MODEL TEST PAPER – 2 (ANSWERS)

SECTION A – OBJECTIVE TYPE QUESTIONS

1.	Answer any 4 out	of the given 6 que	estions on Employa	ability Skills.		
	A. (a)	B. (c)	C. (a)	D. (d)	E. (a) and (c)	F. (a)
2.	Answer any 5 out	of the given 6 que	estions.			
	A. (c)	B. (b)	C. (b)	D. (a)	E. (b)	F. (b)
3.	Answer any 5 out	of the given 6 que	estions.			
	A. (a)	B. (c)	C. (c)	D. (b)	E. (d)	F. (b)
4.	Answer any 5 out	of the given 6 que	estions.			
	A. (d)	B. (b)	C. (b)	D. (a)	E. (a)	F. (a)
5.	5. Answer any 5 out of the given 6 questions.					
	A. (b)	B. (a)	C. (c)	D. (b)	E. (c)	F. (d)

SECTION B-SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills.

- 6. The factors that help in building self-confidence are:
 - (i) Positive thinking
 - (ii) Belief in our ability and skills
 - (iii) Acceptance of our body and mind
 - (iv) Feeling of well-being
- 7. Different types of entrepreneurs are:
 - (i) **Innovative:** Innovative entrepreneurs are those who invent new ideas, new production methods to produce new products and come up with new ways to reorganize the company's structure.
 - (ii) **Imitative:** Imitative entrepreneurs are those who do not make any innovations by themselves but copy inventions made by innovative entrepreneurs.
 - (iii) Fabian: Fabian entrepreneurs are those who do not adopt or innovate new technologies and are satisfied with their existing business techniques. They adopt new technologies only after realizing that not adopting new techniques would result in huge opportunity loss.
 - (iv) **Drone:** Drone entrepreneurs are those who are very conservative and do not want to make any changes to their business set-up even if they are suffering losses.
- **8.** An operating system is a software program that acts as an interface between the user and the computer hardware. The different types of operating systems are:
 - (i) **GUI-based operating system:** It is a user-friendly graphics-based OS that allows users to communicate with the help of buttons, icons and menus that appear on the screen, for example, Windows, MacOS, Android, etc.
 - (ii) **Single-user, single tasking OS:** It enables a single user to perform a single task on the system at one time, for example, MS-DOS.
 - (iii) **Single-user, multi-tasking OS:** It allows a single user to perform multiple tasks on the system at one time, for example, Windows, MacOS, etc.
 - (iv) Multi-user OS: It allows multiple users to work on the same computer simultaneously, for example, UNIX.
 - (v) **Real-time OS:** It provides a computing environment that instantly reacts to an input and executes in real time, for example, Windows CE, Lynx OS.
 - (vi) **Distributed OS:** It runs on a network of computers by integrating different computers into a single mesh computing structure, for example, Windows, UNIX, LINUX.

- 9. Some of the man-made factors that influence our environment are:
 - (i) Overpopulation
- (ii) Deforestation
- (iii) Burning fossil fuels

- (iv) Pollution (v) E-waste
- **10.** The various phases of entrepreneurial development involve:
 - (i) Building an idea: The first step is to build an innovative idea to solve a real customer problem.
 - (ii) **Execution plan:** This phase includes primary and secondary research, customer interviews and financial modelling so as to execute the business plan.
 - (iii) **Putting infrastructure in place:** This phase includes fulfilling basic infrastructure requirements such as office space, machinery, suppliers, working capital, etc.
 - (iv) Raising capital: It is one of the crucial steps in the development of an entrepreneurship as raising capital is the only basis in order to execute a business plan. The capital can be raised through debt or equity and related financial instruments.

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

11. Pixel is called picture element. Pixels are the smallest units of information. Every image is made up of pixels. The more pixels in an image, the sharper and higher quality image it is.

Resolution: The number of pixels in an image is called the resolution. It is identified by the height and width of the image as well as total number of pixels in the image. For example, an HD display has a resolution of 1920×1080 pixels which means the screen will have a width of 1920 pixels while the height of the screen will be of 1080 pixels with a total of 20,73,600 pixels on screen.

12. Accuracy: Accuracy is the proportion of correctness in a classification model. It is defined as the percentage of correct predictions from the total observations. The accuracy tells that overall, how often the model is making a correct prediction.

