

<b>Name:</b>	
<b>Enrolment No:</b>	

## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

**Supplementary Odd Semester Examination, December 2023**

**Programme Name: B.Tech (Mechanical Engineering)**

**Semester : III**

**Course Name : Applied Machine Learning**

**Time : 03 hrs**

**Course Code : MECH 2040**

**Max. Marks: 100**

**Nos. of page(s) : 2**

**Instructions:**

**SECTION A  
ALL QUESTIONS ARE COMPULSORY.**

S. No.	Question	Marks	CO
Q 1	Explain Logistic Regression with its mathematical form.	4	2
Q 2	Explain null and alternative hypothesis.	4	1
Q 3	Explain about R-squared (multiple and adjusted), confusion matrix and precision.	4	2
Q 4	Define CNN with the importance of convolution layer in it.	4	1
Q 5	Explain the conditions to reject null hypothesis as well as to accept alternative hypothesis through <i>p-value</i> and slope.	4	2

**SECTION B  
ALL QUESTIONS ARE COMPULSORY. ATTEMPT ANY ONE FROM Q6**

Q 6	Explain the usefulness of following python libraries with their python syntax: <ul style="list-style-type: none"> <li>a. keras</li> <li>b. tensor</li> <li>c. scipy</li> <li>d. OpenCV</li> <li>e. matplotlib</li> </ul> <p style="text-align: center;"><b>OR</b></p> Explain block diagram of nervous system and its components.	<b>10</b>	<b>2</b>
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Q 7	Explain five benefits of neural network.	10	2
Q 8	Explain about lossless and lossy Compression.	10	3
Q 9	Explain neural model and their equations, and components with model diagram.	10	3

**SECTION-C**

**ALL QUESTIONS ARE COMPULSORY. ATTEMPT ANY ONE FROM Q10**

Q 10	<p>Build two separate models in python – (i) single and (ii) multiple linear regression model which is responsible for generating summary given in Fig.1.</p> <p align="center"><b>OR</b></p> <p>Answer following questions based on model output shown in Fig. 1:</p> <ol style="list-style-type: none"> <li>Name the list of predictors, response and number of observations used for running linear regression model. (2)</li> <li>Explain the accuracy of fitted model. What will be the reliable parameter(s) to analyze the model’s performance and why? (6)</li> <li>Explain strong and weak relationship between all predictors and response. Justify your conclusion. (6)</li> </ol> <p>Which predictors will reject null hypothesis. Discuss your views upon null hypothesis rejection.</p> <pre> =====                         OLS Regression Results ===== Dep. Variable:          logpgp95    R-squared:                0.689 Model:                  OLS         Adj. R-squared:           0.679 Method:                 Least Squares   F-statistic:              74.05 Date:                   Thu, 08 Jul 2021   Prob (F-statistic):      1.07e-17 Time:                   16:24:41         Log-Likelihood:          -62.031 No. Observations:      70             AIC:                     130.1 Df Residuals:          67             BIC:                     136.8 Df Model:               2 Covariance Type:       nonrobust ===== </pre> <table border="1"> <thead> <tr> <th></th> <th>coef</th> <th>std err</th> <th>t</th> <th>P&gt; t </th> <th>[0.025</th> <th>0.975]</th> </tr> </thead> <tbody> <tr> <td>const</td> <td>2.4782</td> <td>0.547</td> <td>4.530</td> <td>0.000</td> <td>1.386</td> <td>3.570</td> </tr> <tr> <td>avexpr</td> <td>0.8564</td> <td>0.082</td> <td>10.406</td> <td>0.000</td> <td>0.692</td> <td>1.021</td> </tr> <tr> <td>resid</td> <td>-0.4951</td> <td>0.099</td> <td>-5.017</td> <td>0.000</td> <td>-0.692</td> <td>-0.298</td> </tr> </tbody> </table> <pre> ===== Omnibus:                17.597    Durbin-Watson:           2.086 Prob(Omnibus):          0.000    Jarque-Bera (JB):       23.194 Skew:                   -1.054    Prob(JB):                9.19e-06 Kurtosis:               4.873    Cond. No.                53.8 ===== </pre> <p>Warnings:</p> <p>[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.</p>		coef	std err	t	P> t	[0.025	0.975]	const	2.4782	0.547	4.530	0.000	1.386	3.570	avexpr	0.8564	0.082	10.406	0.000	0.692	1.021	resid	-0.4951	0.099	-5.017	0.000	-0.692	-0.298	20	3
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**Fig. 1.**

Q 11

- I. Answer following questions based on model summary analysis shown in Fig. 1:
- a. Name the list of predictors, response and number of observations used for generating model' summary in Fig. 2 (2)
  - b. Is the given formula belong to simple or multiple linear regression? Explain your observations? (4)
  - c. Is there any relationship between predictor and responses? Why or why not? (2)
  - d. Determine the strength of relationship between the predictor and the response and how? (6)
  - e. Which type of relationship (either positive or negative) you observed between the predictor and the response? (6)

20

2,3

OLS Regression Results						
Dep. Variable:	Sales	R-squared:	0.897			
Model:	OLS	Adj. R-squared:	0.896			
Method:	Least Squares	F-statistic:	570.3			
Date:	Wed, 14 Sep 2022	Prob (F-statistic):	1.58e-96			
Time:	11:57:02	Log-Likelihood:	-386.18			
No. Observations:	200	AIC:	780.4			
Df Residuals:	196	BIC:	793.6			
Df Model:	3					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
Intercept	2.9389	0.312	9.422	0.000	2.324	3.554
TV	0.0458	0.001	32.809	0.000	0.043	0.049
Radio	0.1885	0.009	21.893	0.000	0.172	0.206
Newspaper	-0.0010	0.006	-0.177	0.860	-0.013	0.011

Fig. 2