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10AL51

# Fifth Semester B.E. Degree Examination, June/July 2019
## Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO questions from each part.***



### PART – A

1 a. Define term 'Management'? Explain its functions. **(05 Marks)**
b. List various contributions made by F.W. Taylor in the field of scientific management. **(05 Marks)**
c. List and explain "Roles of Manger"? **(10 Marks)**

2 a. List importance and purpose of planning process. **(05 Marks)**
b. Distinguish between strategic planning and tactical planning. **(05 Marks)**
c. Explain various steps involved in planning. **(10 Marks)**

3 a. What is 'Span of Management'? Explain various factors governing it. **(10 Marks)**
b. List and explain various principles of organization. **(10 Marks)**

4 a. What is meant by 'co-ordination', and explain requirements for excellent co-ordination. **(10 Marks)**
b. Explain by listing 'essentials of effective control system'. **(10 Marks)**

### PART – B

5 a. List and explain various characteristics of an Entrepreneur. **(10 Marks)**
b. What are the roles of an entrepreneur in Economic development? **(10 Marks)**

6 a. Explain various steps involved in starting a 'small scale industry'. **(10 Marks)**
b. Explain how Govt. of India supported SSI through its five year plan. **(10 Marks)**

7 a. Under what context DIC's were established and what are the assistances it extends to SSI's. **(10 Marks)**
b. How TECSOK assist to start up and existing units and what assignment it undertakes. **(10 Marks)**

8 a. What is project Report and its significance? **(05 Marks)**
b. List Technical Analysis in project feasibility study. **(05 Marks)**
c. On what factors a project report to start an SSI is prepared, briefly explain. **(10 Marks)**

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10EE52

# Fifth Semester B.E. Degree Examination, June/July 2019
# Signals and Systems

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO questions from each part.***



## PART – A

1 a. Explain the following :
   i) Deterministic and random signals
   ii) Energy and power signals. **(10 Marks)**

b. Prove that if x(a) is an odd signal, then

$$\sum_{n=-\infty}^{\infty} x(a) = 0$$ **(05 Marks)**

c. Verify whether the system $y(t) = e^{x(t)}$ is time invariant, linear, memory, stable and causal. **(05 Marks)**

2 a. The impulse response h(n) of a discrete time LTI system is given by $h(n) = \{1, \underset{\uparrow}{3}, 2, -1, 1\}$ and the input $x(a) = u(n) - u(n-3)$. Determine the system output y(n). Sketch y(n) Vs n. Also, verify results of convolution. **(05 Marks)**

b. For a discrete LTI system, the input. $x(n) = \alpha^n$, u(n) and h(n) = u(n). Calculate and plot the output signal y(a). **(10 Marks)**

c. Show that convolution satisfies distributive property. **(05 Marks)**

3 a. Consider a LTI system with unit impulse response $h(t) = e^{-t}$, u(t) and the input $x(t) = e^{-3t}\{u(t) - u(t-2)\}$. Determine the output y(t) and draw y(t) vs t. **(10 Marks)**

b. Determine the complete response of system described by the difference equation. :

$$y(n) - \frac{1}{9}y(n-2) = x(n-1)$$

if $y(-1) = 1$, $y(-2) = 0$ and $x(n) = u(n)$.
Use the conventional method. **(10 Marks)**

4 a. With respect to DTFS, state and prove the following properties :
i) Convolution ii) Modulation. **(10 Marks)**

b. Determine the Fourier series representation for the signal $x(t) = \text{Cos } 4t + \text{Sin } 8t$. **(05 Marks)**

c. The periodic signal x(t) is given by $e^{-t}$ and period T = 2 seconds. Determine the Fourier coefficients for $-1 \le t \le 1$. **(05 Marks)**

