ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE

PG DEPARTMENT OF ECONOMICS

QUESTION BANK (Revised Curriculum 2020-21)

FIRST YEAR- FIRST SEMESTER (2020-21 Batch)

COURSE TITLE: (PAPER TITLE):MATHEMATICS AND STATISTICS FOR ECONOMISTS:

Q P CODE: 80123

Unit	Sl.No	**Questions**	Marks
1	1	Define function.	2
1	2	What are the types of function?	2
1	3	Define linear function.	2
1	4	Define non-linear function.	2
1	5	Distinguish between linear and non-linear function.	2
1	6	What do you mean by parameters?	2
1	7	What do you mean by slope?	2
1	8	When do we get straight line on the graph?	2
1	9	When do we get curve on a graph?	2
1	10	What do you mean by quadratic equation?	2
1	11	What do you mean by simultaneous equation?	2
1	12	What do you mean by constant?	2
1	13	What are the significance of mathematics for economics?	2
1	14	Define Variables.	2
1	15	Define independent variables.	2
1	16	Define dependent variables.	2
1	17	Define exponetional function.	2
1	18	What is formula method to solve quadratic equation?	2
1	19	Define consumption function.	2
1	20	Define Income function.	2
1	21	Define investment function.	2
1	22	Define demand function.	2

1	23	Define supply function.	2
2	24	What are the types of calculus?	2
2	25	What do you mean by differential calculus?	2
2	26	What do you mean by integral calculus?	2
2	27	Define Maxima.	2
2	28	Define Minima.	2
2	29	Distinguish between Maxima and Minima.	2
2	30	What is chain rule of differentiation?	2
2	31	Find dy/dx if $Y=10X^2$.	2
2	32	Find dy/dx if $Y=3X^{-3}$.	2
2	33	Find dy/dx if Y=3X+10.	2
2	34	Find dy/dx if $Y=9+3x^4$.	2
2	35	Find dy/dx if $Y=X^2-18$.	2
2	36	Find dy/dx if $Y=Y^2-Y^3$.	2
2	37	Find dy/dx if $U=X^2+Y^3$.	2
2	38	Find dy/dx if $U=X+Y^2+2XY$.	2
2	39	Find dy/dx if $U=2X^4+4Y+6X^2 Y$.	2
2	40	Find Marginal utility If $U=9X^3+2X^2+X-7$.	2
2	41	Find Marginal utility If $U=2X^3+3X^2+2X^2Y^2$.	2
2	42	If MR is Rs.60 and AR is Rs.40 find the η.	2
2	43	If MR is Rs.50 and $\eta=5$ find AR.	2
2	44	If AR is Rs.30 and $\eta=4$ find MR.	2
2	45	If MR is Rs.300 and AR is Rs.20 find the η.	2
2	46	If MR is Rs.25 and $\eta=2.5$ find AR.	2
2	47	If AR is Rs.15 and $\eta=2$ find MR.	2
2	48	Find Marginal productivity function If $Q=12K^3+5L^2+8KL$.	2
2	49	Find Marginal productivity function If $Q=6L^3+8K^2+4L^2K^3-20$.	2

2	50	Find Marginal Cost function If $C=X^3+2X^2-X$.	2
2	51	Find Marginal Cost function If $C=X+7X^2+2X^3-9X^4$.	2
2	52	Find Average Cost function If $C=6X+3X^2+8X^3+3$.	2
2	53	Find Average Cost function If $C=1000+3X+5X^2$.	2
2	54	Find Marginal Revenue function If $R=8Q+2Q^2-15$.	2
2	55	Find Marginal Revenue function If $R=30+2X^2$.	2
2	56	Find Average Revenue function If $R=30+15Q+17Q^2$.	2
2	57	Find Average Revenue function If $R=300+1200Q+Q^2$.	2
2	58	Find if $\int 5dx$.	2
2	59	Find if $\int X^5 dx$.	2
2	60	Find if $\int (8x^3-3x^2+x-1) dx$.	2
2	61	Find if $\int 4x^8 dx$.	2
2	62	Define matrix.	2
2	63	What do you mean by square matrix?	2
2	64	What do you mean by null matrix?	2
2	65	Define row matrix.	2
2	66	Define column metrics.	2
2	67	Define sub-matrix.	2
2	68	Define rectangular matrix.	2
2	69	What do you mean by identity of matrix?	2
2	70	What do you mean by diagonal matrix?	2
2	71	What do you mean by symmetric matrix?	2
2	72	What do you mean by scalar matrix?	2
2	73	Distinguish between singular and non-singular matrix.	2
2	74	What are the properties of metrics addition?	2
2	75	What are the properties of subtraction of matrix?	2
2	76	What are the properties of determinants?	2

