Q.P. Set

2016/2016

Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

**Re-Examination**

**June 2016**

Maximum Marks: **100** Duration: **3 hour**

Class: **S.Y.B.Tech** Semester: **IV** Program: **Electrical Engineering**

Name of the Course: **EngineeringMathematics IV** Course Code : **BTE226**

Master file.

**Instructions:**

- Attempt any FIVE questions out of SEVEN questions.
- Answers to all sub questions should be grouped together.

| Q | | Marks | CO | Module |
|---|---|---|---|---|
| 1(a) | A sample of 25 pairs of values x and y gave following results $\sum x = 127, \sum y = 100, \sum x^2 = 760, \sum y^2 = 449, \sum xy = 500$ Later on it was found that two pairs of values were taken as $(8,14)$ and $(8,6)$ instead of correct values $(8,12)$ and $(6,8)$. Find correct correlation coefficient between x and y. | 6 | 1 | 1 |
| (b) | Determine constants $\alpha, \beta, \gamma$ if $A = \begin{bmatrix} 0 & 2\beta & \gamma \\ \alpha & \beta & -\gamma \\ \alpha & -\beta & \gamma \end{bmatrix}$ is orthogonal | 6 | 3 | 5 |
| (c) | Let X be a continuous random variable with probability density function $f(x) = \begin{cases} ce^{-2x}, & x > 0 \\ 0 & x \le 0 \end{cases}$ Find (i) c (ii) $P(2 \le X \le 3)$ (iii) mean (iv) variance | 8 | 1 | 1 |
| | | | | |
| 2 (a) | Two independent samples of sizes 8 and 7 contained the following values | 6 | 1 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample I | 19 | 17 | 15 | 21 | 16 | 18 | 16 | 14 |
| Sample II | 15 | 14 | 15 | 19 | 15 | 18 | 16 | |

Is the difference between the sample means significant?

| | | | | |
|---|---|---|---|---|
| (b) | Find mean and variance of Binomial distribution. | **6** | **1** | **2** |
| (c) | A manufacturer produces medicine bottles of which 1% are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 2000 boxes. Using Poisson distribution find how many will contain (i) three defective bottles (ii) at least one defective bottles. | **8** | **1** | **2** |
| | | | | |
| 3 (a) | Calculate the correlation coefficient between x and y from the following data $n=10$, $\sum x=140$, $\sum y=150$, $\sum(x-10)^2=180$, $\sum(y-15)^2=215$, $\sum(x-10)(y-15)=60$. | **6** | **1** | **1** |
| (b) | If A is a non singular matrix of order n, then prove that $(i)\left\|A^{-1}\right\|=\frac{1}{\|A\|}$ $(ii)\ adj\ A^{-1}=(adj\ A)^{-1}$ | **6** | **2** | **5** |
| (c) | If $A=\begin{bmatrix}2&1&1\\0&1&0\\1&1&2\end{bmatrix}$, using Cayley Hamilton Theorem find $A^8-5A^7+7A^6-3A^5+A^4-5A^3+8A^2-2A+I$ | **8** | **3** | **6** |
| | | | | |
| 4 (a) | If $\theta$ is the acute angle between the two regression lines, then prove that $\tan\theta=\frac{1-r^2}{r}\cdot\frac{\sigma_x\sigma_y}{\sigma_x^2+\sigma_y^2}$, where $r,\sigma_x,\sigma_y$ have their usual meanings. | **6** | **2** | **7** |
| (b) | Two independent samples from normal population with equal variance gave the following results<br>Is the difference between the mean significant? | **6** | **1** | **4** |
| (c) | For what values of $\lambda$ and $\mu$ the equations<br>$x+y+z=6$<br>$x+2y+3z=10$<br>$x+2y+\lambda z=\mu$<br>have (i) unique solution (ii) infinite number of | **8** | **2** | **5** |

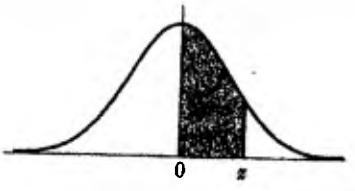
| Sample | Size | Mean | S.D |
|---|---|---|---|
| 1 | 16 | 23.4 | 2.5 |
| 2 | 12 | 24. 9 | 2.8 |

| | | | | |
|---|---|---|---|---|
| | solutions.(iii) no solution | | | |
| | | | | |
| 5 (a) | The probability that the pen manufactured by a company will be defective is $\frac{1}{8}$. If 15 such pens are manufactured, find the probability that (i) exactly three pens will be defective (ii) at least two pens will be defective | **6** | **1** | **2** |
| (b) | Following Table shows the respective heights x and y ( in inches) of a sample of 10 father and their sons. Calculate rank correlation coefficients<br><br>X: 65, 63, 67, 64, 68, 62, 70, 66, 68, 71<br>Y: 68, 66, 68, 65, 69, 66, 68, 65, 71, 70 | **6** | **1** | **2** |
| (c) | Find Eigen values and corresponding Eigen Vectors of $A=\begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ | **8** | **3** | **5** |
| | | | | |
| 6(a) | A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cms. Can it be reasonably regarded that, in the population, the mean height is 165cms, and S.D is 10 cm? | **6** | **1** | **3** |
| (b) | If $A=\begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$, prove that $A^{100}=\begin{bmatrix} -299 & -300 \\ 300 & 301 \end{bmatrix}$ | **6** | **2** | **5** |
| (c) | Reduce the following matrices to normal form and hence find its rank<br><br>$A=\begin{bmatrix} 2 & 1 & 4 & -1 \\ 1 & 2 & 1 & 3 \\ 4 & 5 & -1 & 2 \\ 8 & 7 & 7 & 3 \end{bmatrix}$ | **8** | **3** | **6** |
| | | | | |

| | | | | |
|---|---|---|---|---|
| 7(a) | Calculate the coefficient of correlation for the following data<br><br>**X** 12 17 22 27 32<br>**Y** 113 119 117 115 121 | **6** | **2** | **5** |
| (b) | The mean and standard deviation of the marks obtain by 1000 students in an examination are 34.4 and 16.5 respectively. Assuming that the distribution is normal, find the approximate number of students expected to obtain marks (i) between 30 and 60 (ii) less than 40 (iii) more than 65. | **6** | **1** | **3** |
| (c) | From the following data, find the equation of line of regression of x on y and estimate the most probable value of x when y = 10<br><br>X 3 6 5 4 4 6 7 5<br>Y 3 2 3 5 3 6 6 4 | **8** | **1** | **2** |
| | | | | |