## PART – B

5 a. State and prove Parseval's theorem as applied to Fourier Transform. **(05 Marks)**

b. Calculate the Fourier transform of $x(t) = e^{-a|t|}$, were $a > 0$. Draw its spectrum. **(05 Marks)**

c. Determine the signal x(n) if

$$x(jw) = \frac{5jw + 12}{(jw)^2 + 5jw + 6}.$$ **(05 Marks)**

d. Calculate the Fourier transform if

$x(t) = \sum_{k=0}^{\infty} \alpha^k \ \delta(t - KT)$ where $|\alpha| <|$ **(05 Marks)**

6 a. Determine the DTFT of following :

i) $x(n) = 2^n \cdot u(-n)$

ii) $x(n) = \left(\frac{1}{4}\right)^n \cdot u(n+4)$ **(10 Marks)**

b. The impulse response of a continuous time LTI system is given by

$h(t) = \frac{1}{RC} \cdot e^{-t/RC} \cdot u(t)$.

Determine the frequency response and draw its magnitude and phase response. **(10 Marks)**

7 a. Determine the z – transform of

i) $x(n) = -u(-n-1) + \left(\frac{1}{2}\right)^n \cdot u(n)$

ii) $x(n) = \alpha^{|n|}$

Specify its ROC. **(10 Marks)**

b. Using appropriate properties, determine z-transform of

$x(n) = n^2 \left(\frac{1}{2}\right)^n u(n-3)$. What is its ROC? **(10 Marks)**

8 a. Determine the inverse z-transform for

$$x(z) = \frac{z^3 + z^2 + \frac{3}{2z} + \frac{1}{2}}{z^3 + \frac{3}{2}z^2 + \frac{1}{2z}}$$

If ROC : $|z| < \frac{1}{2}$, use partial fraction expansion method. **(10 Marks)**

b. Determine the impulse response h(n) for a causal LTI system if the input $x(n) = \left(\frac{1}{2}\right)^n u(n) - \frac{1}{4}\left(\frac{1}{2}\right)^{n-1} \cdot u(n-1)$ and its output $y(n) = \left(\frac{1}{3}\right)^n u(n)$. Use z- transform approach. **(05 Marks)**

c. Determine the unilateral z-transform for $y(n) = x(n-2)$, if $x(n) = \alpha^n$. **(05 Marks)**

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10EE53

# Fifth Semester B.E. Degree Examination, June/July 2019
# Transmission and Distribution

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO questions from each part.***



## PART – A

1 a. With the help of circuit diagram, explain the following :
   (i) Feeder
   (ii) Distributor
   (iii) Service Mains. **(06 Marks)**

b. With the help of single line diagram, explain power system scheme and indicate standard voltages. **(06 Marks)**

c. Show that increase in transmission voltage of a transmission line results in
   (i) Increased efficiency
   (ii) Reduced weight of conductor
   (iii) Reduced line drop. **(08 Marks)**

2 a. Define Sag. Mention the factors affecting the Sag. **(04 Marks)**

b. Derive an expression for Sag in freely suspended conductor when the supports are at equal level. **(08 Marks)**

c. The towers of height 30m, and 90m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500m. If the tension in the conductor is 1600kg, calculate the minimum clearance of the conductor and water, weight of the conductor is 1.5 kg/m Bases of towers can be considered to be at water level. **(08 Marks)**

3 a. Why Insulators are used with overhead lines? Discuss the desirable properties of insulators and name the types of insulators. **(07 Marks)**

b. A string of 5 insulators is connected across a 100kV line. If the capacitance of each disc to earth is 0.1 times of the capacitance of the insulator, calculate :
   (i) the distribution of voltage on the insulator discs
   (ii) string efficiency. **(08 Marks)**

c. Write a short note on testing of insulators. **(05 Marks)**

4 a. State and explain factors affecting corona and corona loss. **(08 Marks)**

b. What is grading of cables? Briefly explain various methods of grading. **(08 Marks)**

c. A concentric cable has a core diameter of 0.8cm. The sheath diameter is 3.2cn. If the cable is testing with a voltage of 33kV, calculate the minimum and maximum stress in the insulation. **(04 Marks)**

## PART – B

5 a. Obtain an expression for inductance of three – phase transmission line with unsymmetrical spacing between conductors. **(10 Marks)**

b. Fig Q5(b) shows the spacing of a double circuit 3-phase over head line. The phase sequence is ABC and the line is completely transposed. The conductor radius is 1.3cm; Find the inductance per phase per km.

