CODE NO: 61

FACULTY OF ENGINEERING

BE 2/4 (Civil) II-Semester (Backlog) Examination, May/June 2018

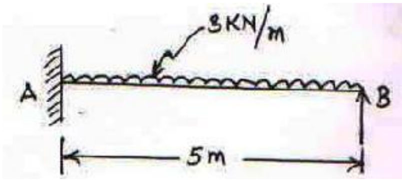
Subject: Strength of Materials – II

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

Note: Answer all Questions from Part – A, & Any five questions from Part – B

PART- A (25 Marks)

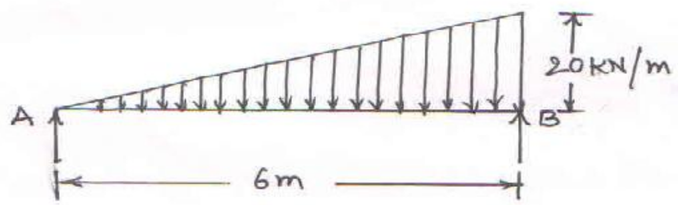
1. Differentiate between 'Flexural rigidity' and 'Torsional rigidity'. (2)
2. How the fixed end and free end of a real beam change in a conjugate beam. (2)
3. Calculate the Prop reaction for cantilever beam shown in fig. (2)



4. State Maxwell's reciprocal Theorem. (2)
5. Define unsymmetrical bending with example. (2)
6. What are the merits of Tension Coefficient method. (3)
7. Explain the concept and importance of shear centre. (3)
8. Write the Secant formula as applicable to columns. Explain the terms involved.(3)
9. State the assumptions made in Euler's theory and its limitations. (3)
10. How to apply Clapeyrons theorem of three moments to a continuous beam with fixed end supports. (3)

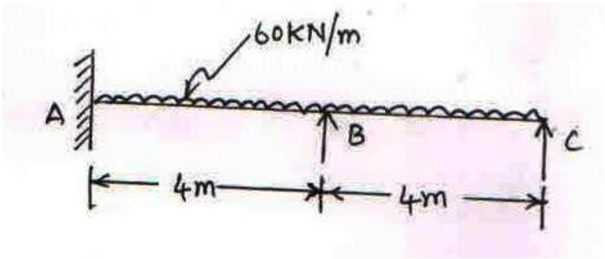
PART– B (50 Marks)

11. A Simply supported beam given below of 6m carries a uniformly varying load of zero intensity at A and 20 KN/m at B. Find the position and magnitude of the maximum deflection. Given $E = 200\ GN/m^2$, $I = 100 \times 10^{-6}\ m^4$. 10

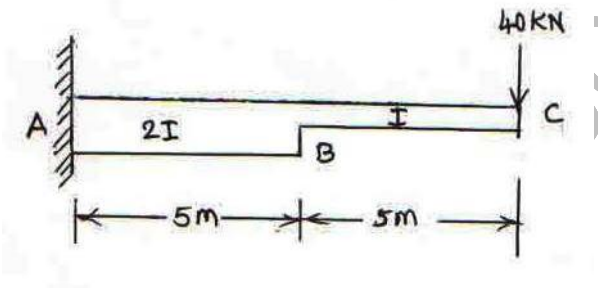


12. Analyse a propped cantilever beam AB of span 6m, fixed at A and supported at C, 1m from end B by a rigid prop. The beam carries a udl of 20kN/m throughout the span. Sketch SFD and BMD. 10

13. Analyse the two span continuous beam ABC shown in fig. below. Draw also SF and BM diagrams. 10



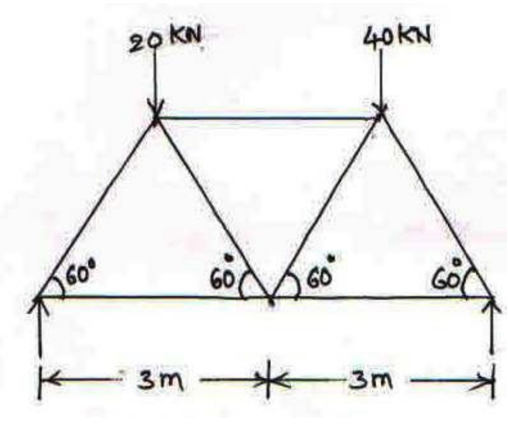
13 Determine the deflection at the free end of a cantilever beam by using castiglinous theorem. E = 200GPa, I = 2 x 10^8 mm^4. 10