2	77	What do you mean by minors in matrix?	2
2	78	What do you mean by cofactor in matrix?	2
2	79	What do you mean by inverse matrix?	2
2	80	Find determents for the given matrix A=$\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$.	2
2	81	Find determents for the given matrix A=$\begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$	2
2	82	Find determents for the given matrix A=$\begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{matrix}$	2
2	83	Find determents for the given matrix A=$\begin{matrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 5 & 6 & 7 \end{matrix}$	2
2	84	Find minors for the given matrix B= $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$.	2
3	85	Define correlation.	2
3	86	What are the types of correlation?	2
3	87	Why do we use scatter plot?	2
3	88	What is the range of correlation?	2
3	89	What do you mean by perfect positive correlation?	2
3	90	What do you mean by perfect negative correlation?	2
3	91	Define hypothesis.	2
3	92	Distinguish between null and alternative hypothesis.	2
3	93	Distinguish between type-I and type-II error.	2
3	94	What do you mean by level of significance?	2
3	95	What do you mean by confidence interval?	2
3	96	Define regression.	2
3	97	Distinguish between PRF and SRF.	2
3	98	What do you mean by simple regression?	2
3	99	Define multiple regression.	2
3	100	Distinguish between simple and multiple regression.	2

3	101	Define R-square.	2
3	102	Distinguish between R-square and adjusted R-square.	2
3	103	The average GPA of all students is 2.70 A sample of 117 were drown and sample mean is 3.00 and S.D is 0.70 Is there a different between mean and sample mean? Test at 5% level of significance.	2
3	104	What are the components of time series?	2
3	105	Define time series.	2
3	106	What do you mean by survey method?	2
3	107	What are the statistical method?	2
3	108	What are survey methods?	2
3	109	What are the merits of survey method?	2
3	110	What are the demerits of survey method?	2
3	111	What are the merits of statistical method?	2
3	112	What are the demerits of statistical method?	2
4	113	Define index number.	2
4	114	What are the types of index number?	2
4	115	What do you mean by deflating index?	2
4	116	Distinguish between chain base and fixed base index number?	2
4	117	What are the merits of index number?	2
4	118	Define simple index number.	2
4	119	What do you mean by relative index number?	2
4	120	Define consumer price index.	2
4	121	Define whole sale price index.	2
4	122	What are the limitations of index number?	2
4	123	What do you mean by weighted index number?	2
4	124	Define splicing.	2
4	125	What do you mean by price index?	2
4	126	What do you mean by quantity index?	2
4	127	Define Laspeyer's index number.	2

4	128	Define Paache's index number.	2
4	129	Define Marshall Edge worth's index number.	2
4	130	Define Fisher's index number.	2
4	131	Define time reversal index number.	2
4	132	Define factor reversal index number.	2
4	133	Distinguish between time reversal and factor reversal index number.	2
1	134	Briefly explain the significance of mathematical economics.	5
1	135	Analyse the different types of functions.	5
1	136	Distinguish between linear and non-linear functions.	5
1	137	Solve the quadratic equations: $3x^2+5x-2=0$	5
1	138	Solve the quadratic equations: $3x^2+7x+2=0$	5
1	139	Solve the quadratic equations: $4x^2+13x+3=0$	5
1	140	Solve the quadratic equations: $4x^2+5x-6=0$	5
1	141	Determine demand curve for the given equation: Y=-2P+3.	5
1	142	Determine demand curve for the given equation: Y=9-3P.	5
1	143	Determine demand curve for the given equation: Y=-20-7P.	5
1	144	Determine demand curve for the given equation: Y=10-3.5P.	5
1	145	Determine Supply curve for the given equation: Y=5+3P.	5
1	146	Determine Supply curve for the given equation: Y=-9+9P.	5
1	147	Determine Supply curve for the given equation: Y=3X+15.	5
1	148	Determine Supply curve for the given equation: Y=4X+3.	5
1	149	Find equilibrium price and quantity for the given equation: Qd=500-100P and Qs= 50+5p.	5
1	150	Find equilibrium price and quantity for the given equation: Qd=50-10P and Qs= 5+5p.	5
1	151	Find equilibrium price and quantity for the given equation: Qd=33-3P and Qs= 26-2P.	5
1	152	Find equilibrium price and quantity for the given equation: Qd=-25P +20 and Qs= 5P+60.	5
1	153	Find the equilibrium level of income C=85+0.9Y, I=55 and G=25.	5
1	154	Find the equilibrium level of income C=25+0.75Y, I=50 and G=25.	5