# *Appendix C*

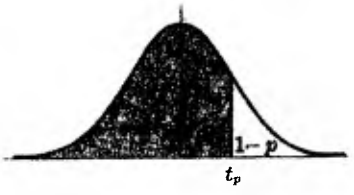
**Areas under the Standard Normal Curve from 0 to $z$**




| $z$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | .0000 | .0040 | .0080 | .0120 | .0160 | .0199 | .0239 | .0279 | .0319 | .0359 |
| 0.1 | .0398 | .0438 | .0478 | .0517 | .0557 | .0596 | .0636 | .0675 | .0714 | .0754 |
| 0.2 | .0793 | .0832 | .0871 | .0910 | .0948 | .0987 | .1026 | .1064 | .1103 | .1141 |
| 0.3 | .1179 | .1217 | .1255 | .1293 | .1331 | .1368 | .1406 | .1443 | .1480 | .1517 |
| 0.4 | .1554 | .1591 | .1628 | .1664 | .1700 | .1736 | .1772 | .1808 | .1844 | .1879 |
| 0.5 | .1915 | .1950 | .1985 | .2019 | .2054 | .2088 | .2123 | .2157 | .2190 | .2224 |
| 0.6 | .2258 | .2291 | .2324 | .2357 | .2389 | .2422 | .2454 | .2486 | .2518 | .2549 |
| 0.7 | .2580 | .2612 | .2642 | .2673 | .2704 | .2734 | .2764 | .2794 | .2823 | .2852 |
| 0.8 | .2881 | .2910 | .2939 | .2967 | .2996 | .3023 | .3051 | .3078 | .3106 | .3133 |
| 0.9 | .3159 | .3186 | .3212 | .3238 | .3264 | .3289 | .3315 | .3340 | .3365 | .3389 |
| 1.0 | .3413 | .3438 | .3461 | .3485 | .3508 | .3531 | .3554 | .3577 | .3599 | .3621 |
| 1.1 | .3643 | .3665 | .3686 | .3708 | .3729 | .3749 | .3770 | .3790 | .3810 | .3830 |
| 1.2 | .3849 | .3869 | .3888 | .3907 | .3925 | .3944 | .3962 | .3980 | .3997 | .4015 |
| 1.3 | .4032 | .4049 | .4066 | .4082 | .4099 | .4115 | .4131 | .4147 | .4162 | .4177 |
| 1.4 | .4192 | .4207 | .4222 | .4236 | .4251 | .4265 | .4279 | .4292 | .4306 | .4319 |
| 1.5 | .4332 | .4345 | .4357 | .4370 | .4382 | .4394 | .4406 | .4418 | .4429 | .4441 |
| 1.6 | .4452 | .4463 | .4474 | .4484 | .4495 | .4505 | .4515 | .4525 | .4535 | .4545 |
| 1.7 | .4554 | .4564 | .4573 | .4582 | .4591 | .4599 | .4608 | .4616 | .4625 | .4633 |
| 1.8 | .4641 | .4649 | .4656 | .4664 | .4671 | .4678 | .4686 | .4693 | .4699 | .4706 |
| 1.9 | .4713 | .4719 | .4726 | .4732 | .4738 | .4744 | .4750 | .4756 | .4761 | .4767 |
| 2.0 | .4772 | .4778 | .4783 | .4788 | .4793 | .4798 | .4803 | .4808 | .4812 | .4817 |
| 2.1 | .4821 | .4826 | .4830 | .4834 | .4838 | .4842 | .4846 | .4850 | .4854 | .4857 |
| 2.2 | .4861 | .4864 | .4868 | .4871 | .4875 | .4878 | .4881 | .4884 | .4887 | .4890 |
| 2.3 | .4893 | .4896 | .4898 | .4901 | .4904 | .4906 | .4909 | .4911 | .4913 | .4916 |
| 2.4 | .4918 | .4920 | .4922 | .4925 | .4927 | .4929 | .4931 | .4932 | .4934 | .4936 |
| 2.5 | .4938 | .4940 | .4941 | .4943 | .4945 | .4946 | .4948 | .4949 | .4951 | .4952 |
| 2.6 | .4953 | .4955 | .4956 | .4957 | .4959 | .4960 | .4961 | .4962 | .4963 | .4964 |
| 2.7 | .4965 | .4966 | .4967 | .4968 | .4969 | .4970 | .4971 | .4972 | .4973 | .4974 |
| 2.8 | .4974 | .4975 | .4976 | .4977 | .4977 | .4978 | .4979 | .4979 | .4980 | .4981 |
| 2.9 | .4981 | .4982 | .4982 | .4983 | .4984 | .4984 | .4985 | .4985 | .4986 | .4986 |
| 3.0 | .4987 | .4987 | .4987 | .4988 | .4988 | .4989 | .4989 | .4989 | .4990 | .4990 |
| 3.1 | .4990 | .4991 | .4991 | .4991 | .4992 | .4992 | .4992 | .4992 | .4993 | .4993 |
| 3.2 | .4993 | .4993 | .4994 | .4994 | .4994 | .4994 | .4994 | .4995 | .4995 | .4995 |
| 3.3 | .4995 | .4995 | .4995 | .4996 | .4996 | .4996 | .4996 | .4996 | .4996 | .4997 |
| 3.4 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4998 |
| 3.5 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 |
| 3.6 | .4998 | .4998 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.7 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.8 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.9 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 |