14 A helical spring in which the slope of the helix may be assumed to be small, is required to transmit a maximum pull of 1000N and to extend 10mm for a 200N load. If the mean diameter of the coil is to be 80mm, find a suitable diameter of the wire from which to make the spring and the approximate number of coils required. Allowable shear stress = 100 MN/m^2, Modulus of rigidity = 80 GN/m^2. 10

15 Derive Euler's Theory of long Column when both ends of the member are pinned. 10

16 Find the forces in the given members of the truss shown below by Tension Coefficient method. 10



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Code No. 67

FACULTY OF ENGINEERING

B.E 2/4 (EEE) II – Semester (Backlog) Examination, May / June, 2018

Subject : Electrical Circuits - II

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

Note: Answer all questions from Part – A & Any five questions from Part – B.

Part – A (25 MARKS)

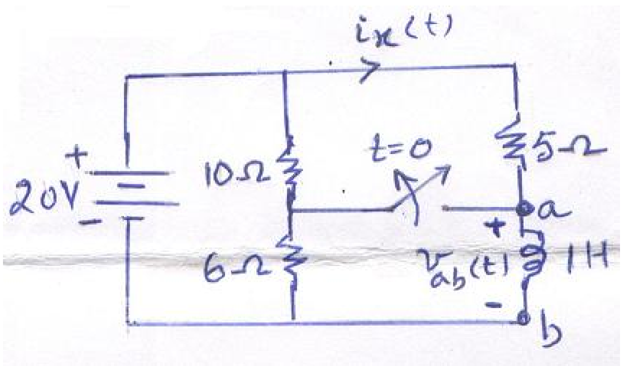
1. Explain the initial conditions in R, L and C in respect of transient analysis 3
2. Define the terms (a) Natural response (b) Forced response 3
3. Draw a neat sketch of the signal x (t) = u (-t+1) 3
4. State the initial value theorem of Laplace Transform 2
5. Draw the pole Zero plot of F(s) = $\frac{10s}{(s+3)(s+2)}$ 3
6. Given Z_{11} =4, Z_{12}=1, Z_{21}=3 and Z_{22}=3, find the transmission parameters 2
7. Define even symmetry and odd symmetry in fourier Series 3
8. If f(t) = 10 + 8 cost + 4 Cos 3t+2 Cos 5+ . . . . , what is the magnitude of the d.c. component? 1
9. Define the tern Network synthesis 2
10. How do you test whether a given polynomial is Hurwitz or not? 3

PART-B Marks: (50 Marks)

11. In the circuit shown the switch was closed for a long time and was opened at t=0 find the following

(i) V_{ab} (0-) (ii) i_x (0-) (iii) i_x (0+) (iv) V_{ab} (0+) (v) ix (t = ∞) (vi) V_{ab} (t = ∞)

(vii) i_x (t) for t > 0 10



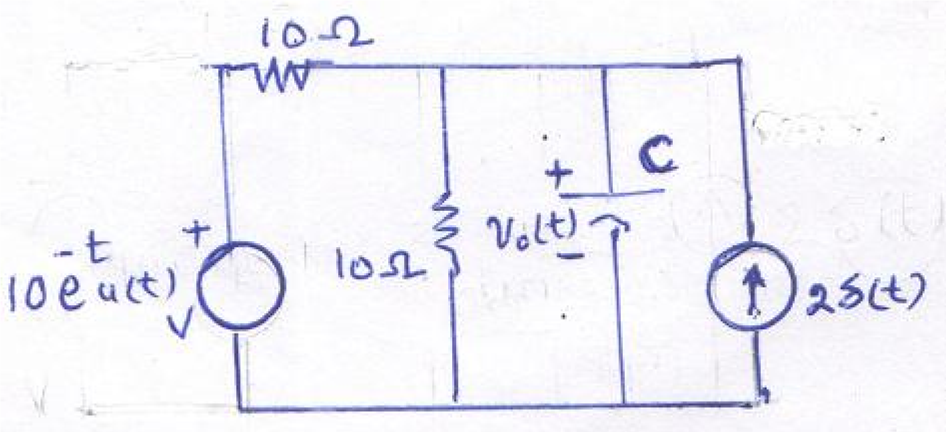
12. Find the Laplace transform of :-

a) f(t) =δ (t) + 2 u (t) – 3 e – 2t u (t) 5

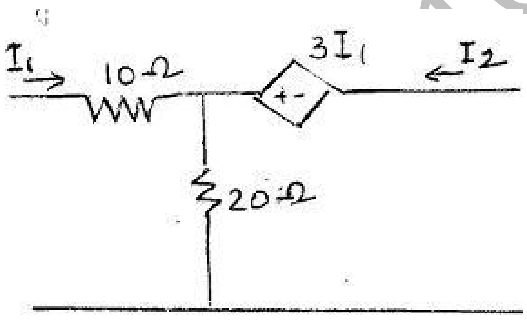
b) Find the inverse Laplace transform of

