Code No. 3081

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) II - Semester (Main) Examination, May / June 2017

Subject : Strength of Materials – II

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 What is internal indeterminacy ? Give an example of such type of truss. (2)

2 What is shear flow? Explain briefly. (2)

3 What is the product of inertia of a rectangular section of breadth b and depth d about axis passing through sides of the rectangle? (2)

4 Write the formula for finding deflection in a closely coiled helical spring subjected to an axial twist. (2)

5 What is the difference between 'elastic' and 'rigid' props? (2)

6 Write the secant formula. Explain the terms involved (3)

7 Draw conjugate beam for a cantilever of span / subjected to a udl w per unit length. (3)

8 What is 'tension coefficient' ? Explain with suitable example. (3)

9 Using strain energy concepts determine the maximum deflection in a cantilever of span / subjected to a point load 'W' at the free end. (3)

10 A beam 3 meter long, simply supported at its ends is carrying a point load 'W' at its centre. If the slope at the end of the beam is not to exceed 1.5 degree. Find the deflection at the center of the beam. (3)

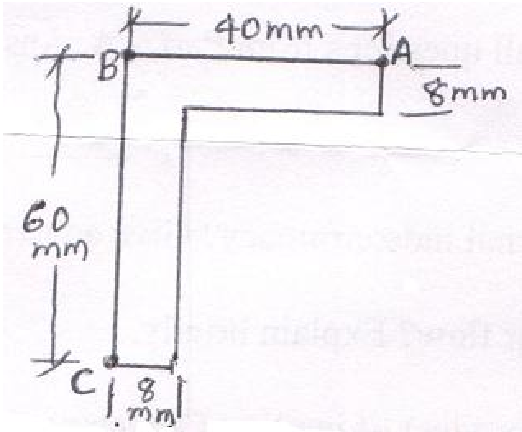
PART – B (50 Marks)

11 An overhanging beam ABC is supported at A and B 10 meters apart while BC is the overhang of 2 meter long. A udl of 1kN/m acts on the overhang and a point load 9kN at 6m from A. Calculate slope at A and C and deflection at C and under the point load. E = 200kN/mm^2 and I = 9.25x10^7 mm^4. (10)

12 A cantilever of span 'L' is subjected to a point load 'W' at the free end. The half span of the beam from the fixed end has a diameter 'D' while the other half from the free end has a diameter D/3. Using castigliano's theorem calculate the maximum deflection in the beam. Also determine the slope at free end. (10)

13 Derive Euler's formula for a long column with both ends hinged. Also mention assumptions involved in the derivation of this formula.

14 A 60 mm x 40 mm x 8 mm angle section is used as a simply supported beam over a span of 3m. It carries a load of 300 kN at 1m from the left support along the vertical axis through centroid. Find maximum stresses at A, B & C.



15 A fixed beam of 12 m span carries two point load of 20kN at 3m from each end. Obtain the values of the support moments. Also, calculate the deflection at the centre. Moment of inertia of the section = 8520 cm^4 and E = 2.05 x 10^4 N/mm^2.

16 A beam ABCD, 16m long is continuous over three spans: AB 6m, BC=5m and CD=5m, the end supports being fixed and all supports at the same level. There is a uniformly distributed load of 20kN/m over BC. On AB, there is a point load of 80kN at 2m from A and on CD, there is a point load of 60kN at 3m from D. Calculate the moments and reactions at the supports and also draw BMD.

17 (a) A channel section is kept with the web vertical. The flanges and web are 10cm and 15cm overall length respectively both being 2cm thick. Locate the shear centre.

(b) A closely coiled helical spring has mean dia of 75mm and spring constant of 80kN/m. It has 8 coils. What is the suitable diameter of the spring wire if maximum shear stress is not to exceed 250MN/m^2. G = 80GN/m^2.

*****

Code No. 3087

FACULTY OF ENGINEERING

B.E. 2/4 (EEE) II - Semester (Main & Backlog) Examination, May / June 2017

Subject : Electrical Circuits - II

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Derive the expression for current response of source free RC series circuit. (3)

2 Define Transfer function. (3)

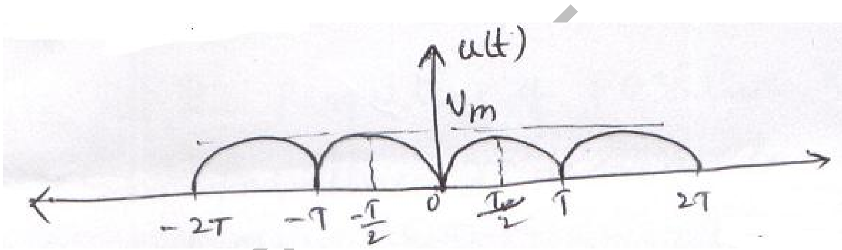
3 A 100 V DC source is applied in a coil of $R = 10\ \Omega$ and $L = 10$ H. Find the energy supplied to the coil in 5 seconds? (3)