# *Appendix D*

**Percentile Values ($t_p$)**
**for**
**Student's $t$ Distribution**
**with $\nu$ Degrees of Freedom**

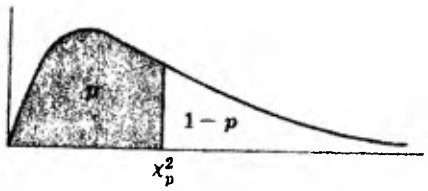



| $\nu$ | $t_{.55}$ | $t_{.60}$ | $t_{.70}$ | $t_{.75}$ | $t_{.80}$ | $t_{.90}$ | $t_{.95}$ | $t_{.975}$ | $t_{.99}$ | $t_{.995}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .158 | .325 | .727 | 1.000 | 1.376 | 3.08 | 6.31 | 12.71 | 31.82 | 63.66 |
| 2 | .142 | .289 | .617 | .816 | 1.061 | 1.89 | 2.92 | 4.30 | 6.96 | 9.92 |
| 3 | .137 | .277 | .584 | .765 | .978 | 1.64 | 2.35 | 3.18 | 4.54 | 5.84 |
| 4 | .134 | .271 | .569 | .741 | .941 | 1.53 | 2.13 | 2.78 | 3.75 | 4.60 |
| 5 | .132 | .267 | .559 | .727 | .920 | 1.48 | 2.02 | 2.57 | 3.36 | 4.03 |
| 6 | .131 | .265 | .553 | .718 | .906 | 1.44 | 1.94 | 2.45 | 3.14 | 3.71 |
| 7 | .130 | .263 | .549 | .711 | .896 | 1.42 | 1.90 | 2.36 | 3.00 | 3.50 |
| 8 | .130 | .262 | .546 | .706 | .889 | 1.40 | 1.86 | 2.31 | 2.90 | 3.36 |
| 9 | .129 | .261 | .543 | .703 | .883 | 1.38 | 1.83 | 2.26 | 2.82 | 3.25 |
| 10 | .129 | .260 | .542 | .700 | .879 | 1.37 | 1.81 | 2.23 | 2.76 | 3.17 |
| 11 | .129 | .260 | .540 | .697 | .876 | 1.36 | 1.80 | 2.20 | 2.72 | 3.11 |
| 12 | .128 | .259 | .539 | .695 | .873 | 1.36 | 1.78 | 2.18 | 2.68 | 3.06 |
| 13 | .128 | .259 | .538 | .694 | .870 | 1.35 | 1.77 | 2.16 | 2.65 | 3.01 |
| 14 | .128 | .258 | .537 | .692 | .868 | 1.34 | 1.76 | 2.14 | 2.62 | 2.98 |
| 15 | .128 | .258 | .536 | .691 | .866 | 1.34 | 1.75 | 2.13 | 2.60 | 2.95 |
| 16 | .128 | .258 | .535 | .690 | .865 | 1.34 | 1.75 | 2.12 | 2.58 | 2.92 |
| 17 | .128 | .257 | .534 | .689 | .863 | 1.33 | 1.74 | 2.11 | 2.57 | 2.90 |
| 18 | .127 | .257 | .534 | .688 | .862 | 1.33 | 1.73 | 2.10 | 2.55 | 2.88 |
| 19 | .127 | .257 | .533 | .688 | .861 | 1.33 | 1.73 | 2.09 | 2.54 | 2.86 |
| 20 | .127 | .257 | .533 | .687 | .860 | 1.32 | 1.72 | 2.09 | 2.53 | 2.84 |
| 21 | .127 | .257 | .532 | .686 | .859 | 1.32 | 1.72 | 2.08 | 2.52 | 2.83 |
| 22 | .127 | .256 | .532 | .686 | .858 | 1.32 | 1.72 | 2.07 | 2.51 | 2.82 |
| 23 | .127 | .256 | .532 | .685 | .858 | 1.32 | 1.71 | 2.07 | 2.50 | 2.81 |
| 24 | .127 | .256 | .531 | .685 | .857 | 1.32 | 1.71 | 2.06 | 2.49 | 2.80 |
| 25 | .127 | .256 | .531 | .684 | .856 | 1.32 | 1.71 | 2.06 | 2.48 | 2.79 |
| 26 | .127 | .256 | .531 | .684 | .856 | 1.32 | 1.71 | 2.06 | 2.48 | 2.78 |
| 27 | .127 | .256 | .531 | .684 | .855 | 1.31 | 1.70 | 2.05 | 2.47 | 2.77 |
| 28 | .127 | .256 | .530 | .683 | .855 | 1.31 | 1.70 | 2.05 | 2.47 | 2.76 |
| 29 | .127 | .256 | .530 | .683 | .854 | 1.31 | 1.70 | 2.04 | 2.46 | 2.76 |
| 30 | .127 | .256 | .530 | .683 | .854 | 1.31 | 1.70 | 2.04 | 2.46 | 2.75 |
| 40 | .126 | .255 | .529 | .681 | .851 | 1.30 | 1.68 | 2.02 | 2.42 | 2.70 |
| 60 | .126 | .254 | .527 | .679 | .848 | 1.30 | 1.67 | 2.00 | 2.39 | 2.66 |
| 120 | .126 | .254 | .526 | .677 | .845 | 1.29 | 1.66 | 1.98 | 2.36 | 2.62 |
| $\infty$ | .126 | .253 | .524 | .674 | .842 | 1.28 | 1.645 | 1.96 | 2.33 | 2.58 |

*Source*: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd, Edinburgh), and by permission of the authors and publishers.