x (s) = $\frac{3s^2+8s+6}{(s+2)(s^2+2S+1)}$ 5

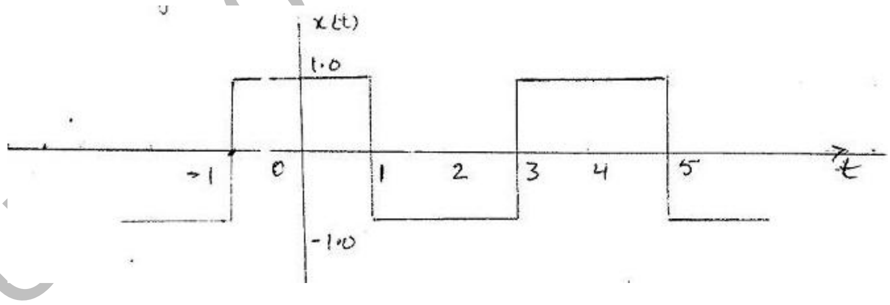
13. Using Laplace Transforms find V_0 (t), given $V_0(0)$ = 5V and C = 0.1 F 10



14. Find the transmission Parameters of the two – port network shown 10



15. Find the trigonometric fouries series 10



16. Check whether the following polynomials are Hurwitz or not

a) P(s) = $S^3 + 6s^2 + 11S + 6$ 5

b) P (s) = $S^5 + s^3 + s$ 5

17. a) The driving point impedance of an LC network is given by

$$Z(s) = \frac{10(s^2+4)(s^2+16)}{s(s^2+9)}$$ 10

Obtain the first form of Foster network

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Code No. 74

FACULTY OF ENGINEERING

B.E 2/4 (Inst.) II – Semester (Backlog) Examination, May / June 2018

Subject : Transducer Engineering

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

Note: Answer all questions from Part – A & Any five questions from Part – B.

Part – A (25 Marks)

1. What is the difference between static and dynamic characteristics of instruments 2
2. A transducer is connected to a measuring instrument having full scale deflection of 30V. If the meter reads 17.23V as against a true value of 20V, find the error and express the error as % fsd? 3
3. What are the types of strain gauges? 2
4. Explain the difference between peltier effect and Seebeck effect? 2
5. A certain sensor exhibiting first order sigmoidal response is subject to a sudden temperature change of 30^{o}C to 120^{o}C. If it has a time contant of 5 secs what temperature will be indicated by it after 5 secs? 3
6. Explain the principle of capacitive transducer for measurement of level? 2
7. What is a Hygrometer? 2
8. Write the expressions for quarter Bridge, half bridge and full bridge in strain measurements? (Only expressions) 3
9. Explain the principle for High Pressure Measurements? 3
10. Write the mathematical expressions for standard test signals used for performance analysis of systems? 3

PART-B Marks: (50 Marks)

11. Derive the response of first order system subjected to
    a) Step input b) Ramp input 10
    Explain the concept of time constant form the step resonse.
12. Derive the expression for gauge factor for metal wire gauges? What is the gauge factor range for semiconductor strain gauges? 10
13. With a neat diagram explain the generalized instrumentation system? Define also the dynamic characteristics of Instrumentation system? 10
14. Explain with neat diagram the working principle of Variable capacitive transducers in measurement and control applications? 10
15. What is a RTD? With a neat diagram explain platinum RTD? How is it different form Thermistor? 10
16. Write short notes on
    a) Diaphragms 5
    b) Vacuum measurements 5
17. Explain with neat diagrams LVDT and RVDT? 10

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CODE NO: 78

FACULTY OF ENGINEERING

B.E 2/4 (ECE) II-Semester (Backlog) Examination, May / June 2018

Subject: Probability Theory & Stochastic Processes

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

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

ART-A (25 Marks)