1	155	Find the equilibrium level of income C=12.5+0.45Y, I=25 and G=12.5.	5
2	156	Distinguish between Maxima and Minima.	5
2	157	Write a note on significance of differentiation.	5
2	158	Find dy/dx if $Y=(X^2+5)\ (2X^2-4X+3)$.	5
2	159	Find dy/dx if $Y=(3X^3+2X)\ (5X^2-9)$.	5
2	160	Find dy/dx if $Y=(X^5+X^3)\ (X^2+2X)$.	5
2	161	Find dy/dx if $Y=(3X^2+1)/\ (X^3+2X)$.	5
2	162	Find dy/dx if $Y=(X^2+2)\ /(3X^3-2X^2)$.	5
2	163	Find dy/dx if $Y=(X^2+1)/\ (2X^2-4X)$.	5
2	164	Find the point of inflection $Y=10X^3-15X^2+10$.	5
2	165	Find the point of inflection $U=X^3+Y^3-3X-27Y+24$.	5
2	166	Find the point of inflection $Y=2X^2+Y^2-4X+8Y$.	5
2	167	Find out Marginal utility function for a given total utility function $U=4X^2Y+6XY^3+6X+3Y$. If Y=3 and X=2 find TU and MU.	5
2	168	Find out Marginal utility function for a given total utility function $U=(6X+3Y)(X^2-10)$.	5
2	169	Find out Marginal utility function for a given total utility function $U=(X^2-Y^2)/(X^3+Y^3)$.	5
2	170	Find the elasticity of demand and MR at P=2. If the demand function $Q=30-5Q-P^2$.	5
2	171	Find the elasticity of demand and MR at P=10. If the demand function $Q=650-5P-P^2$.	5
2	172	Find the elasticity of demand and MR at Q=1. If the demand function $P=-2Q^2+18$.	5
2	173	Compute Marginal productivity if K=2 and L=4 for the given function $X=3KL^2+4K^2L+2L+2K$.	5
2	174	Compute Marginal productivity if K=2 and L=4 for the given function $Q=(X^2+2)\ (X+3)$.	5
2	175	Compute Marginal productivity if K=3 and L=5 for the given function $X=4L^4K^2+6LK^3+12L+18K$.	5
2	176	If $C=2X-2X^2+X^3$ find Average cost and Marginal cost.	5
2	177	If $C=2Q^2+3Q+10$ find Average cost and Marginal cost if Q=10.	5
2	178	If $C=10+2X+13X^2$ find Average cost and Marginal cost if X=3.	5
2	179	If $R=80Q-2Q^2-15$ find the Average Revenue and Marginal revenue functions.	5
2	180	If $R=300+1200Q-Q^2$ find the Average Revenue and Marginal revenue functions.	5
2	181	If $R=30+15Q-17Q^2$ find the Average Revenue and Marginal revenue functions where Q=2.	5

2	182	Given the demand function $P=85-4X-X^2$ find the consumer surplus at X=5.	5
2	183	Given the demand function $P=35-2X-X^2$find the consumer surplus at X=3.	5
2	184	Given the demand function $P=25-6X-X^2$ find the consumer surplus at P=64.	5
2	185	The supply function for a commodity $P=4+X+X^2$ find producer surplus when the price is P=6.	5
2	186	The supply function for a commodity $P=2X^2+X+5$ find producer surplus when the price is X=3.	5
2	187	The supply function for a commodity $P=5+X+X^2$ find producer surplus when the price is P=11.	5
2	188	Write a note on types of Matrix.	5
2	189	Solve linear equation: $2X_1+3X_2=5$ $11X_1-5X_2=6$	5
2	190	Solve linear equation: $2X_1+3X_2=13$ $X_1+7X_2=23$	5
3	191	Write a note on correlation.	5
3	192	What are the types of correlation?	5
3	193	What are the importance and limitation of correlation?	5
3	194	Calculate the correlation coefficient from the following data of marks obtained in commerce (X) and Economics (Y). X: 50, 60, 58, 47, 49, 33, 65 Y: 48, 65, 50, 48, 55, 58, 63	5
3	195	From the data given below obtain the correlation coefficient. X: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Y: 10, 7, 2, 6, 4, 8, 3, 1, 5, 9	5
3	196	Seven students have obtain the following ranks in two subjects' history and geography. Find their rank correlation coefficient. Rank in History: 7, 1, 4, 6, 5, 3, 2 Rank in Geography: 5, 1, 2, 3.5, 3.5, 7, 6	5
3	197	Find out Karl Pearson's Coefficient of correlation from the following data. X: 2, 3, 5, 6, 8, 9 Y: 6, 5, 7, 8, 12, 11	5
3	198	From the following data calculate Karl Pearson's coefficient of correlation. A: 1, 5, 3, 2, 1, 1, 7, 0 B: 0, 1, 0, 0, 11, 2, 1, 5	5
3	199	Find out coefficient of correlation from the following data. X-- 17 ,18, 19, 20, 21, 22, 23, 24 ,25 Y—38, 37, 38, 33, 32, 33, 34, 29, 26	5
3	200	Seven students have obtain the following ranks in two subjects' history and geography. Find their rank correlation coefficient. Rank in History: 7, 1, 4, 6, 5, 3, 2	5