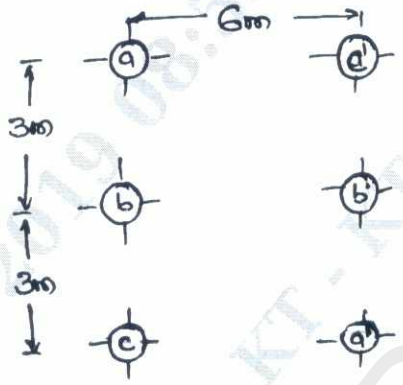


Fig Q5(b) **(10 Marks)**

6 a. Derive an expression for capacitance per phase of three phase double circuit with unsymmetrical spacing transposed. **(08 Marks)**

b. Find the capacitance of a single phase line 40km long consisting of two parallel wires each 5mm dia and 1.5m apart. Determine the capacitance of the line taking into account the effect of ground. The height of conductors above the ground is 7m. **(06 Marks)**

c. Explain the terms self GMD and mutual GMD. **(06 Marks)**

7 a. Derive an expression for transmission efficiency and voltage regulation for medium transmission line using nominal – T method. Draw relevant phasor diagram. **(08 Marks)**

b. A 3-phase, 50Hz, 100km long transmission line has following line constants :

Resistance/ph/km = 0.1Ω, Reactance/ph/km = 0.5Ω , Suspectance/ph/km = $10 \times 10^{-6}$ ℧.

If the line supplies the load of 20MW at 0.9p.f lagging at 66kV at the receiving end, using nominal π method calculate :

(i) Sending end p.f (ii) Regulation and (iii) transmission efficiency. **(12 Marks)**

8 a. Explain with diagram different types of DC distribution and mention their merit and demerits. **(10 Marks)**

b. A DC 2-wire distributor AB is 500m long and is fed at both ends at 240V. The distributor is loaded as shown in Fig Q8(b). The resistance of the distributor (go and return) is 0.001Ω per meter. Calculate :

i) The point of minimum voltage

ii) Value of this voltage.

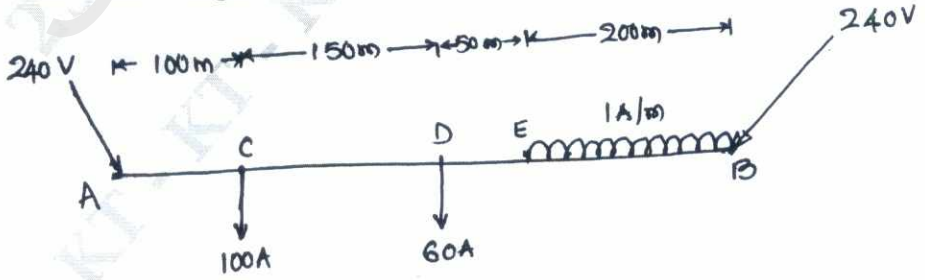


Fig Q8(b) **(10 Marks)**

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10EE54

# Fifth Semester B.E. Degree Examination, June/July 2019
## D.C Machines and Synchronous Machines

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO questions from each part.***



### PART – A

1 a. What is critical resistance? Explain the method to determine it. **(06 Marks)**

b. With the help of figures, explain the reaction in a phenomenon of armature reaction in D.C machine. **(08 Marks)**

c. An 8 pole wave wound d.c. generator has 480 Armature conductor. The armature current is 200A. Find the armature reaction demagnetizing ampere turns per pole if
   i) Brushes are on G.N.A and
   ii) Brushes are shifted 6° electrical from G.N.A. **(06 Marks)**