4 State and prove find value theorem of Laplace Transforms. (3)

5 Prove that for ABCD parameters AD-BC=1. (3)

6 For a given π-Network determine the equivalent T-Network using two-port parameters. (3)

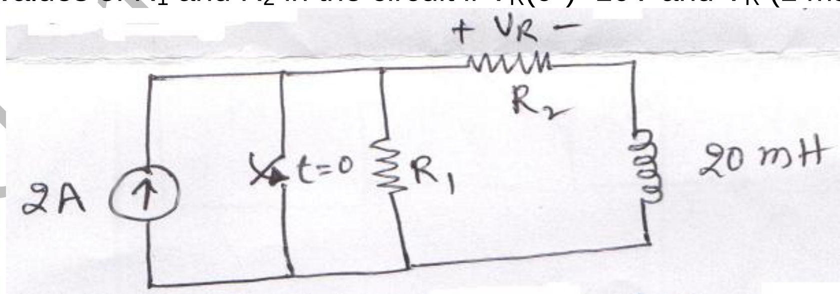
7 Find the Fourier series expression of the given signal. (4)



8 Write the significance of Network functions. (3)

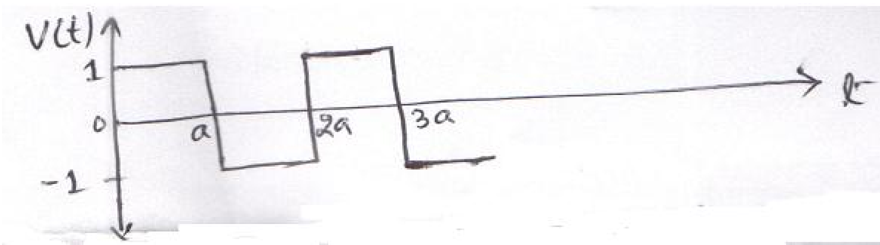
PART – B (50 Marks)

9 The switch in the circuit is open for a long time and is closed at t = 0. Find the values of R_1 and R_2 in the circuit if $V_R(0^+)$=10V and V_R (1 msec)=5V. (10)



10 A series RLC circuit with $R = 30\Omega$, $L = 0.1$H and $C = 10\mu F$ is excited by a source with $V(t) = 20 \cos(10t + \pi/3)$. Determine the complete solution for the current when the circuit is closed at t = 0. (10)

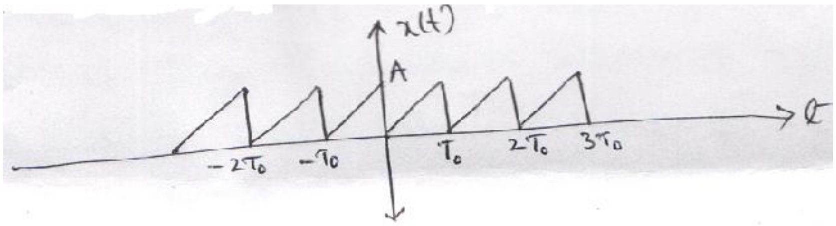
11 Find the Laplace transform of the following signal. (10)



12 (a) Show that the h-parameters will note exists for a two-port network when $Z_{22}=0$? (5)

(b) A two-port network is characterized by the equations $4v_1 + 2I_1+3I_2 = 0$ and $10I1+10I_2 - 2v1 - 3v_2=0$. Find the short circuit parameters? (5)