		Rank in Geography: 5, 1, 2, 3.5, 3.5, 7, 6	
3	201	Find out Karl Pearson's Coefficient of correlation from the following data. X: 2, 3, 5, 6, 8, 9 Y: 6, 5, 7, 8, 12, 11	5
3	202	What are the steps involved in hypothesis testing?	5
3	203	Distinguish between Type-I and Type-II Error.	5
3	204	Write a note on level of significance.	5
3	205	Write a note on type of hypothesis.	5
3	206	A Stenographer claims that she can take dictation at the rate of 120 words per minute, can we reject her claim on the basis of 100 trails in which she demonstrates a mean 116 words with a standard deviation of 15 words? Use 5 percent level of significance (CV=1.96)	5
3	207	It is claimed that a random sample of 100 tyres with a mean life of 15269 kms is drawn from a population of tyres which has a mean life of 15200 kms and a standard deviation of 1248 kms. Test the validity of the claim at 5 percent level of significance? (CV=1.96)	5
3	208	A weighing machine without any display was used by an average of 320 persons a day with a standard deviation of 50 persons. When an attractive display was used in the machine, the average for 100 days increased by 15 persons. Can we say that the display did not help much? Use 5 percent level of significance (CV=1.96).	5
3	209	A random sample of 17 agriculture labors have a mean income of 30000 and a S.D of 8000.A random sample of 18 non-agricultural works have mean income of 33000 and a S.D of 8300 .test the claim at = 0.05 that the mean annual income of agriculture and nan-agriculture workers are not same. (Critical value=2.042)	5
3	210	Define Regression. Distinguish between PRF and SRF.	5
3	211	Distinguish between R-square and Adjusted R-square.	5
3	212	The following table gives the aptitude test scores and productivity indices of 10 workers selected at random. Calculate the regression equations. Aptitude Scores (X): **60**, 62, 65, 70, 72, 48, 53, 73, 65, 82 Productivity index Y: 68, 60, 62, 80, 85, 40, 52, 62, 60, 81	5
3	213	From the data given below find PRF and SRF lines Demand: 56, 53, 45, 42, 54. Price: 25, 20, 18, 16, 21.	5
3	214	Find the SRF function and R-square for the data given below: X: 18 ,20, 25, 29, 33. Y: 15, 17, 20, 22, 26.	5

<table>
<tr><td>3</td><td>215</td><td>Specify a regression equation for output and labour. Estimate the same by using following information Interpret the results
<table><tr><td>Output</td><td>50</td><td>67</td><td>72</td><td>40</td><td>80</td><td>25</td><td>100</td><td>57</td></tr><tr><td>Labour</td><td>08</td><td>10</td><td>15</td><td>05</td><td>20</td><td>04</td><td>18</td><td>07</td></tr></table></td><td>5</td></tr>
<tr><td>3</td><td>216</td><td>Define trend analysis. What are the types of trends?</td><td>5</td></tr>
<tr><td>3</td><td>217</td><td>Analyse the survey methods of trend analysis.</td><td>5</td></tr>
<tr><td>3</td><td>218</td><td>Fit a trend line by the method of semi-averages.
<table><tr><td>Year</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td></tr><tr><td>Profits</td><td>28.0</td><td>29.4</td><td>30.2</td><td>27.0</td><td>32.5</td></tr></table></td><td>5</td></tr>
<tr><td>3</td><td>219</td><td>Estimate the trend values using the data given below by taking four-yearly moving average and forecast the value for the year 2015 :
<table><tr><td>Years</td><td>1999</td><td>2000</td><td>2001</td><td>2002</td><td>2003</td><td>2004</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr><tr><td>Values</td><td>12</td><td>25</td><td>39</td><td>54</td><td>70</td><td>87</td><td>105</td><td>100</td><td>82</td><td>65</td><td>49</td><td>34</td><td>20</td><td>7</td></tr></table></td><td>5</td></tr>
<tr><td>3</td><td>220</td><td>Using three yearly moving average compute trend values and find for the year 2008:
<table><tr><td>Year</td><td>1998</td><td>1999</td><td>2000</td><td>2001</td><td>2002</td><td>2003</td><td>2004</td><td>2005</td><td>2006</td></tr><tr><td>Sale</td><td>15</td><td>21</td><td>20</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>54</td></tr></table></td><td>5</td></tr>
<tr><td>3</td><td>221</td><td>Fit a trend line by the method of semi-averages.
<table><tr><td>Year</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td></tr><tr><td>Profits</td><td>28.0</td><td>29.4</td><td>30.2</td><td>27.0</td><td>32.5</td></tr></table></td><td>5</td></tr>
<tr><td>4</td><td>222</td><td>Define index number. How are they constructed?</td><td>5</td></tr>
<tr><td>4</td><td>223</td><td>What are index number? Analyse the use of index number</td><td>5</td></tr>
<tr><td>4</td><td>224</td><td>What are the problems faced in construction of index number?</td><td>5</td></tr>
<tr><td>4</td><td>225</td><td>What are the features of index number?</td><td>5</td></tr>
<tr><td>4</td><td>226</td><td>Write a note on types of index number.</td><td>5</td></tr>
<tr><td>4</td><td>227</td><td>What are the uses of index number?</td><td>5</td></tr>
<tr><td>4</td><td>228</td><td>Construct the Chain base index number for data given below.
<table><tr><td>Year</td><td>2011</td><td>2012</td><td>2013</td><td>2014</td><td>2015</td><td>2016</td></tr><tr><td>Price</td><td>100</td><td>150</td><td>200</td><td>220</td><td>230</td><td>250</td></tr></table></td><td>5</td></tr>
<tr><td>4</td><td>229</td><td>Construct the fixed base index number for data given below.
<table><tr><td>Year</td><td>2011</td><td>2012</td><td>2013</td><td>2014</td><td>2015</td><td>2016</td></tr><tr><td>Price</td><td>20</td><td>24</td><td>35</td><td>36</td><td>38</td><td>40</td></tr></table></td><td>5</td></tr>
<tr><td>4</td><td>230</td><td>Calculate Laspeyres ideal index number from the data given below:
<table><tr><td rowspan="2">Commodity</td><td colspan="2">2009</td><td colspan="2">2010</td></tr><tr><td>Price</td><td>Quantity</td><td>Price</td><td>Quantity</td></tr><tr><td>A</td><td>12</td><td>49</td><td>10</td><td>50</td></tr><tr><td>B</td><td>15</td><td>25</td><td>12</td><td>20</td></tr><tr><td>C</td><td>20</td><td>10</td><td>18</td><td>12</td></tr></table></td><td>5</td></tr>
</table>