# *Appendix E*

## Percentile Values ($\chi_p^2$) for the Chi-Square Distribution with $\nu$ Degrees of Freedom




| $\nu$ | $\chi^2_{.005}$ | $\chi^2_{.01}$ | $\chi^2_{.025}$ | $\chi^2_{.05}$ | $\chi^2_{.10}$ | $\chi^2_{.25}$ | $\chi^2_{.50}$ | $\chi^2_{.75}$ | $\chi^2_{.90}$ | $\chi^2_{.95}$ | $\chi^2_{.975}$ | $\chi^2_{.99}$ | $\chi^2_{.995}$ | $\chi^2_{.999}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .0000 | .0002 | .0010 | .0039 | .0158 | .102 | .455 | 1.32 | 2.71 | 3.84 | 5.02 | 6.63 | 7.88 | 10.8 |
| 2 | .0100 | .0201 | .0506 | .103 | .211 | .575 | 1.39 | 2.77 | 4.61 | 5.99 | 7.38 | 9.21 | 10.6 | 13.8 |
| 3 | .0717 | .115 | .216 | .352 | .584 | 1.21 | 2.37 | 4.11 | 6.25 | 7.81 | 9.35 | 11.3 | 12.8 | 16.3 |
| 4 | .207 | .297 | .484 | .711 | 1.06 | 1.92 | 3.36 | 5.39 | 7.78 | 9.49 | 11.1 | 13.3 | 14.9 | 18.5 |
| 5 | .412 | .554 | .831 | 1.15 | 1.61 | 2.67 | 4.35 | 6.63 | 9.24 | 11.1 | 12.8 | 15.1 | 16.7 | 20.5 |
| 6 | .676 | .872 | 1.24 | 1.64 | 2.20 | 3.45 | 5.35 | 7.84 | 10.6 | 12.6 | 14.4 | 16.8 | 18.5 | 22.5 |
| 7 | .989 | 1.24 | 1.69 | 2.17 | 2.83 | 4.25 | 6.35 | 9.04 | 12.0 | 14.1 | 16.0 | 18.5 | 20.3 | 24.3 |
| 8 | 1.34 | 1.65 | 2.18 | 2.73 | 3.49 | 5.07 | 7.34 | 10.2 | 13.4 | 15.5 | 17.5 | 20.1 | 22.0 | 26.1 |
| 9 | 1.73 | 2.09 | 2.70 | 3.33 | 4.17 | 5.90 | 8.34 | 11.4 | 14.7 | 16.9 | 19.0 | 21.7 | 23.6 | 27.9 |
| 10 | 2.16 | 2.56 | 3.25 | 3.94 | 4.87 | 6.74 | 9.34 | 12.5 | 16.0 | 18.3 | 20.5 | 23.2 | 25.2 | 29.6 |
| 11 | 2.60 | 3.05 | 3.82 | 4.57 | 5.58 | 7.58 | 10.3 | 13.7 | 17.3 | 19.7 | 21.9 | 24.7 | 26.8 | 31.3 |
| 12 | 3.07 | 3.57 | 4.40 | 5.23 | 6.30 | 8.44 | 11.3 | 14.8 | 18.5 | 21.0 | 23.3 | 26.2 | 28.3 | 32.9 |
| 13 | 3.57 | 4.11 | 5.01 | 5.89 | 7.04 | 9.30 | 12.3 | 16.0 | 19.8 | 22.4 | 24.7 | 27.7 | 29.8 | 34.5 |
| 14 | 4.07 | 4.66 | 5.63 | 6.57 | 7.79 | 10.2 | 13.3 | 17.1 | 21.1 | 23.7 | 26.1 | 29.1 | 31.3 | 36.1 |
| 15 | 4.60 | 5.23 | 6.26 | 7.26 | 8.55 | 11.0 | 14.3 | 18.2 | 22.3 | 25.0 | 27.5 | 30.6 | 32.8 | 37.7 |
| 16 | 5.14 | 5.81 | 6.91 | 7.96 | 9.31 | 11.9 | 15.3 | 19.4 | 23.5 | 26.3 | 28.8 | 32.0 | 34.3 | 39.3 |
| 17 | 5.70 | 6.41 | 7.56 | 8.67 | 10.1 | 12.8 | 16.3 | 20.5 | 24.8 | 27.6 | 30.2 | 33.4 | 35.7 | 40.8 |
| 18 | 6.26 | 7.01 | 8.23 | 9.39 | 10.9 | 13.7 | 17.3 | 21.6 | 26.0 | 28.9 | 31.5 | 34.8 | 37.2 | 42.3 |
| 19 | 6.84 | 7.63 | 8.91 | 10.1 | 11.7 | 14.6 | 18.3 | 22.7 | 27.2 | 30.1 | 32.9 | 36.2 | 38.6 | 43.8 |
| 20 | 7.43 | 8.26 | 9.59 | 10.9 | 12.4 | 15.5 | 19.3 | 23.8 | 28.4 | 31.4 | 34.2 | 37.6 | 40.0 | 45.3 |
| 21 | 8.03 | 8.90 | 10.3 | 11.6 | 13.2 | 16.3 | 20.3 | 24.9 | 29.6 | 32.7 | 35.5 | 38.9 | 41.4 | 46.8 |
| 22 | 8.64 | 9.54 | 11.0 | 12.3 | 14.0 | 17.2 | 21.3 | 26.0 | 30.8 | 33.9 | 36.8 | 40.3 | 42.8 | 48.3 |
| 23 | 9.26 | 10.2 | 11.7 | 13.1 | 14.8 | 18.1 | 22.3 | 27.1 | 32.0 | 35.2 | 38.1 | 41.6 | 44.2 | 49.7 |
| 24 | 9.89 | 10.9 | 12.4 | 13.8 | 15.7 | 19.0 | 23.3 | 28.2 | 33.2 | 36.4 | 39.4 | 43.0 | 45.6 | 51.2 |
| 25 | 10.5 | 11.5 | 13.1 | 14.6 | 16.5 | 19.9 | 24.3 | 29.3 | 34.4 | 37.7 | 40.6 | 44.3 | 46.9 | 52.6 |
| 26 | 11.2 | 12.2 | 13.8 | 15.4 | 17.3 | 20.8 | 25.3 | 30.4 | 35.6 | 38.9 | 41.9 | 45.6 | 48.3 | 54.1 |
| 27 | 11.8 | 12.9 | 14.6 | 16.2 | 18.1 | 21.7 | 26.3 | 31.5 | 36.7 | 40.1 | 43.2 | 47.0 | 49.6 | 55.5 |
| 28 | 12.5 | 13.6 | 15.3 | 16.9 | 18.9 | 22.7 | 27.3 | 32.6 | 37.9 | 41.3 | 44.5 | 48.3 | 51.0 | 56.9 |
| 29 | 13.1 | 14.3 | 16.0 | 17.7 | 19.8 | 23.6 | 28.3 | 33.7 | 39.1 | 42.6 | 45.7 | 49.6 | 52.3 | 58.3 |
| 30 | 13.8 | 15.0 | 16.8 | 18.5 | 20.6 | 24.5 | 29.3 | 34.8 | 40.3 | 43.8 | 47.0 | 50.9 | 53.7 | 59.7 |
| 40 | 20.7 | 22.2 | 24.4 | 26.5 | 29.1 | 33.7 | 39.3 | 45.6 | 51.8 | 55.8 | 59.3 | 63.7 | 66.8 | 73.4 |
| 50 | 28.0 | 29.7 | 32.4 | 34.8 | 37.7 | 42.9 | 49.3 | 56.3 | 63.2 | 67.5 | 71.4 | 76.2 | 79.5 | 86.7 |
| 60 | 35.5 | 37.5 | 40.5 | 43.2 | 46.5 | 52.3 | 59.3 | 67.0 | 74.4 | 79.1 | 83.3 | 88.4 | 92.0 | 99.6 |
| 70 | 43.3 | 45.4 | 48.8 | 51.7 | 55.3 | 61.7 | 69.3 | 77.6 | 85.5 | 90.5 | 95.0 | 100 | 104 | 112 |
| 80 | 51.2 | 53.5 | 57.2 | 60.4 | 64.3 | 71.1 | 79.3 | 88.1 | 96.6 | 102 | 107 | 112 | 116 | 125 |
| 90 | 59.2 | 61.8 | 65.6 | 69.1 | 73.3 | 80.6 | 89.3 | 98.6 | 108 | 113 | 118 | 124 | 128 | 137 |
| 100 | 67.3 | 70.1 | 74.2 | 77.9 | 82.4 | 90.1 | 99.3 | 109 | 118 | 124 | 130 | 136 | 140 | 149 |

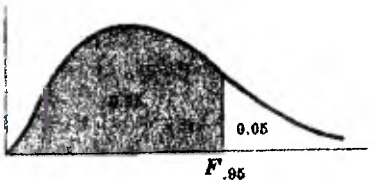
*Source*: E. S. Pearson and H. O. Hartley, *Biometrika Tables for Statisticians*, Vol. 1 (1966), Table 8, pages 137 and 138, by permission.