13 Find the Fourier series expansion for the following signal. (10)



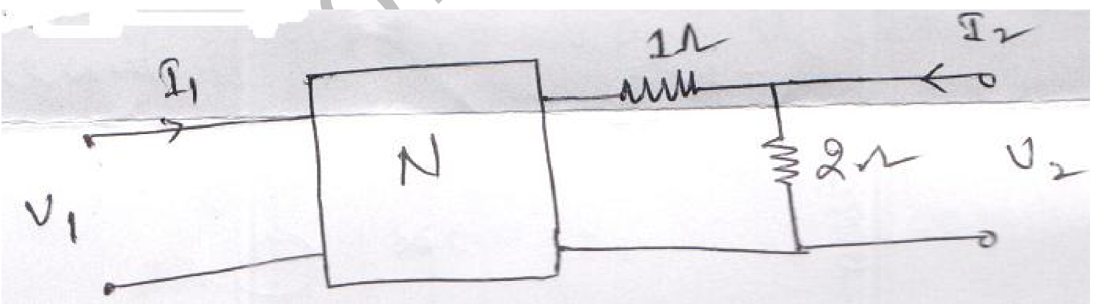
14 (a) Synthesize the impedance function $Z(s)=\dfrac{(s^2+10)(s^2+16)}{s(s^2+4)}$ using Foster forms of realization. (5)

(b) Write all the properties of positive real functions and check for positive realness for the following polynomial p(s). (5)

$p(s) = 2s^6 + s^5 + 3s^4 + 6s^3 + 56s^2 + 25s + 25$

15 Find the elements of the matrix N for the given following two-port network if (10)

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} 4 & 3 \\ 2 & 10 \end{bmatrix} \begin{bmatrix} V_2 \\ -I_2 \end{bmatrix}$$



*****

Code No. 3094

FACULTY OF ENGINEERING

B.E. 2/4 (Inst.) II – Semester (Main & Backlog) Examination, May / June 2017

Subject: Transducer Engineering

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 Differentiate between Accuracy and Precision. 2

2 A 0-10A Ammeter has a guaranteed accuracy of 1% of fsd. The limiting error while reading 2.5A is_____. 3

3 Draw the bock diagram of a typical transducer. 2

4 Discuss an application of strain guage. 2

5 Why capacitive proximity transducer is suitable for both metallic and non metallic contact? 3

6 What is meant by hygrometer? State its principal with respect to capacitive pickup. 3

7 State the principal of bimetallic strip thermometer. Give its range of measurement. 2

8 Discuss about the semiconducting type of temperature transducers. 3

9 Using suitable equation describe the operation of any one type of manometer. 2

10 A McLeod gauge has volume of bulb, capillary and tube down to its opening equal to $90cm^3$ and a capillary diameter of 1mm. Calculate the pressure indicated by a reading of 3cm. 3

PART – B (5x10 = 50 Marks)

11 Explain the various Dynamic characteristics of measuring systems. 10

12 Find the step response of the first order system given

$$T(s) = \frac{25}{1+2S}$$

Also find the steady state error for the response. 1m

13 Derive the output voltage of strain gauge measuring circuits (Wheatstone bridge) for
- a) Full Bridge
- b) Half Bridge and
- c) Quarter Bridge. 10

14 Using suitable waveforms explain linear variable differential transformer (LVDT). Also explain the similar transducer for angular measurement of displacement. 10

15 a) Using a suitable expression and neat sketch explain Resistance temperature detectors. 5

b) Discuss the standards use for the measurement of pressure. 5

16 Discuss any four sensors for the measurement of Low pressure. 10

17 With short notes on: 10
- a) Non electrical type of pressure measurement
- b) Pyrometers
- c) Measurement standards.

****

Code No. 3098

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) II - Semester (Main) Examination, May / June 2017

Subject : Probability Theory and Stochastic Processes

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1 Two aeroplanes bomb a target in succession. The probability of each correctly scoring a hit is 0.3 and 0.2 respectively. The second will bomb only if the first misses the target. Find the probability that (i) the target is hit (ii) both fails to score the hits. (3)

2 If probability density function is defined as $f(x) = kx^3$ in $0 \le x \le 3$, 0 elsewhere. Find the value of k. (2)

3 Define moment generating function and characteristic function. (2)

4 Determine the given function is valid PSD $e^{-(w-1^2)}$. (3)

5 Define ergodicity and write its importance. (2)

6 x and y are two random variables such that (3)

x = 1 with probability 1/3 y=2 with probability ¾

0 with probability 2/3 - 3 with probability ¼ . Find $E[2x^2 - Y^2]$

7 List the properties of joint density and distribution function. (3)

8 x and y are two independent random variables whose moments are $\mu_{10}=12$, $\mu_{20}=24$, $\mu_{02}= 22$ and $\mu_{20}=-16$. Find the moment μ_{22}. (3)

9 Define PSD function of a stationary random process. (2)

10 The mean and variance of the binomial variable x with parameters n & p are 16 and 8. Find $P(x \ge 1)$ and $P(x > 2)$. (2)

PART – B (50 Marks)