4	231	Calculate Marshall Edgeworth ideal index number from the data given below: Commodity | 2009 (Price, Quantity) | 2010 (Price, Quantity) A | 12 | 49 | 10 | 50 B | 15 | 25 | 12 | 20 C | 20 | 10 | 18 | 12	5
4	232	Calculate Fisher's price and quantity index: Commodity | 2015 (Price, Quantity) | 2017 (Price, Quantity) A | 16 | 50 | 24 | 45 B | 18 | 30 | 24 | 25 C | 20 | 5 | 15 | 8	5
4	233	Calculate Fisher's ideal index number from the data given below: Commodity | 2009 (Price, Quantity) | 2010 (Price, Quantity) A | 10 | 49 | 12 | 50 B | 12 | 25 | 15 | 20 C | 18 | 10 | 20 | 12	5
4	234	Calculate the Paasche's price and quantity index for the following index: Commodity | 2019 (Price, Expenditure) | 2020 (Price, Expenditure) A | 8 | 80 | 10 | 120 B | 10 | 120 | 12 | 96 C | 5 | 40 | 5 | 50 D | 4 | 56 | 3 | 60	5
4	235	Calculate Marshall-Edgeworth price and quantity index: Commodity | 2015 (Price, Quantity) | 2017 (Price, Quantity) A | 16 | 50 | 24 | 45 B | 18 | 30 | 24 | 25 C | 20 | 5 | 15 | 8	5
4	236	From the following data construct an index number (i) with 2005 as base. (ii) by chain base method: Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 Price | 50 | 60 | 62 | 65 | 70 | 78	5
4	237	Following are the index number of prices (base 1981=100): Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 Index number | 140 | 200 | 210 | 230 | 250 | 260 | 280 | 300	5
4	238	From the given average prices of three commodities, find chain base index numbers chained to 1998: Year | 1991 | 1992 | 1993 | 1994 | 1995 X | 8 | 10 | 12 | 15 | 12 Y | 10 | 12 | 15 | 18 | 20 Z | 5 | 9 | 12 | 15 | 18	5
4	239	Construct the fixed base index number. Year | 1991 | 1992 | 1993 | 1994 | 1995 A | 8 | 10 | 12 | 15 | 12	5

<table>
<tr><td>4</td><td>240</td><td>Construct the fixed base index number.

<table><tr><td>Year</td><td>1991</td><td>1992</td><td>1993</td><td>1994</td><td>1995</td></tr><tr><td>B</td><td>12</td><td>15</td><td>18</td><td>20</td><td>10</td></tr></table></td><td>5</td></tr>
<tr><td>4</td><td>241</td><td>Construct the fixed base index number.