# *Appendix F*

## 95th Percentile Values (0.05 Levels), $F_{.95}$, for the $F$ Distribution

$\nu_1$ degrees of freedom in numerator

$\nu_2$ degrees of freedom in denominator




| $\nu_2$ \ $\nu_1$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 161 | 200 | 216 | 225 | 230 | 234 | 237 | 239 | 241 | 242 | 244 | 246 | 248 | 249 | 250 | 251 | 252 | 253 | 254 |
| 2 | 18.5 | 19.0 | 19.2 | 19.2 | 19.3 | 19.3 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| 3 | 10.1 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 | 8.74 | 8.70 | 8.66 | 8.64 | 8.62 | 8.59 | 8.57 | 8.55 | 8.53 |
| 4 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 | 5.96 | 5.91 | 5.86 | 5.80 | 5.77 | 5.75 | 5.72 | 5.69 | 5.66 | 5.63 |
| 5 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 | 4.68 | 4.62 | 4.56 | 4.53 | 4.50 | 4.46 | 4.43 | 4.40 | 4.37 |
| 6 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 | 4.06 | 4.00 | 3.94 | 3.87 | 3.84 | 3.81 | 3.77 | 3.74 | 3.70 | 3.67 |
| 7 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 | 3.64 | 3.57 | 3.51 | 3.44 | 3.41 | 3.38 | 3.34 | 3.30 | 3.27 | 3.23 |
| 8 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 | 3.35 | 3.28 | 3.22 | 3.15 | 3.12 | 3.08 | 3.04 | 3.01 | 2.97 | 2.93 |
| 9 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 | 3.14 | 3.07 | 3.01 | 2.94 | 2.90 | 2.86 | 2.83 | 2.79 | 2.75 | 2.71 |
| 10 | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 | 2.91 | 2.85 | 2.77 | 2.74 | 2.70 | 2.66 | 2.62 | 2.58 | 2.54 |
| 11 | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 | 2.85 | 2.79 | 2.72 | 2.65 | 2.61 | 2.57 | 2.53 | 2.49 | 2.45 | 2.40 |
| 12 | 4.75 | 3.89 | 3.49 | 3.26 | 3.11 | 3.00 | 2.91 | 2.85 | 2.80 | 2.75 | 2.69 | 2.62 | 2.54 | 2.51 | 2.47 | 2.43 | 2.38 | 2.34 | 2.30 |
| 13 | 4.67 | 3.81 | 3.41 | 3.18 | 3.03 | 2.92 | 2.83 | 2.77 | 2.71 | 2.67 | 2.60 | 2.53 | 2.46 | 2.42 | 2.38 | 2.34 | 2.30 | 2.25 | 2.21 |
| 14 | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.76 | 2.70 | 2.65 | 2.60 | 2.53 | 2.46 | 2.39 | 2.35 | 2.31 | 2.27 | 2.22 | 2.18 | 2.13 |
| 15 | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 | 2.48 | 2.40 | 2.33 | 2.29 | 2.25 | 2.20 | 2.16 | 2.11 | 2.07 |
| 16 | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 | 2.49 | 2.42 | 2.35 | 2.28 | 2.24 | 2.19 | 2.15 | 2.11 | 2.06 | 2.01 |
| 17 | 4.45 | 3.59 | 3.20 | 2.96 | 2.81 | 2.70 | 2.61 | 2.55 | 2.49 | 2.45 | 2.38 | 2.31 | 2.23 | 2.19 | 2.15 | 2.10 | 2.06 | 2.01 | 1.96 |
| 18 | 4.41 | 3.55 | 3.16 | 2.93 | 2.77 | 2.66 | 2.58 | 2.51 | 2.46 | 2.41 | 2.34 | 2.27 | 2.19 | 2.15 | 2.11 | 2.06 | 2.02 | 1.97 | 1.92 |
| 19 | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.54 | 2.48 | 2.42 | 2.38 | 2.31 | 2.23 | 2.16 | 2.11 | 2.07 | 2.03 | 1.98 | 1.93 | 1.88 |
| 20 | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 | 2.35 | 2.28 | 2.20 | 2.12 | 2.08 | 2.04 | 1.99 | 1.95 | 1.90 | 1.84 |
| 21 | 4.32 | 3.47 | 3.07 | 2.84 | 2.68 | 2.57 | 2.49 | 2.42 | 2.37 | 2.32 | 2.25 | 2.18 | 2.10 | 2.05 | 2.01 | 1.96 | 1.92 | 1.87 | 1.81 |
| 22 | 4.30 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.46 | 2.40 | 2.34 | 2.30 | 2.23 | 2.15 | 2.07 | 2.03 | 1.98 | 1.94 | 1.89 | 1.84 | 1.78 |
| 23 | 4.28 | 3.42 | 3.03 | 2.80 | 2.64 | 2.53 | 2.44 | 2.37 | 2.32 | 2.27 | 2.20 | 2.13 | 2.05 | 2.01 | 1.96 | 1.91 | 1.86 | 1.81 | 1.76 |
| 24 | 4.26 | 3.40 | 3.01 | 2.78 | 2.62 | 2.51 | 2.42 | 2.36 | 2.30 | 2.25 | 2.18 | 2.11 | 2.03 | 1.98 | 1.94 | 1.89 | 1.84 | 1.79 | 1.73 |
| 25 | 4.24 | 3.39 | 2.99 | 2.76 | 2.60 | 2.49 | 2.40 | 2.34 | 2.28 | 2.24 | 2.16 | 2.09 | 2.01 | 1.96 | 1.92 | 1.87 | 1.82 | 1.77 | 1.71 |
| 26 | 4.23 | 3.37 | 2.98 | 2.74 | 2.59 | 2.47 | 2.39 | 2.32 | 2.27 | 2.22 | 2.15 | 2.07 | 1.99 | 1.95 | 1.90 | 1.85 | 1.80 | 1.75 | 1.69 |
| 27 | 4.21 | 3.35 | 2.96 | 2.73 | 2.57 | 2.46 | 2.37 | 2.31 | 2.25 | 2.20 | 2.13 | 2.06 | 1.97 | 1.93 | 1.88 | 1.84 | 1.79 | 1.73 | 1.67 |
| 28 | 4.20 | 3.34 | 2.95 | 2.71 | 2.56 | 2.45 | 2.36 | 2.29 | 2.24 | 2.19 | 2.12 | 2.04 | 1.96 | 1.91 | 1.87 | 1.82 | 1.77 | 1.71 | 1.65 |
| 29 | 4.18 | 3.33 | 2.93 | 2.70 | 2.55 | 2.43 | 2.35 | 2.28 | 2.22 | 2.18 | 2.10 | 2.03 | 1.94 | 1.90 | 1.85 | 1.81 | 1.75 | 1.70 | 1.64 |
| 30 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 | 2.09 | 2.01 | 1.93 | 1.89 | 1.84 | 1.79 | 1.74 | 1.68 | 1.62 |
| 40 | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 | 2.08 | 2.00 | 1.92 | 1.84 | 1.79 | 1.74 | 1.69 | 1.64 | 1.58 | 1.51 |
| 60 | 4.00 | 3.15 | 2.76 | 2.53 | 2.37 | 2.25 | 2.17 | 2.10 | 2.04 | 1.99 | 1.92 | 1.84 | 1.75 | 1.70 | 1.65 | 1.59 | 1.53 | 1.47 | 1.39 |
| 120 | 3.92 | 3.07 | 2.68 | 2.45 | 2.29 | 2.18 | 2.09 | 2.02 | 1.96 | 1.91 | 1.83 | 1.75 | 1.66 | 1.61 | 1.55 | 1.50 | 1.43 | 1.35 | 1.25 |
| ∞ | 3.84 | 3.00 | 2.60 | 2.37 | 2.21 | 2.10 | 2.01 | 1.94 | 1.88 | 1.83 | 1.75 | 1.67 | 1.57 | 1.52 | 1.46 | 1.39 | 1.32 | 1.22 | 1.00 |