2 a. Explain the methods of speed control as applied to i) D.C shunt motor ii) D.C series motor. **(12 Marks)**

b. A 230C, d.c shunt motor runs at 800rpm and takes armature current of 50A. Find resistance to be added to the field circuit to increase speed from 800rpm to 1000 rpm at an armature current of 80A. Assume flux proportional to field current armature resistance = 0.15Ω and field resistance = 250Ω. **(08 Marks)**

3 a. Derive torque equation of a D.C motor and discuss T versus $I_a$ and N versus $I_a$ characteristics of D.C series and shunt motors. **(10 Marks)**

b. With a neat circuit diagram, explain the importance and procedure of conducting Swinburne test on d.c motor. List the advantages of this test. Show how the efficiency as
   i) Motor and
   ii) Generator can be predetermined. **(10 Marks)**

4 a. Explain back to back test of two identical D.C machines. Derive the expressions for efficiency of the machines as generator and motor. Mention the advantages of this test over the other tests. **(12 Marks)**

b. A test in two coupled similar tramway motors, with their fields connected in series gave the following results, when one machine actual as a motor and other as generator.

| | | | | |
|---|---|---|---|---|
| Motor | - | Armature current | = | 56A |
| | | Applied voltage across motor terminals | = | 590 volts |
| | | Voltage drop across filed winding | = | 40V |
| Generator | - | Armature current | = | 44A |
| | | Armature voltage | = | 400V |
| | | Filed voltage drop | = | 40V |
| Resistance of each armature | | | = | 0.3 Ω |

Calculate the efficiency of motor and generator at this load. **(08 Marks)**

## PART – B

5 a. Mention the advantages of revolving field and stationery armature type alternators. **(04 Marks)**

b. With usual notations, derive the EMF equation of an alternator with distributed and short pitched windings. **(06 Marks)**

c. A synchronous generator runs at 250 RPM and generates at 50Hz. There are 216 slots each containing 5 conductors arranged in full pitched winding for 3 phase star connection. All conductors each phase are in series and the flux per pole is 30 milli wb sinusoidally distributed. Find the induced emf (line value). Find the KVA rating of the alternator when rated current is 100A. **(10 Marks)**

6 a. What are the different methods to predetermine mining voltage regulation of an alternator. Explain any one method in detail. **(10 Marks)**

b. A 3 phase 6000V alternator has the following O.C.C at normal speed

| Filed amp | 14 | 18 | 23 | 30 | 43 |
|---|---|---|---|---|---|
| Line voltage | 4000 | 5000 | 6000 | 7000 | 8000 |

With armature short circuited and full load current following field current is 17A and when the machine is supplying full load of 200KVA at zero power factors, the field current is 42.5A and the terminal voltage is 6000V. Determine the field current required when the machine is supplying full load 0.8 p.f lag by ZPF method. **(10 Marks)**

7 a. With a neat circuit diagram explain how an alternator in synchronized with bus bars. **(06 Marks)**

b. Two 3$\phi$ synchronous generators operate in parallel on the same load. Determine the KW output and power factor of each machine under the following conditions synchronous impedance of each generator = 0.2 + J2$\Omega$/phase.
Induced emf per phase 2000 + J0 volts.
For machine 1and 2200 + J100 for machine 2. **(10 Marks)**

c. Explain hunting in synchronous motors. **(04 Marks)**

8 a. Explain the slip test on salient pole synchronous machines with a neat circuit diagram and indicate how $X_d$ and $X_q$ can be determined from the test. **(10 Marks)**

b. A 3.5 MVA, slow speed, 3 phase synchronous generator rated at 6.6kV has 32 poles. Its direct and quadrature axies synchronous reactances are 9.6$\Omega$ and 6$\Omega$ respectively. Neglecting armature resistance, determine the regulation and excitation emf needed to maintain 6.6kV at the terminals when supplying a load of 2.5 mW at 0.8 p.f lagging. What maximum power can generator supply at the rated terminal voltage if the field becomes open circuited. **(10 Marks)**

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10EE55

# Fifth Semester B.E. Degree Examination, June/July 2019
## Modern Control Theory

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, selecting at least TWO full questions from each part.***