<table><tr><td>Year</td><td>1991</td><td>1992</td><td>1993</td><td>1994</td><td>1995</td></tr><tr><td>C</td><td>5</td><td>9</td><td>12</td><td>15</td><td>18</td></tr></table></td><td>5</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>242</td><td>Explain the significance of mathematical economics and its limitation.</td><td>10</td></tr>
<tr><td>1</td><td>243</td><td>Find equilibrium price and quantity before and after tax if tax=5 per unit for the given equation: Qd=220-5P and Qs= -20+3p.</td><td>10</td></tr>
<tr><td>1</td><td>244</td><td>Find equilibrium price and quantity before and after tax if tax=2 per unit for the given equation: Qd=125-2P and Qs= -45+8p.</td><td>10</td></tr>
<tr><td>1</td><td>245</td><td>Find equilibrium price and quantity before and after tax if tax=10 per unit for the given equation: Qd=24-4P and Qs= -27+13p.</td><td>10</td></tr>
<tr><td>1</td><td>246</td><td>Find equilibrium price and quantity before and after tax if tax=6 per unit for the given equation: Qd=220-5P and Qs= -20+3p.</td><td>10</td></tr>
<tr><td>1</td><td>247</td><td>Find equilibrium price and quantity before and after subsidy if Subsidy =5 per unit for the given equation: Qd=500-100P and Qs= 50+5P.</td><td>10</td></tr>
<tr><td>1</td><td>248</td><td>Find equilibrium price and quantity before and after subsidy if Subsidy =3 per unit for the given equation: Qd=11P-11 and Qs= 9P+7.</td><td>10</td></tr>
<tr><td>1</td><td>249</td><td>Find the equilibrium level of income C=50+08Y, I=100 and G=50.</td><td>10</td></tr>
<tr><td>1</td><td>250</td><td>Find the equilibrium level of income C=100+0.9Y, I=200 and G=100.</td><td>10</td></tr>
<tr><td>2</td><td>251</td><td>Find the consumer maximisation point if utility function $U=16X_1X_2$. Price of commodity is P_1=4 Rs. And P_2=12 Rs. Consumer income is m=60 Rs.</td><td>10</td></tr>
<tr><td>2</td><td>252</td><td>Find the consumer maximisation point if utility function U=f(XY). Price of commodity is P_1=5Rs. And P_2=5 Rs. Consumer income is m=50 Rs.</td><td>10</td></tr>
<tr><td>2</td><td>253</td><td>Find the consumer maximisation point if utility function $U=20Q_1Q_2$. Price of commodity is P_1=4 Rs. And P_2=10 Rs. Consumer income is m=100 Rs.</td><td>10</td></tr>
<tr><td>2</td><td>254</td><td>Given the demand function by P= (10-2D) ($20-D^2$) find the MR and elasticity if D=1, D=4.</td><td>10</td></tr>
<tr><td>2</td><td>255</td><td>Let the demand curve $P=100-4X-6X^3$. Find MR and Elasticity.</td><td>10</td></tr>
<tr><td>2</td><td>256</td><td>A Monopolist faces a linear demand P=100-4X and his Total Cost C=5+2X find the optimal price, output and profit.</td><td>10</td></tr>
<tr><td>2</td><td>257</td><td>A Monopolist faces a linear demand P=100-2Q and his Total Cost C=50+2Q find the optimal price, output and profit.</td><td>10</td></tr>
<tr><td>2</td><td>258</td><td>A Monopolist faces $R=14X-X^2$ and his Total Cost $C=X^2-2X$ find the optimal price, output and</td><td>10</td></tr>
</table>

		profit.	
2	259	Given the following demand function for two separate markets and the total cost function of the monopoly firm. Find the price, output and maximum profit for the given function: $P_1=8-2X$ $P_2=14-Y^2$ and $C=10+4X+2Y$.	10
2	260	Given the following demand function for two separate markets and the total cost function of the monopoly firm. Find the price, output and maximum profit for the given function: $P_1=17-2Q_1$ $P_2=25-3Q_2$ and $C=2+Q_1+Q_2$.	10
2	261	Given the following demand function for two separate markets and the total cost function of the monopoly firm. Find the price, output and maximum profit for the given function: $P_1=2-X_1$ $P_2=9-6X_2$ and $C=X_1+X_2$.	10
2	262	If $C=50-2Q+7Q^2+Q^3$ find the Marginal cost ,Average cost and cost minimization point.	10
2	263	If $C=3X^4-4X^3+2X^2-9X$ find the Marginal cost ,Average cost and cost minimization point.	10
2	264	If $C=X+7X^2+2X^3-9X^4$ find the Marginal cost ,Average cost and cost minimization point.	10
2	265	Let $P=25-9X$ find Marginal revenue, Average revenue, Total revenue and profit maximisation point.	10
2	266	Let $P=12+8Q-Q^2$ find Marginal revenue, Average revenue, Total revenue and profit maximisation point.	10
2	267	Let $R=100X-X^2-X^3$ find Marginal revenue, Average revenue, Total revenue and profit maximisation point.	10
2	268	Solve linear equation by using Cramer's Rule: $3X+Y+3Z=12$ $X+5Y+2Z=9$ $2X+3Y+Z=8$	10
2	269	Solve linear equation by using Cramer's Rule: $2X+3Y+Z=-5$ $X+2Y-4Z=6$ $3X+Y-3Z=5$	10
	270	Solve linear equation by using Cramer's Rule: $X-2Y+3Z=1$ $3X-Y+4Z=3$ $2X+Y2Z=-1$	
3	271	The ranks of 12 persons before and after the training are as follows. Find the Rank Correlation Coefficient: Rank Before: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 ,11, 12 Rank After: 12, 9, 6, 10, 3, 5, 4, 7, 8, 2 , 11, 1	10
3	272	Calculate Spearman's Rank Correlation coefficient between A and R Series: Rank of A: 2.5, 5, 6, 7, 8, 9, 1, 4 , 2.5 Rank of B: 3,5, 6.5 ,6.5 9, 8, 1 , 4, 2	10
3	273	Calculate Rank Correlation Coefficient from the following data. Father's: 6, 63,67,64, 69, 62, 70, 66, 68, 67, 69,69	10