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

Precision: Precision is the ratio of positive predictive value (True Positive) to the sum of positive predictions (True Positive+False Positive). It tells us how many times our positive prediction was actually positive.

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

Accuracy works well when an equal number of data sets belonging to each category of COVID-19 positive and negative patients are fed into the AI-based machine. But if the AI-based model is trained with data sets having a large number of symptoms of positive patients than negative, then the model would always predict positive cases with higher accuracy but would give us false results (imbalanced data sets) by failing to diagnose the disease and sending a healthy person to hospital.

So, we can say here that Precision is more important than Accuracy for evaluation of a model as Precision can correctly identify patients with an imbalanced training data set.

13. A colour model is a system for creating a full range of colours using primary colours. There are two types of colour models.

Additive colour models use light to represent colours while subtractive colour models use ink to print digital images on papers.

The primary colours of additive colour models are: Red, Green and Blue, while the colours of subtractive colour models are: Cyan, Magenta, Yellow and Black.

14. Named Entity Recognition (NER) is a text analysis technique that uses Machine Language algorithms along with Natural Language Processing (NLP) to extract the keyword and recognize the category of named entities such as people, place, time, currency, etc. For example,

Bill Gates was born and raised in Seattle, Washington. In 1975, he co-founded Microsoft with childhood friend Paul Allen in Albuquerque, New Mexico.

The named identities in the above statement are:

- Person: Bill Gates, Paul Allen
- Location: Seattle, Washington, Albuquerque, Mexico
- Time: 1975
- Company: Microsoft

15. Weak AI: Weak AI is a type of AI which is programmed to operate within a set of predefined functions to accomplish specific tasks. It has limited functionality in terms of scope and domain. It gathers context from keywords and sentence structures.

Examples of weak AI include Siri, Alexa, Google Assistant

Strong AI: Strong AI tries to work like our brain to accomplish a task and doesn't rely on human programming to be able to think or accomplish tasks. Machines with strong AI will be able to exhibit self-awareness and emotions. It uses clustering and association to process data.

Examples of Strong AI:

- Advanced self-driving car (not auto park feature).
- Evolved version of Sophia like humanoids.
- Extension of GPT-3 to general recognition and interpretation in NLP.
- **16. Computer Vision** enables machines to see using sensory device (camera) and analyze visual data on the basis of algorithms, to recognize the image, videos, etc.

Human Vision uses the eye as well as the brain to identify and analyze visual data. When we see an object, the light receptors in our eyes send the input to the primary visual cortex through nerves and, in the brain, the neural network helps in the process of remembering and labelling objects.

Answer any 3 out of the given 5 questions in 50–80 words each.

17. Python code for the following operators:

If A= 20 and B= 18:

Operator	Python Code	Output
+ Addition	A + B	38
 Subtraction 	А — В	2
* Multiplication	A * B	360
/ Division	А/В	1.111
% Modulus	А % В	2
** Exponent	A **B	2621440000000000000000000000000000000000

- **18.** The 4Ws problem canvas helps in identifying the key elements related to problems. Here, we are creating 4Ws problem canvas on the basis of given scenario:
 - A. WHO: Who is having the problem?
 - (i) Who are the stakeholders?
 - Ans. Here, School Management, teachers and students are the stakeholders.
 - (ii) What do you know about them?
 - Ans. Teachers spending more time in taking and maintaining attendance of the students is very timeconsuming.
 - B. WHAT: What is the nature of the problem?
 - (i) What is the problem?
 - Ans. The problem is with taking attendance of students who have shifted to some other sections to attend joint classes. It becomes very difficult for teachers to maintain attendance of all students and, in the process, a lot of teaching time is wasted.
 - (ii) How do you know it is a problem?
 - Ans. As students keep shifting from class to class, it not only leads to delay in taking attendance but also leads to waste of the teacher's time which ultimately hampers study.
 - C. WHERE: Where does the problem arise?
 - (i) What is the context/situation in which the stakeholders experience the problem?
 - Ans. The problem arises when students need to move to some other classes to attend joint classes with other sections and teachers have to maintain their attendance.