1. A and B alternately throw a pair of dice. A wins if he throws 6 before B throws 7, and B wins if he throws 7 before A throws 6. If A begins, find the probability of A winning the game. (3)
2. X and Y are random variables related by Y=3X+6, X is a zero mean random variable with variance 2. Find the variance of Y. (2)
3. What is a Random variable? Explain different types of Random variables. (3)
4. Determine whether the following function is a valid probability distribution function or not? Write the properties used. (3)

$$G_X(x) = \frac{x}{a}\left[u(x-a) - u(x-2a)\right]$$

5. What are Random Numbers and mention applications of random numbers? (3)
6. Define mean Ergodic process. (2)
7. Autocorrelation function of a stationary random process is $R_{XX}(^{2}) = 25 + \frac{4}{1+6^{2\ 2}}$. Find its variance. (3)
8. Express third order moments about mean of a random variable X in terms of lower order moments like mean, variance etc. (2)
9. If X and Y are independent, then show that E [XY] = E[X]*E[Y]. (2)
10. What is meant by stochastic convergence of probability? (2)

PART-B (50 Marks)

11. (a) State and prove Baye's Theorem. (4)

    (b) Two boxes B1 and B2 contain 100 and 200 light bulbs respectively. B1 and B2 have 15 and 5 defective bulbs respectively.

    (i) Suppose a box is selected at random and one bulb is picked out. What is the probability that it is defective?

    (ii) Suppose we test the bulb and it is found to be defective. What is the probability that it came from B1? (3+3)

12. Discuss the characteristics of Rayleigh, Nakagami-m, Beta, Gamma random variables using relevant expressions and sketches of their distribution and density functions. (10)

13 (a) In a sports event javelin throw distances are well approximated by a Gaussian distribution for which mean is 30m and standard deviation is 5m. In a qualifying round, contestants must throw farther than 27m to qualify. In the main event the record throw is 44m

(i) What is the probability of being disqualified in the first round?

(ii) In the main event what is the probability the record will be broken? (2+3)

(b) Obtain the characteristic function of Poisson random variable. (5)

14. Let X and Y are two random variables with joint Probability Mass Function

f(x,y) = , for x=1,2 ; y= 1,2

Find (i) correlation between X and Y (ii) Variance (X/Y=1) (5+5)

15. (a) Check whether the random process X(t)= A cos(ω_0t + θ) is WSS process or not, for A and ω_0 being constant and θ is uniformly distributed between (0,2π). (7)

(b) Write the properties of Autocorrelation function of a random process and prove any two of them. (3)

16. If X and Y are independent random variables and W=X+Y, where the densities of X and Y are assumed to be $f_X(x) = 4e^{-4x}u(x)$ and $f_Y(\mathrm{y}) = 5e^{-5y}u(\mathrm{y})$. Find the density function of W. (10)

17. A Gaussian random variable, for which $\overline{X}$ =0.6 and $\pm_X$ =0.8 is transformed to a new random variable by the transformation.

$$Y=T(X) = \begin{cases} 4 & 1.0 \le x \le \infty \\ 2 & 0 \le x \le 1.0 \\ -2 & -1.0 \le x < 0 \\ -4 & -\infty < x < -1.0 \end{cases}$$

(i) Find the density function of Y. (5)

(ii) Find the mean and variance of Y (2+3)

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Code No.89

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE/CSE) II – Semester (Backlog) Examination, May / June 2018

Subject : Mathematics - IV

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

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

PART – A (25 Marks)

1. Show that $\lim\limits_{z \to 0} \frac{\text{Im}(z)}{|z|}$ does not exist. (3)
2. State Cauchy's integral theorem. (2)
3. Find the zeros and singularities of $f(z) = \frac{z^2 - 1}{(z+4)^2 z^3}$ (3)
4. Find image of the line x= 1 under the transformation $W=\frac{1}{Z}$. (2)
5. Obtain the Z transform of the sequence $\{e^{in\theta}\}$. (3)
6. If $Z\{f_n\} = \frac{1}{z-2}$, find f_0 and f_1. (2)
7. Find the Fourier cosine transform of $f(x) = \begin{cases} \cos x & 0 < x < 1 \\ 0 & x > 1 \end{cases}$ (3)
8. Find the finite Fourier sine transform of f(x)=x, 0 < x < 2. (2)

9., Derive the Newton-Raphson iterative formula to find $N^{1/3}$ where N > 0 (3)

10. Find the approximate value of y(0.2) if $y' = x + y^2$, y(0) = 1 with h = 0.1 by using Euler's method. (2)

PART-'B'(50 Marks)

11. a) Determine the analytic function whose real partt is $y + e^x \cos y$. (5)

b) Evaluate $\oint_C \frac{\sin® \; z^2 + \cos® \; z^2}{(z-1)(z-2)}$ dz, where C : | z | = 3 using Cauchy's integral formula. (5)