### PART – A

1 a. Compare Modern Control Theory and conventional control theory. **(06 Marks)**

b. Obtain the state model for the system represented by Fig.Q.1(b) by selecting appropriate state variables. **(06 Marks)**

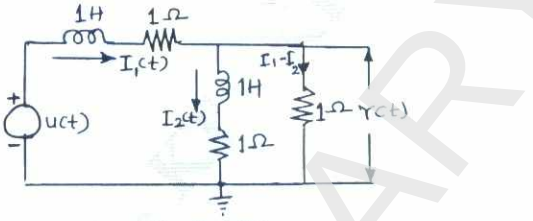


Fig.Q.1(b)

c. Obtain the state model using phase variables for the system described by $\frac{d^3y(t)}{dt^3}+8\frac{d^2y(t)}{dt^2}+14\frac{dy(t)}{dt}+4y(t)=10u(t)$. Draw state diagram also. **(08 Marks)**

2 a. Obtain the state model of the system given in Fig.Q.2(a) selecting displacements as output. **(07 Marks)**

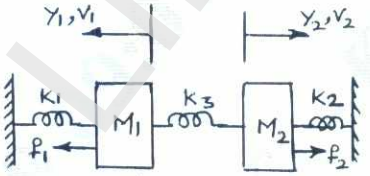


Fig.Q.2(a)

b. Obtain the state model in diagonal form for the system represented by transfer function $G(s)=\frac{s^2+6s+8}{s^2+4s+3}$. Also draw the block diagram. **(08 Marks)**

c. Derive an expression to find transfer function from the given state model. **(05 Marks)**

3 a. Obtain the transfer function of the system represented by state equation and output equation as

$\dot{x}_1=-5x_1-x_2+24$

$\dot{x}_2=3x_1-x_2+54$

$y=x_1+2x_2$ **(06 Marks)**

b. Find the transformation matrix 'M' that transforms the matrix

$A=\begin{bmatrix}4 & 1 & -2\\ 1 & 0 & 2\\ 1 & -1 & 3\end{bmatrix}$ into diagonal or Jordan form. **(10 Marks)**

c. Write in brief about generalized eigen vectors. **(04 Marks)**

4 a. Given $A_1 = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$ $A_2 = \begin{bmatrix} 0 & 3 \\ -3 & 0 \end{bmatrix}$ and $A = \begin{bmatrix} 2 & 3 \\ -3 & 2 \end{bmatrix}$. If $A_1 A_2 = A_2 A_1$, prove $e^{A_1 t} \times e^{A_2 t} = e^{At}$. **(08 Marks)**

b. Compute $e^{At}$ for the system represented as $\dot{x} = AX$, where $A = \begin{bmatrix} 0 & 2 \\ -2 & -4 \end{bmatrix}$ by Caley Hamilton method. **(06 Marks)**

c. Test observability and controllability for the system represented by

$$\dot{x} = \begin{bmatrix} -1 & -2 & -2 \\ 0 & -1 & 1 \\ 1 & 0 & -1 \end{bmatrix} x + \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} u \; ; \; y = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix} x .$$ **(06 Marks)**

## PART – B

5 a. Draw the block diagram of Leunberger observer and write the state equations in estimated states. **(05 Marks)**

b. Consider the system represented by $\dot{x} = Ax + Bu$; where $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 2 \end{bmatrix}$. It is desired to place the eigen values at S = -3 and S = -5 by using state feed back control u = -KX. Determine the gain matrix K by using Ackerman's formula. **(08 Marks)**

c. A system described by $\dot{x} = Ax$; and y = Cx where $A = \begin{bmatrix} -1 & 1 \\ 1 & 2 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 0 \end{bmatrix}$. Design full order observer to have the eigen values of an observer at (-5 + j5) and (-5 - j5) by direct substitution method. **(07 Marks)**

6 a. Write a note on PID controllers. **(05 Marks)**

b. Explain the properties of non linear systems. **(05 Marks)**

c. Explain the common physical non linearities with their input-output characteristics. **(10 Marks)**

