A music streaming platform that suggests songs and playlists based on user listening history.

(v) Name any two search engines.

(vi) What is the primary need for evaluating an AI model's performance in the AI Model Development process ?

(a) To increase the complexity of the model.

(b) To visualize the data.

(c) To assess how well the chosen model will work in future.

(d) To reduce the amount of data used for training.

5. Answer any **5** out of the given **6** questions : **5 × 1 = 5**

(i) **Assertion (A) :** The term used to refer to the number of pixels in an image is resolution.

Reason (R) : Resolution in an image denotes the total number of pixels it contains, usually represented as height × width.

(a) Both (A) and (R) are true and (R) is the correct explanation for (A).

(b) Both (A) and (R) are true and (R) is not the correct explanation for (A).

(c) (A) is true, but (R) is false.

(d) (A) is false, but (R) is true.

(ii) When a machine possesses the ability to mimic human traits, i.e., make decisions, predict the future, learn, and improve on its own, it is said to have :

(a) Computational Skills (b) Learning Capability

(c) Artificial Intelligence (d) Cognitive Processing

(iii) **Statement 1 :** To evaluate a models' performance, we need either precision or recall.

Statement 2 : When the value of both Precision and Recall is 1, the F1 score is 0.

(a) Both statement 1 and statement 2 are correct.

(b) Both statement 1 and statement 2 are incorrect.

(c) Statement 1 is correct, but statement 2 is incorrect.

(d) Statement 1 is incorrect, but statement 2 is correct.

(iv) The concept of _____ is used to apply face filters on various social media platforms.

(a) NLP (b) Computer Vision

(c) Data Science (d) Block chain Technology

(v) The 4 W's Problem Canvas helps in identifying the key elements related to the given problem.

Which of the following is NOT one of the blocks of the Problem Canvas ?

(a) When (b) Where

(c) What (d) Why

(vi) Which domain of AI is used for interacting with virtual assistants such as Siri and Alexa ?

(a) Machine Learning (ML)

(b) Computer Vision (CV)

(c) Natural Language Processing (NLP)

(d) Technical Vision (TV)

Section – B

(Subjective Type Questions)

Answer any **3** out of given **5** questions on Employability Skills. Answer each question in **20-30** words. **3 × 2 = 6**

6. Give any two examples of how individual choices and behaviours can contribute in achieving sustainable development.
7. List any two common misconceptions about entrepreneurship.
8. What is the importance of time management in effectively dealing with stress ? Provide any one strategy for improving time management skills to reduce stress.
9. Mention any two measures that individuals or organisations can take to protect their data from theft and viruses.
10. The method of communication that you choose could affect the relationship with your peers, superiors and customers. Write the four factors on the basis of which you can choose the right method of communication.

Answer any **4** out of given **6** questions in **20-30** words each. **4 × 2 = 8**

11. Differentiate between Machine Learning (ML) and Deep Learning (DL).
12. What are the primary differences between Script-bots and Smart-bots ?
13. What do you mean by Evaluation of an AI model ? Also explain the concept of overfitting with respect to AI model Evaluation.

14. For a healthcare organisation's objective of predicting disease outbreaks and efficiently allocating resources through the analysis of medical records, would you recommend using supervised learning or unsupervised learning as the preferred machine learning approach ? Explain your choice briefly.

15. What role does data play in AI based applications ? Name any two sources of online data collection for building any AI based application.

16. Differentiate between grayscale and RGB images.

Answer any **3** out of given **5** questions in **50-80** words each. **3 × 4 = 12**

17. What are Neural networks ? Briefly explain all the layers of a neural network.

18. Give any four examples of applications of AI that we see around us.

19. Consider the following two documents :

Document 1 : ML and DL are part of AI.

Document 2 : DL is a subset of ML.

Implement all four steps of the Bag of Words (BoW) model to create a document vector table. Depict the outcome of each step.

20. Consider the following graphs (Figure 1 and Figure 2) that demonstrate the two types of Supervised Learning Models of Artificial Intelligence. Identify and explain each model giving suitable examples of each.

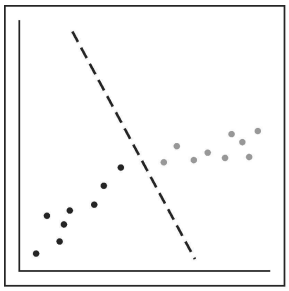


Figure 1

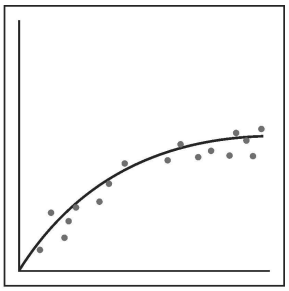


Figure 2

21. A binary classification model has been developed to classify news articles as either "Fake News" or "Real News". The model was tested on a dataset of 500 news articles, and the resulting confusion matrix is as follows :

Confusion Matrix		Reality	
		Yes	No
Predicted	Yes	45	15
	No	20	420

(A) How many total cases are True Negative in the above scenario ?

(B) Calculate Precision, Recall and F1-Score.