12. a) Expand $f(z) = \frac{1}{(z-1)(z+3)}$ in the region 1 < | z | < 3. (5)

b) Find the bilinear transformation which maps the points z = 1, i, -1 into the points on to the points ω=0, 1, ∞. (5)

13.a) Find the Z transform of the sequence {n sinnθ}. (5)

b) Solve the difference equation $y_{n+2} - 3y_{n+1} + 2y_n = 0$, $y_0 = -1$, $y_1 = 2$ (5)

14.a) Find the Fourier transform of $f(x) = e^{\frac{-x^2}{2}}$. (5)

b) Show that $F_C\{x(fx)\} = \frac{d}{ds} F_s\{f(x)\}$ and hence find $F_C\{xe^{-x}\}$. (5)

15.a) Apply Lagrange's interpolation formula to find f(x) from the data given below : (5)

x:	0	1	2	3
y:	1	2	11	34

b) Using Runge-Kutta method of order 4, find the approximate value of y(0.1) if $y' = \frac{1}{x+y}, y(0) = 1.$ (5)

16. a) Derive Cauchy – Reimann equations in polar form. (5)

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{2 - \cos\theta}$ (5)

17. a) Find $Z^{-1}\left\{\frac{z^2 - z}{(z+1)(z+2)(z+3)}\right\}$ (5)

b) Find a root of the equation $e^x = 3^x$ correct to two decimal places using bisection method. (5)

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Code No.93

FACULTY OF INFORMATICS

B.E. 2/4 (I.T.) II Sem. (Backlog) Examination, May / June 2018

Subject : Probability and Random Processes.

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

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

PART – A (25 Marks)

1. State the generalized form of Bernoulli theorem. 2
2. State Addition theorem for n events. 2
3. Define Cumulative Distribution Function (CDF) of a random variable X. State its properties. 3
4. If A, B and C are any three events such that :
   $P(A) = P(B)=P(C)=1/4$,
   $P(A)\cap B)=P(\cap C)=0$ and
   $P(A\cap C)=1/8$
   Find the probability that at least one of the events A, B, C occurs. 3
5. What is Joint Characteristic Functions' and what is its use 3
6. A coin is tossed 1000 times, Find the probability of getting 520 heads. 2
7. Show that Covariance of two independent random variables is 0. 2
8. If X, Y are random variables and a, b are constants then prove that
   $Var(aX-bY)= a^2Var(X) +b^2 Var(Y) – 2ab, Cov(X,Y)$. 3
9. Define Gaussian process. 2
10. Write any three properties of Power Spectral density of a stationary process. 3

PART-'B'(50 Marks)

11. a) Two players A and B draws balls one at a time alternatively from a box containing m white balls and n black balls. Suppose the player who picks the first white ball wins the game, what is the probability the player who starts the game will win ? 5

    b) State and prove Bayes theorem. 5

12. a) The Probability Density Function (PDF) of a continuous random Variable X that can take values between X=2 and X=5 is given by $f(x)=k(1+x^2)$.
    Find : i) k ii) Mean iii) Variance iv) $P(X<4)$
    v) $P(X>3)$ vi) $P(3<X<4)$ 10

13. Let X and Y are two continuous random variables with joint density function $f(x,y)= 4xy;0<x<1\&0<y<1$ and $f(x,y)=0$; elsewhere.
    Find : i) Var (X) ii) Var (Y) iii) Cov(X,Y)
    vi) $P(X<1/2)$ v) $P(Y>1/4)$ vi) $P(X<1/2, Y>1/4)$ 10

14. a) Define stationary process. What are the necessary and Sufficient conditions for a process to be stationary ? 10 3

    b) Let X(t) = A cos wt + B sin wt, Y(t) = B cos t – A sin wt where A and B are random variables, w is constant, show that X(t) and Y(t) are wide sense stationary stationary if A and B are uncorrelated, with zero mean and same variance. 7

Contd…..2

15. State and prove Wiener-Kintchine theorem. 10

16. a) Explain conditional probability. 3
    b) A discrete random variable has the following probability distribution.

x	1	2	3	4	5	6
P(X=x)	K	3k	5k	7k	9k	11k

Find : i) K ii) Mean iii) Variance iv) $P(1<X<5)$ v) $P(X>3)$ 7

17. a) If X, Y are two independent exponential random variables with common parameter,
    1. Find density function of U such that $U=X+Y$ 5
    b) Explain the properties of Power spectral density. 5

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