- D. WHY: Why do you believe it is a problem worth solving?
 - (i) What would be the key value to the stakeholders?
 - Ans. To overcome the abovesaid problem, Facial Recognition Attendance System needs to be installed in the classes. It is based on face detection and recognition algorithms that automatically detects the students using webcam and when the student enters the classroom, the system marks the attendance by recognizing them. This system not only reduces the time teachers spend taking attendance but also deals with emotion recognition so that teachers are able to monitor students' behaviour.
 - (ii) How would it improve their situation?
 - Ans. The benefits of using Facial Recognition-based Attendance System are:
 - (a) It eliminates the chances of human error while taking attendance.
 - (b) It helps the teacher to monitor and better address student mental health needs.
 - (c) The teachers can be more productive in the classroom by using this system.
- **19.** The Confusion Matrix is used to record the result of comparison between Prediction and Reality. It helps to understand the prediction results and their interpretation. The possible situations in the given scenario are:

Case – 1

Will there be a delay in production in a factory?		
Prediction: Yes	Reality: Yes	
Result: True Positive		

Here, the model predicts a Yes which means that there will be a delay in production in the factory. The Prediction matches Reality. Hence, this condition is termed as True Positive.

Case – 2

Will there be a delay in production in a factory?		
Prediction: No	Reality: No	
Result: True Negative		

Here, the model predicts a No which means that there will not be a delay in production in the factory. The Prediction matches Reality. Hence, this condition is termed as True Negative.

Case – 3

Will there be a delay in production in a factory?		
Prediction: Yes	Reality: No	
Result: False Positive		

Here, the Reality is that there will not be a delay in production in the factory but the machine has incorrectly predicted that there will be a delay. Hence, this condition is termed as False Positive.

Case – 4

Will there be a delay in production in a factory?		
Prediction: No	Reality: Yes	
Result: False Negative		

Here, the Reality is that there will be a delay in production in the factory but the machine has incorrectly predicted it as 'No'. Hence, this condition is termed as False Negative. The Confusion Matrix for the sample data given in the question:

The Confusion Matrix		Reality	
		Yes	No
Prediction	Yes	120 TP	62 FP
	No	70 FN	85 TN

(i)
$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} * 100$$

 $= \frac{120 + 85}{120 + 85 + 62 + 70}$
 $= \frac{205}{337} * 100$
 $= 60.83\%$
(ii) $Precision = \frac{TP}{TP + FP}$
 $= \frac{120}{120 + 62} = \frac{120}{182} = 0.65$
(iii) $Recall = \frac{TP}{TP + FN}$
 $= \frac{120}{120 + 70} = \frac{120}{190} = 0.63$

(iv) *F-measure* = 2 *
$$\frac{Recall * Precision}{Recall + Precision}$$

= 2 * $\frac{0.63 * 0.65}{0.63 + 0.65}$
= 2 * $\frac{0.4095}{1.28}$ = 0.6398

20. In NLP, machine learning algorithms use both syntax and semantics of a sentence to understand natural language.

Semantics analysis: It is a branch of linguistics concerned with the meaning and interpretation of words, sign and sentence structure. It consists of two types of semantics—logical semantics that deal with sense and reference and lexical semantics that works in finding word meanings and relations between them. It lets machines understand natural language the way humans do.

For example, "I saw a saw which could not saw." This sentence is grammatically correct but it is difficult to make sense out of three different 'saw' with different meanings using NLP engine.

Syntactic analysis: It refers to the arrangement of words and phrases to create well-formed sentences in a language. It is also known as syntax analysis. It checks whether the given sentence conveys its logical meaning with proper grammatical structure or not. For example, "Movie theatre go to friends." This sentence does not convey any meaning and is not even grammatically correct.

21. Although CV has surpassed the accuracy of human vision, there are still constraints regarding simple object detection, face recognition under variance of lighting, expression, additional objects on the face, etc. CV output is subject to errors. Al-based facial recognition techniques can be used to save lives by automatically diagnosing disorders and illnesses. It can be used in law enforcement to identify criminal convictions or missing children.

Some of the ethical concerns around the use of CV include:

- (i) Identity theft: Use of CV applications may lead to a third-party committing unintentional identity theft.
- (ii) **Discrimination:** Use of machine learning models and convolutional neural networks in CV can lead to unfair treatment due to bias and discrimination regarding race, gender or class.
- (iii) **Security:** CV technologies can impose security vulnerabilities due to presence or misuse of cameras or CCTV systems.
- (iv) **Deep fake news:** Using CV technologies, it is possible to create fake images and videos that can be used for discrediting a public figure by impersonating.
- (v) Adversarial attacks: It refers to hackers trying to manipulate the inputs of machine learning models so as to cause the model to make mistake and block the system.