*Source:* E. S. Pearson and H. O. Hartley, *Biometrika Tables for Statisticians*, Vol. 2 (1972), Table 5, page 178, by permission.

lib sem
2216/21

Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Re- Examination
June 2016

Max. Marks:100 Duration: 3 Hrs
Class: S.Y.BTech Semester: IV Program: Electrical Engineering
Name of the Course: Electrical & Electronic Measurements Course Code : BTE228

Master file.

**Instructions:**

1. Attempt any five questions
2. Draw neat diagrams
3. Assume suitable data if necessary

| Question No | | Maximum Marks | Course Outcome Number | Module No. |
|---|---|---|---|---|
| Q1 | a. Which are the different principles of operation used in analog instruments. Explain? | [10] | CO 1 | 1 |
| | b. With neat diagram explain Vernier technique for small time interval measurement? | [10] | | 2 |
| Q2 | a. An analog signal lying in a range from 0 to V is to be digitized in a 3 bit format, what is the quantization error? Show the digitization of signal | [10] | CO 1 | 4 |
| | b. With a neat Phasor diagram derive the expression for transformation ratio and phase angle for a current transformer? | [10] | | 6 |
| Q3 | a. Attempt any two<br>1. digital ohm meter<br>2. digital capacitance meter<br>3. digital quality factor meter | [2*5] | CO 1 | 5 |
| | b. A potential transformer, ratio 1000/100 volt, has the following constants:<br>Primary resistance = 94.5 Ω<br>Secondary resistance = 0.86 Ω<br>Primary reactance = 66.2 Ω<br>Total equivalent reactance = 110 Ω<br>No load current = 0.02 A at 0.4 power factor<br>Calculate (1) phase angle error at no load (2) burden in VA at unity power factor at which the phase angle will be zero. | [10] | | 6 |

| | | | | |
|---|---|---|---|---|
| Q4 | a. Draw the circuit for peak frequency recorder and explain its working | [10] | CO 1 | 3 |
| | b. Explain different damping systems in electromechanical indicating instruments? | [10] | | 1 |
| Q5 | a. Draw the circuit for detecting the order of occurrence of two events and explain the same | [10] | CO 1 | 2 |
| | b. Draw different strain gauge circuitry and write output equation for each circuit? | [10] | | 7 |
| Q6 | a. Find the gage factor of a 128 Ω conductor that is 24 mm long if the resistance changes 13.3 Ω and the length changes 1.6 mm under a tension force. | [5 | CO 1 | 7 |
| | b. If the main and vernier oscillators have time periods of 10.006 and 10.001 μs, respectively, and the time interval to be measured is 1410.05 s, what would be the readings of the main and the vernier counters? Find the total measurement time | [5] | | 2 |
| | c. With diagram explain frequency meter and modulation index meter | [10] | | 5 |
| Q7 | a. It is known that a certain transducer has a resistance of approximately 800Ω. This transducer is connected as one of the resistor in Wheatstone bridge circuit. The galvanometer resistance is used in the circuit. The galvanometer resistance is 100Ω and galvanometer current is 0.8μA. Calculate the resistance of the unknown resistor. | [10] | CO 1 | 1 |
| | b. Explain charge balancing VFC | [10] | | 4 |

(1)

Library
27166116

Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Re-Exam
May 2016

Max. Marks: **100** Duration: **3 hrs**
Class: **SY B. Tech** Semester: **IV** Program: **Electrical Engineering**
Name of the Course: **Microprocessor and Microcontroller** Course Code : **BTE231**

Master file.