		Height ,71 Son's Height 68, 66, 68, 65, 69, 66, 68, 65, 71, 67, 68, 70	
3	274	The ranks of 12 persons before and after the training are as follows. Find the Rank Correlation Coefficient: Rank Before 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 ,11, 12 Rank After 12, 9, 6, 10, 3, 5, 4, 7, 8, 2 , 11, 1	10
3	275	The following table gives the number of units produced per day by two workers A and B for a number of days: Test at 5% level of significance should these results be accepted as evidence that B is the more stable worker. A 40 30 38 41 38 35 - - B 39 38 41 33 32 49 49 34	10
3	276	Answer using t-test whether the following two samples drawn from same population at 5% level of significance: Sample I 17 27 18 25 27 29 27 23 17 Sample II 16 16 20 16 20 17 15 21 -	10
3	277	Students were given intensive coaching and 5 tests were conducted in a month. The scores of tests 1 and 5 are given below. Does the scores from test 1 to 5 shown an improvement. Test at 5% level of significance .(critical value -2.101) No of Students 1 2 3 4 5 6 Marks in 1st test 60 41 70 55 62 38 Marks in 2nd test 68 51 84 63 72 50	10
3	278	Ten young recruits were put through a strenuous physical training programme by the army. Their weights (in kg) were recorded before and after with the following results: using 5% level of significance conclude that the programme affects the average weight of young recruits. Recruit 1 2 3 4 5 6 7 Weight before 127 195 162 170 143 205 168 Weight after 135 200 160 182 147 200 172	10
3	279	From the following data, find the regression equation. X 2 3 4 5 6 Y 6 5 4 3 2 Z 10 6 11 16 7	10
3	280	From the following data find the PRF and SRF function. Y 8 36 23 27 14 12 X_1 10 37 18 25 14 28 X_2 8 20 14 11 9 4	10
3	281	Find the SRF and PRF functions to the following data X 1 2 3 4 5 Y 2 4 6 8 2	10

3	282	For the data given below find SRF, R-square and adjusted R-square: State | A | B | C | D | E | F Y (in Quintals) | 40 | 50 | 60 | 70 | 80 | 90 X Rainfall (in inches | 20 | 30 | 40 | 50 | 60 | 70 T Temperature | 20 | 30 | 40 | 30 | 20 | 40	10
3	283	Fit a trend line by the method of semi-averages. Year | 2006 | 2007 | 2008 | 2009 | 2010 Profits | 28.0 | 29.4 | 30.2 | 27.0 | 32.5	10
3	284	Estimate the trend values using the data given below by taking four-yearly moving average and forecast the value for the year 2015 : Years | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 Values | 12 | 25 | 39 | 54 | 70 | 87 | 105 | 100 | 82 | 65 | 49 | 34 | 20 | 7	10
3	285	Fit a trend line by using least square with the following data and find sales for the year 2005: Years | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 Sales | 6.7 | 5.3 | 4.3 | 6.1 | 5.6 | 7.9 | 6.1	10
4	286	Define Index number. Explain the steps to construct index numbers.	10
4	287	Define Index number. Explain the types and limitation of index numbers.	
4	288	Calculate Marshall-Edgeworth price and quantity index: Commodity | 2015 | | 2017 | | Price | Quantity | Price | Quantity A | 16 | 50 | 24 | 45 B | 18 | 30 | 24 | 25 C | 20 | 5 | 15 | 8 D | 10 | 6 | 12 | 16 E | 10 | 10 | 14 | 12	10
4	289	Calculate Marshall-Edgeworth number from the data given below: Commodity | 2009 | | 2010 | | Price | Quantity | Price | Quantity A | 10 | 49 | 12 | 50 B | 12 | 25 | 15 | 20 C | 18 | 10 | 20 | 12 D | 20 | 5 | 40 | 2	10
4	290	Calculate Paasche's price and quantity index numbers: Commodity | 2009 | | 2010 | | Price | Quantity | Price | Quantity A | 10 | 49 | 12 | 50 B | 12 | 25 | 15 | 20 C | 18 | 10 | 20 | 12 D | 20 | 5 | 40 | 2 E | 10 | 10 | 14 | 12	10
4	291	Calculate the Laspeyre's price and quantity index for the following index: Commodity | 2019 | | 2020 | | Price | Expenditure | Price | Expenditure A | 8 | 80 | 10 | 120	10