11 (a) Box 1 contains 1000 bulbs of which 10% are defective. Box 2 contains 2000 bulbs of which 5% are defective. Two bulbs are picked from a randomly selected box. (a) Find the probability that both bulbs are defective. (b) Assuming both are defective, find the probability that they came from B be defective. (5)

(b) 10% of the bolts produced by a certain machine turn out to be defective. Find the probability that in a sample of 10 bolts selected at random, exactly two of them will be defective using (i) Binomial distribution (ii) Poisson distribution and comment on result. (5)

12 Find the mean and variance of a random variable x which is Poisson distributed. (10)

13 (a) The joint probability of density two random variable x and y is (5)

$f_{xy}(x, y) = c(2x+y)$ $0 \le x \le 1$ and $0 \le x \le 2$

$f(x, y) = 0$ otherwise

Find (i) the value of 'c' (ii) marginal distribution functions of x 4Y

(b) The joint probability of density two random variables x and y is

$f_{xy}(x, y) = 1$ $-1/2 \le x \le 1/2$ and $-1/2 \le y \le 1/2$

0 Elsewhere

Find $(\phi_x(w_1)$, $(\phi_y(w_2)$, $\phi_{xy}(w_1, w_2)$. (5)

14 (a) The first, second and third moments of probability distribution about the point are 1, 16, 40 respectively. Find the mean, variance and the third central moment. (5)

(b) The joint probability of density two random variables x and y is given by

$f_{xy}(x,y)=Ae^{-|x|-|y|}$ for $-\infty \le x \le \infty$, $-\infty \le y \le \infty$ (5)

Are x and y statistically independent. ..2

15 (a) Prove that the PSD and Time Average of autocorrelation function form a Fourier transform pair. (5)

(b) Consider a random process $x(t) = A_0\cos(w_0t+\Phi)$ where A_0 and Φ are statistically independent and Φ is a uniform in the interval $(-\pi, \pi)$. Determine the autocorrelation function $R_{xx}(t_1t_2)$ of the process x(t). (5)

16 (a) If x(t) is a stationary random process having mean value 2 and auto correlation function $R_{xx}(\tau) = 5 + 3e^{-|\tau}|$. Find the mean and variance of the Random variable $y = \int_0^3 x(t)dt.$ (5)

(b) Prove that $|R_{xx}(\tau)| \le R_{xx}(0)$. (5)

17 For two random variable x and y

$f_{xy}(x,y)=0.15\delta(x+1)\,\delta(y)+0.1\delta(x)\delta(y)+0.18\delta(x)\delta(y-2)+0.4\delta(x-1)\delta(y+2)+0.2\delta(x-1)\,\delta(y-1)+0.05\delta(x-1)\delta(y-1)$. Find

(a) The cross correlation between x and y (2)

(b) Covariance between x and y (2)

(c) The correlation coefficient between x and y (4)

(d) Are x and y uncorrelated or orthogonal (2)

*****

Code No. 3101

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/A.E/CSE) II Semester (Main & Backlog) Examination, May / June 2017

Subject: Mathematics – IV

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1 Determine whether the function $f(z) = \frac{\overline{z}}{z}$ is continuous at origin. 2

2 Evaluate $\int_c (z - z^2)\,dz$, where c is the upper half of the circle |z-2| = 3. 3

3 Locate and classify the singular points of $f(z) = \frac{1}{z(e^z - 1)}$. 2

4 Define conformal mapping with an example. 3

5 Find the Z-transform of the sequence $\{\cos \frac{n\text{®}}{3}\}$. 2

6 If $Z\{f_n\} = \frac{z}{(z-1)^2}$, find f_n. 3

7 Find the finite Fourier sine transform of $f(x) = e^x$ in (0, 1). 2

8 State convolution theorem for Fourier transforms. 3

9 Find an interval of unit length which contains the smallest negative root in magnitude of the equation $2x^3+3x^2+2x+5 = 0$. 2

10 Find the Lagrange interpolating polynomial that fits the data. 3

x	-2	1	0	2
f(x)	3	-3	1	-1

PART – B (5x10 = 50 Marks)

11 a) Show that the function $u = e^{-2y} \sin (x^2-y^2)$ is harmonic and find its conjugate harmonic function V. 5

b) State and prove Cauchy's integral formula. 5

12 a) Find all possible Taylor's and Laurent series expansions of $f(z) = \frac{1}{z(z-1)}$ about z=0. 5

b) State residue theorem and hence evaluate $\oint_c z^3 e^{\frac{1}{z}}\,dz$, where c is $|z| = \frac{3}{2}$. 5