7 a. Explain the construction of phase trajectory by isoclines method for a second order system. **(08 Marks)**

b. Find out the singular points for the following:
i) $\ddot{Y} + 3\dot{Y} - 10Y = 0$ ii) $\ddot{Y} + 3\dot{Y} + 2Y = 0$ **(08 Marks)**

c. Write a note on limit cycles. **(04 Marks)**

8 a. Explain : i) Stability ii) Asymptotic stability iii) Asymptotic stability in large and iv) Instability with respect to Lyapunov stability theorem. **(08 Marks)**

b. Check the negative definiteness of the quadratic equation
$Q = -x_1^2 - 3x_2^2 - 11x_3^2 + 2x_1x_2 - 4x_2x_3 - 2x_1x_3$. **(04 Marks)**

c. Determine the stability of the origin of the following system:
$\dot{x}_1 = x_1 - x_2 - x_1^3$
$\dot{x}_2 = x_1 + x_2 - x_2^3$ **(08 Marks)**

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10EE56

# Fifth Semester B.E. Degree Examination, June/July 2019
## Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

**Note:** *1. Answer any FIVE full questions, selecting at least TWO full questions from each part.*
*2. Standard resistance and capacitance data table may be used.*



### PART – A

1 a. Give the circuit and design steps for
i) Capacitor coupled voltage follower.
ii) High zin capacitor coupled voltage follower. **(08 Marks)**

b. Design the following circuits with $f_l = 100H_3$, $R_L = 3.8K\Omega$, gain = 10 and output = 5V p-p.
i) Capacitor coupled inverting amplifier
ii) Capacitor coupled non-inverting amplifier. **(12 Marks)**

2 a. Give the need for frequency compensation. **(04 Marks)**

b. Define phase-margin and explain how phase-lead compensation circuit helps to improve the same. **(06 Marks)**

c. i) Draw the graph of open-loop frequency response of Op-Amp and mark $A_{OL}$, UGB and open-loop bandwidth (Typical values of 741).
ii) Derive equation to calculate maximum peak output and maximum frequency of operation for a given slew-rate.
iii) Find the max frequency for 741-op-amp with 5V output [Assume SR = 0.5V/μsec]. **(10 Marks)**

3 a. With the help of a neat circuit diagram and waveforms, explain the working of peak clipper. **(06 Marks)**

b. Explain the working of a sample-hold circuit. **(06 Marks)**

c. Describe the operation of R-2R DAC. **(08 Marks)**

4 a. Give the design steps for inverting Schmitt trigger circuit with variable UTP and LTP. **(08 Marks)**

b. Design an astable multivibrator using op-amp to produce ±1kHz and ±9V output. **(06 Marks)**

c. Draw the circuit of monostable circuit using op-amp with relevant waveforms, briefly give the working. **(06 Marks)**

### PART – B

5 a. Explain the working of op-amp RC phase-shift oscillator. **(06 Marks)**

b. Design a Weinbridge oscillator using BIFET op-amp for output frequency of 10Hz with ±12V. **(06 Marks)**

c. Give the working of a triangular/square wave generator. **(08 Marks)**

6 a. Write the circuit and design procedure for second order lowpass and highpass active filters. Draw the expected frequency-response. **(10 Marks)**

b. Design single stage band pass-filter with cutoff frequencies 300Hz and 3kHz. **(05 Marks)**

c. Explain how a bandstop filter is designed using a lowpass filter and a highpass filter. **(05 Marks)**

7 a. Define the terms line regulation and load regulation. **(04 Marks)**

b. With the help of block diagram, explain the PLL operation. **(08 Marks)**

c. Briefly explain the operation of op-amp series voltage regulator. **(08 Marks)**

8 a. Explain how a 723 IC can be used as low voltage regulator and high voltage regulator. **(12 Marks)**

b. A LM 317 regulator is to provide a 6V output from a 15V supply. The load current is 200mA. Determine suitable resistance values for $R_1$ and $R_2$ and calculate regulator power dissipation. **(08 Marks)**

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