			B	10	120	12	96	
			C	5	40	5	50	
			D	4	56	3	60	
			E	20	100	25	150	
4	292	Calculate Fisher's ideal price and quantity index:						10

Commodity	2015		2017	
	Price	Quantity	Price	Quantity
A	16	50	24	45
B	18	30	24	25
C	20	5	15	8
D	10	6	12	16
E	10	10	14	12

4	293	Calculate the Paasche's price and quantity index for the following index:						10

Commodity	2019		2020	
	Price	Expenditure	Price	Expenditure
A	8	80	10	120
B	10	120	12	96
C	5	40	5	50
D	4	56	3	60
E	20	100	25	150

4	294	Calculate Laspeyre's price and quantity index numbers:						10

Commodity	2009		2010	
	Price	Quantity	Price	Quantity
A	10	49	12	50
B	12	25	15	20
C	18	10	20	12
D	20	5	40	2
E	10	10	14	12

4	295	Calculate Fisher's ideal index number from the data given below:						10

Commodity	2009		2010	
	Price	Quantity	Price	Quantity
A	10	49	12	50
B	12	25	15	20
C	18	10	20	12
D	20	5	40	2

4	296	Calculate Marshall-Edgeworth price and quantity index:						10

Commodity	2015		2017	
	Price	Quantity	Price	Quantity
A	16	50	24	45
B	18	30	24	25
C	20	5	15	8
D	10	6	12	16
E	10	10	14	12

4	297	Calculate Marshall-Edgeworth number from the data given below:						10

Commodity	2009		2010	
	Price	Quantity	Price	Quantity
A	10	49	12	50
B	12	25	15	20

			C	18	10	20	12		
			D	20	5	40	2		

Model Question Paper

St. Philomena's College (Autonomous) Mysore

I Semester M.A Final Examination December 2019

Subject: ECONOMICS

Title: MATHEMATICS & STATISTICS FOR ECONOMISTS (HC)

Time: 3 Hours **Max Marks: 70**

PART –A

1. **Answer any Five the following:** **5×2=10**

a. What do you mean by equilibrium?

b. Distinguish between linear and non-linear equations.

c. Find derivative for $Y = \frac{x^3 + 3x}{2x - 10}$

d. Compute price elasticity for $Qd = 60 - P - P^2$ at P=2

e. Find Marginal cost function from $Tc = \frac{2}{3}x^3 - 2x^2 + 200x + 50$

f. Mention the uses of scatter diagram.

g. Define time series.

h. What do you mean by deflation?

PART –B

Answer any Six of the following: **6×5=30**

2. In an hypothetical economy

$C = 250 + 0.74$, $I = 5000 - 800i + 0.04y$ and $G = 500$. Find equilibrium national income investment and consumption.

3. Find the elasticity of demand and M R for the demand function $P = -2Q^2 + 18$ for Q=1.

4. Suppose the firm faces a demand curve for its product P=32-2q and the firm's cost of production is $C = \frac{2}{3}q^3 - 4q^2 + 200q + 60$ find maximum profit.

5. Discuss the important properties of Cobb-Douglas production function.

6. If D=250-10p and S=-30+3P are demand and supply functions respectively, find consumer's surplus.

7. Compute and interpret Pearson's correlation coefficient for the following variables.

Invt (in Lakhs)	540	220	480	390	350	410	320	450
Interest rate (%)	4	10	4	7	8	6	9	5

PTO

8. Describe the various components of time series.

9. Compute Fisher's ideal index for the following data and verify time reversal test.

	Base year		Current	
Item	**Price**	**Quantity**	**Price**	**Quantity**
A	20	40	40	100
B	15	30	35	70
C	8	20	20	45
D	3	10	8	25

PART –C

Answer any Three of the following: 3×10=

10. Discuss in details the application of differential calculus in Economics.

11. Solve the following set equations by using Cramer's method.

$$3P_1 + 4P_2 - P_3 = 50$$

$$P_1 - P_2 - 4P_3 = 30$$

$$2P_1 + 3P_2 + 5P_3 = 10$$

12. A price discriminating Monopoly sells in two markets whose demands functions are $q_1 = 160 - 10p_1$ and $q_2 = 240 - 20q_2$ it falls the total cost function Tc=2+1.2q+0.02q^2, where $q = q_1 + q_2$. How much should it sell in each market and at what price in order to maximize profits?

13. If $U=8x_1x_2$ is utility function and income is Rs 200 and prices of x_1 and x_2 are Rs.2 and Rs.5 respectively. Find the amounts of x_1 and x_2 utility is maximized.

14. Estimate the influence of education on salary using following information and interpret the results.

Salary (in Crore)	10	20	35	15	5	50	42	70	65	32
Education (in years)	4	5	14	5	3	17	13	18	14	11

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