**Instructions:**

- Question 1 is compulsory.
- Attempt any **four** of the remaining questions.
- Assume suitable data if required.
- Answers to all sub-questions should be grouped together.

| Question No | | Maximum Marks | Course Outcome Number |
|---|---|---|---|
| Q1 a) | Explain control and status signals of 8085 microprocessor. | 5 | 1 |
| b) | Draw the program status word of 8051 microcontroller. How the flag status affected by processor operations. | 5 | 2 |
| c) | List the register of the basic computer system. | 5 | 1 |
| d) | Assume that XTAL = 11.0592 MHz. What value do we need to load into the timer's registers if we want to have a time delay of 5ms? Show the program for timer 0 to create a pulse width of 5 ms on P2.3 | 5 | 4 |
| Q2 a) | What is machine instruction? What are the elements of machine instructions? Explain. | 5 | 1 |
| b) | Explain various data addressing modes of 8085 microprocessor with the help of examples. | 10 | 1 |
| c) | Write 8085 assembly language program to convert BCD data to Binary data. | 5 | 4 |
| Q3 a) | Explain TMOD function register and its timer modes of operation. | 5 | 3 |
| b) | Explain the internal block diagram of 8051 Microcontroller. | 10 | 2 |
| c) | Write an ALP to perform multiplication of 2 numbers and to load accumulator, DPH, & DPL using 8051? | 5 | 2 |
| Q4 a) | List the various features of 8051 microcontroller. | 5 | 2 |
| b) | List the special function registers of 8051 microcontroller. | 5 | 2 |
| c) | Write an ALP (Assembly Language Program) to add 20 natural numbers and complement the result. | 5 | 4 |
| d) | Write an ALP to toggle all bits of P0, P1, and P2 by using delay of 500 ms. | 5 | 4 |

| | | | |
|---|---|---|---|
| Q5 a) | What are the different steps to create the program? | 5 | 4 |
| b) | Explain the JUMP instructions present in 8051 microcontroller with a mnemonic code and its operation for each. | 5 | 2 |
| c) | For an 8051 system of 15.0592 MHz, find time delay for the following: | 5 | 2 |

| Instructions | Machine cycle |
|---|---|
| DELAY:MOV R3, #500 | 1 |
| HERE: NOP | 1 |
| NOP | 1 |
| NOP | 1 |
| NOP | 1 |
| NOP | 1 |
| DJNZ R3, HERE | 2 |
| RET | 2 |

| | | | |
|---|---|---|---|
| d) | Assume that bit P1.3 is an input and represents the condition of an oven. If it goes high, it means that the oven is hot. Monitor the bit continuously. Whenever it goes high, send a high to low pulse to port P1.5 to turn on a buzzer. Draw interface diagram and write an ALP. | 5 | 4,5 |
| Q6 a) | Assume the 5 BCD data items are stored in RAM locations starting at 46H, write an assembly language program to find the sum of all numbers write an ALP. The result must be in BCD. | 5 | 4 |

| Memory Location | Data |
|---|---|
| 46 | 71 |
| 47 | 11 |
| 48 | 65 |
| 49 | 59 |
| 50 | 37 |

| | | | |
|---|---|---|---|
| b) | In a semester a student has to take five courses. The marks of the student (out of 25) are stored in RAM locations 50H onwards, write an ALP to find the average marks and output it to PORT1. | 5 | 4 |
| c) | Write an 8051 C program to send HEX values for ASCII characters of A,B,C,D to PORT P2. | 5 | 3 |
| d) | Write an 8051 C program to toggle the bits of P1 port continuously with 500 ms delay. Crystal frequency is 15.0592 MHz. | 5 | 3 |
| Q7 a) | Write an 8051 C program to toggle all the bits of P2 continuously every 1000 ms. Use Timer 1, mode 1 to create the delay. | 10 | 3,5 |
| b) | How does one interface a 16x2 LCD using 8051 microcontroller? | 10 | 3,5 |

Library
24106116

Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

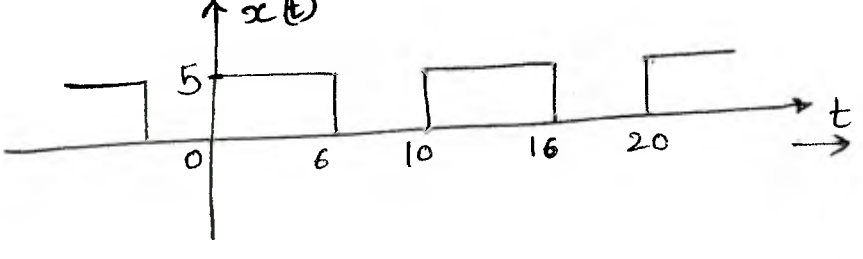
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
Re – Examination
June 2016

Max. Marks: 100 | Duration: 3 Hr.
Class: SYBTech | Semester: IV | Program: Electrical
Name of the Course: **Signals and Systems** | Course Code : **BTE230**

**Instructions:**

- Attempt any FIVE question out of Seven questions
- Answers to all sub questions should be grouped together
- Figures to the right indicate full marks
- In the absence of any data, make suitable assumptions and justify the same.

Master file.

| Q. No | | Max. Marks | CO No. | Module No. |
|---|---|---|---|---|
| Q1 a | Find energy/power of signal $x[n] = (0.5)^n u[n]$. | 05 | 01 | 01 |
| b | Determine odd and even parts of signal $x[n] = \{4, 1, -1, \underset{\uparrow}{2}, 1, -1, 5\}$. | 05 | 01 | 01 |
| c | Determine if the signal $y(t) = \sin(2t) - \cos(2\pi t)$ is periodic? If yes determine fundamental time period. | 05 | 01 | 01 |
| d | Determine Fourier Transform of $x(t) = e^{-2t} u(t-3)$. | 05 | 03 | 02 |
| Q2 a | Find the inverse Fourier Transform of $X(jw) = \frac{1}{jw\,(jw+1)} + \pi\delta(w)$. | 05 | 03 | 02 |
| b | Determine Trigonometric Fourier series of following signal.   | 10 | 03 & 04 | 02 |
| c | State and prove time shifting property of Fourier Transform. | 05 | 03 | 02 |