13 a) Find the Z-transform of $\{n^2e^n+4^{-n}\cos n\theta\}$. 5

b) If $Z\{f_n\} = F(z)$, prove that $\lim\limits_{n\to\infty} f_n = \lim\limits_{z\to 1} (z-1)\, F(z)$. Hence find $\lim\limits_{n\to\infty} f_n$, if

$Z\{f_n\} = \dfrac{z^2-3z+5}{(z-1)(z+2)}$. 5

14 a) Using Fourier sine integral, show that

$$\int_0^{\infty} \frac{1-\cos p\text{®}}{p} \sin px \, dp = \begin{cases} \dfrac{\text{®}}{2}, & 0 < x < \text{®} \\ 0, & x > \text{®} \end{cases}$$ 5

b) Find the Fourier cosine transform of $f(x) = e^{-ax}\cos ax$. 5

15 a) Perform first three iterations of Newton – Raphson method to find the root of $3x-\cos x-1 = 0$ which lies in (0, 1). 5

b) Apply Runge-Kutta method of order 4 to find y(0.1) for $\dfrac{dy}{dx} = \dfrac{1}{x+y}$, y(0) = 1. 5

16 a) Verify Cauchy's integral theorem for $f(z) = z^3-iz^2-5z+2i$ and c is the circle $|z-1| = 2$. 5

b) Using the following data, find the value of x for which y is minimum. 5

x	0	2	4	6
y	3	3	11	27

17 Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & |x|<1 \\ 0, & |x|>1 \end{cases}$ and hence evaluate

i) $\displaystyle\int_o^{\infty} \frac{x\cos x-\sin x}{x^3}\cos\frac{x}{2}\,dx$

ii) $\displaystyle\int_o^{\infty} \frac{x\cos x-\sin x}{x^3}\,dx$. 10

****

Code No. 3113

FACULTY OF INFORMATICS

B.E. 2/4 (IT) II Semester (Main & Backlog) Examination, May / June 2017

Subject: Probability and Random Processes

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1 Define axiomatic definition of probability. 3

2 Show that the area under the exponential distribution curve is one. 3

3 State the properties of moment generation. 3

4 Define power spectral density function. 3

5 Find mean and variance of binomial distribution. 2

6 State the properties of cross correlation. 2

7 If X and Y are independent andom variables. Prove that
$V(aX – bY) = a^2V(X) + b^2V(Y) – 2ab\,COV(X,Y)$ (here a, b are constants). 3

8 State Ergodicity and Stationarity. 2

9 Show that the area under the normal curve is one. 2

10 Show that 2n – (n+1) equations are needed to establish mutual independence of ‘n’ events. 2

PART – B (5x10 = 50 Marks)

11 a) Train X and Y arrive at a station at random between 8:00 a.m. and 8:20 a.m. Train X stops for four minutes and Train Y stops for five minutes. Assuming that the train arrive independently of each other, determine. 7

i) Train X arrives before Train Y

ii) Two trains meet at the station

iii) If they met at the station, what is the probability that X arrived before Y.

b) If the cdf of the RV is given by F(x) = 0, for x < 0;
= x2/16 for $0 \leq x \leq 4$ and
= 1, for $4 \leq x$.

Find P(x > 1/x < 3). 3

12 a) A fair coins is tosses twice, and let the random variable X represent the number of heads, find Fx(X). 5

b) Over a period of 12 hours, 180 calls are made at random. What is the probability that in a four hour interval the number of calls is between 50 and 70? 5

13 a) If the power spectral density of a WSS process is given by

S(w) = b/a (a - |w|), |w| < = a, 0, |w| > a

Find the autocorrelation function of the process. 5

b) Write short notes on:

i) Thermal Noise

ii) Filters. 5

14 a) Show that the random process X(t) = a cos ($w_o t$ + θ) is wide-sense stationary, if A and w_o are constants and uniformly distributed random variable in (0, 2®). 5

b) Find the autocorrelation function of a random telegraph signal process. 5

15 Three switches S1, S2 and S3 connected in parallel operate independently and each switch remains closed with probability p. 10

a) Find the probability of receiving an input signal at the output.

b) Find the probability that the switch S1 is open given that an input signal is received at the output.

16 a) Prove that the random process X(t) = A cos (wt+θ) is not stationery, if it is assumed that A and w are constants and θ is uniformly distributed on the interval (0,®). 5

b) Explain the properties of power spectral density function. 5

17 Explain about: 10

a) Poisson process

b) White noise

c) Colored noise.

****