| | | | | |
|---|---|---|---|---|
| Q3 a | Determine output of the system if $x(t) = e^{3t} u(t)$ and $h(t) = u(t-3)$. (solve by taking convolution integral and Laplace transform). | 10 | 02 | 04 & 03 |
| b | Find the inverse Laplace Transform of $X(s) = \frac{(2s+1)}{(s+4)(s+9)}$ if the convergence regions are i) $s > -4$ ii) $s < -9$ iii) $-9 < s < -4$. | 10 | 05 | 03 |
| Q4 a | Consider a system described be the difference equation<br>$y(n) = -y(n-2)+y(n-1)+5\,x(n)+0.4\,x(n-1)$.<br>Find the response of the system to the input $x(n) = (0.5)^n u(n)$.<br>Initial conditions in the system are $y(-1) = 0.75$ and $y(-2) = 0.25$.<br>Determine impulse response and comment on the stability of system. | 15 | 06 & 07 | 05 & 06 |
| b | Determine inverse Z- Transform of $F(z) = \frac{1}{z+1}$ if i) $\|z\|<1$ and ii) $\|z\|>1$. | 05 | 06 | 06 |
| Q5 a | Determine linear convolution of following sequence.<br>X[n]= {-3,1,4,0,-2,1} and h[n]= {5, -2, 3 0, 1 -3}. | 05 | 02 | 01 |
| b | State and explain initial and final value theorem for Z-transform and determine the initial and final value of y[n] if its Z-Transform $Y(z) = \frac{Z(Z-3)}{(z-0.5)(z-1)(z-4)}$ | 10 | 06 | 06 |
| c | Determine Z- Transform of $x[n] = n\,0.2^n u[n]$. | 05 | 06 | 06 |
| Q6 a | Obtain Direct I and Direct II form realization of the system described as<br>$y[n] = 0.2y[n-1] + 4y[n-2] - 0.5\,y[n-3] + 3\,x[n] + 0.6\,x[n-1] + 0.4\,x[n-2]$ | 10 | 07 | 05 |
| b | Determine circular convolution of periodic signals x[n]={0,2,4,6,8} and h[n]={0,1,2,9,4} defined for $0 \leq n \leq 4$. | 10 | 02 | 05 |
| Q7 a | Determine DTFS coefficients of the periodic signal x[n]= {1,3,5,8,2}. | 10 | 03 | 07 |
| b | Determine DTFT of signal x[n] = u[n] and plot frequency spectrum (magnitude and phase). | 10 | 03 | 07 |

Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Exam
May 2016

Max. Marks: 100
Class: S.Y. B. Tech. Electrical
Program: Electrical Engineering
Name of the Course: Analog Circuits

Duration: Three Hours
Semester: IV ~~III~~

Course Code : BTE227

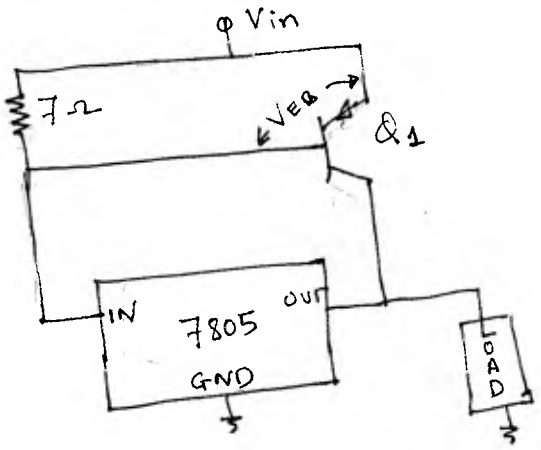
Master file.

**Instructions:**

- Question No. 1 is compulsory
- Attempt **any Four questions** out of remaining SIX questions.
- Answer to all sub questions should be grouped together.
- Figures to the right indicate **full marks.**

| Q. No | | | Max. Marks | Course Outcome Number | Moc No. |
|---|---|---|---|---|---|
| 1 | | State whether following statements are True/False. Justify your answer. | **20** | | |
| | (i) | Oscillator circuit does not require any input signal. | | CO 7 | 7 |
| | (ii) | Pulse Width Modulation circuit can be obtained using IC 555 | | CO 3 | 3 |
| | (iii) | Wien bridge oscillator uses positive as well as negative feedback. | | CO 7 | 7 |
| | (iv) | Efficiency of linear regulators is less compared to switching regulators. | | CO 4 | 4 |
| 2 | A | With respect to power amplifier explain the following terms: | **08** | CO 2 | 1 |
| | (i) | Conversion efficiency | (ii) Distortion | | |
| | (iii) | Heat sink | (iv) $P_{dmax}$ | | |
| | B | Explain working of transformer coupled class B push pull power amplifier. What is crossover distortion? How is it eliminated? | **12** | CO 2 | 1 |
| 3 | A | IC 555 is to be used as Schmitt trigger. Draw the circuit diagram specifying the supply voltage and all the components values. | **05** | CO 3 | 3 |
| | B | With the corresponding circuit diagram explain use of IC 723 to get output voltage of 4V for output current of 13 A. | **05** | CO 4 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| | C | With respect to the circuit diagram, Calculate output current coming from 7805 and coming from the transistor $Q_1$ for each load (i) 100 Ω (ii) 5 Ω (iii) 1 Ω. Given $V_{EB\,(ON)} = 1V$, $\beta = 15$. | **10** | CO 4 | 4 |




| | | | | | |
|---|---|---|---|---|---|
| 4 | A | Determine higher cutoff frequency for common emitter amplifier (potential divider bias with $R_E$ bypassed). Given: $V_{cc} = 20V$, $C_{bc} = 36pF$, $C_{bc} = 4pF$, $C_{ce} = 1pF$, $C_{wi} = 6pF$, $C_{wo} = 8pF$, $Cs = 10\mu F$, $C_E = 20\ \mu F$, $C_C = 1\mu F$, $h_{fe} = 100$, $h_{ie} = 1.576K\Omega$, $R_s = 1K\Omega$, $R_1 = 40\ K\Omega$, $R_2 = 10K\Omega$, $R_C = 4K\Omega$, $R_L = 2.2K\Omega$, $R_E = 2\ K\ \Omega$. | **10** | CO 1 | 2 |
| | B | With reference to the frequency response, gain of BJT amplifier is lower at low frequency whereas it is not so with opamp. Justify why? | **10** | CO 1 | 2 |
| 5 | A | Explain different types of negative feedback. Compare them with respect to (i) input Impedance (ii) output impedance. | **12** | CO 5 | 6 |
| | B | Negative FB is employed with amplifiers in spite of reduction in gain. | **08** | CO 5 | 6 |
| 6 | A | Draw neat block diagram of 555 timer and hence explain the function of : (i) discharge transistor (ii) comparators | **10** | CO 3 | 3 |
| | B | Draw the circuit diagram arrangement showing wein bridge oscillator. For the circuit drawn, choose the component values so that the circuit will work as wien bridge oscillator. Justify the same. Calculate the frequency of oscillation, feedback factor. | **10** | CO 7 | 7 |
| 7 | A | Active filters are preferred over passive filters | **05** | CO 6 | 5 |
| | B | Higher the order of the filter better is the filter. Explain | **05** | CO 6 | 5 |
| | C | Design first order LPF with cutoff frequency 6kHz and a pass band gain of 12. Draw circuit diagram. | **05** | CO 6 | 5 |
| | D | Draw the circuit diagram of RC phase shift oscillator. Given R = 4.7KΩ., C = 0.01μF. Calculate frequency of oscillation for the circuit you have drawn. | **05** | CO 7 | 7 |